Chapter 7
Response to Comments

SCH# 2013081079

Volume 1A, Appendix A

REVISIONS to Title 19 – KERN COUNTY ZONING ORDINANCE – 2025(A), Focused on Oil and Gas Local Permitting

Kern County Planning and Natural Resources Department
2700 M Street, Suite 100
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May 2025

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EARTHJUSTICE

May 1, 2025

VIA FEDERAL EXPRESS MAIL

Kern County Planning and Natural Resources Department
Attn: Keith Alvidrez, Planner II
2700 "M" Street, Suite 100
Bakersfield, CA 93301

Re: ***Supporting Materials for Comments on the Draft Second Supplemental Recirculated Environmental Impact Report for Revisions to Title 19-Kern County Zoning Ordinance (2025-A) Focused on Oil and Gas Local Permitting (SCH # 2013081079)***

Enclosed please find a thumb drive of materials submitted on behalf of Center for Biological Diversity, Center on Race, Poverty & the Environment, Comité Progreso de Lamont, Committee for a Better Arvin, Committee for a Better Shafter, Earthjustice, Natural Resources Defense Council, and Sierra Club.

The enclosed drive is submitted in support of the comment letter that, on behalf of the above-listed groups, I emailed to Keith Alvidrez (AlvidrezK@kerncounty.com) and the Planning and Natural Resources Department (planning@kerncounty.com; OG-SSREIRComments@kerncounty.com) on April 28, 2025.

The enclosed drive includes a list of key references cited in the comment letter dated April 28, 2025, along with the references themselves. These documents should be considered and included in the county's administrative record for this matter. Note that we are only submitting newly cited references; we are not submitting duplicates of references that we have submitted previously or materials that are in the administrative record already.

Some of the documents may be subject to copyright protection; the Kern County Planning and Natural Resources Department may use them fairly but should be judicious about public dissemination.

Please feel free to contact me should you have any questions or concerns.

Sincerely,

Colin C. O'Brien

Deputy Managing Attorney
Earthjustice
180 Steuart St. #194330
San Francisco, CA 94105
cobrien@earthjustice.org

LIST OF SUPPORTING MATERIALS SUBMITTED

The documents listed below are submitted on the enclosed thumb drive, in support of the April 28, 2025 comment letter regarding the Draft Second Supplemental Recirculated Environmental Impact Report for Revisions to Title 19-Kern County Zoning Ordinance (2025-A) Focused on Oil and Gas Local Permitting (SCH # 2013081079) Center for Biological Diversity, Center on Race, Poverty & the Environment, Comité Progreso de Lamont, Committee for a Better Arvin, Committee for a Better Shafter, Earthjustice, Natural Resources Defense Council, and Sierra Club. These materials should be considered by the Kern County Planning and Natural Resources Department and included in the administrative record for the project.

For ease of reference, each supporting document is only listed once, under the comment section heading within which it is first cited.

NOTE: Some of the documents may be subject to copyright protection; the Kern County Planning and Natural Resources Department may use them fairly but the Department should be judicious about public dissemination.

III. The Draft SSREIR's analysis and mitigation of air quality impacts is inadequate.

American Lung Association, *State of the Air 2025 Report*

EPA, *Reconsideration of the National Ambient Air Quality Standards for Particulate Matter*, 89 Fed. Reg. 16202 (Mar. 6, 2024)

EPA, *Clean Air Plans; Contingency Measures for the Fine Particulate Matter Standards; San Joaquin Valley, California*, 88 Fed. Reg. 87988, 88000 (Dec. 20, 2023)

Kern County Public Health Department, *Valley Fever, It's in the Air, Beware* (undated)

Michael Patterson, *Valley Fever cases and deaths reach record-high in 2024, Kern Co. Public Health data shows*, Bakersfield Now (Apr. 3, 2025)

Kern County Planning & Natural Resources Dept., *Recirculated Draft Environmental Impact Report for 99 Houghton Industrial Park Project* (Oct. 2019)

Kern County Planning & Natural Resources Dept., *Draft Environmental Impact Report for the IPG Industrial Project* (Mar. 2025)

IV. The Draft SSREIR's analysis and mitigation of water supply impacts is inadequate.

State Water Board, *Frequently Asked Questions on Mandatory Consolidation or Extension of Service for Water Systems*

Kristin Dobbin, Justin McBride, and Gregory Pierce, *Designing Water System Consolidation Projects: Considerations for California Communities* (Oct. 2022)

State Water Resources Control Bd., *Mandatory Consolidation: Community and Program Info* (last visited Apr. 24, 2025)

Peter Segall, *City Moves Forward With Proposed Sewer, Water Rate Increases*, Bakersfield Californian (Mar. 27, 2025)

Letter from Tien Tran et al., Community Water Center, Clean Water Action, Leadership Counsel for Justice and Accountability, and Central California Environmental Justice Network Recommendations for Kern Subbasin Mitigation Program (Dec. 18, 2024)

V. The Draft SSREIR fails to adequately analyze harm to certain species and does not adopt adequate mitigation.

Rose JP, Camp SM, Pascetto ZN, Johnson CB, Lei SH, Napolitano GR, Schoenig EJ, Macias DA, Jordan AC, Halstead BJ. 2024, *Digging into detectability: uncovering how temperature influences detection probability of the fossorial Temblor legless lizard*, Journal of Fish and Wildlife Management 15(1):237–250; e1944-687X

Center for Biological Diversity, *Petition to List the Temblor Legless Lizard (Anniella Alexanderae) as an Endangered or Threatened Species Under the California Endangered Species Act (CESA)* (Nov. 18, 2021)

CDFW, *Evaluation of the Petition from the Center for Biological Diversity to List the Temblor Legless Lizard (Anniella Alexanderae) as Threatened or Endangered Under the California Endangered Species Act* (Mar. 22, 2022)

CDFW, *Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species* (June 6, 2023)

CDFW, *Vallejo Mill Historical Park Pickleball Courts and Dog Park Project, Mitigated Negative Declaration, SCH No. 2025030735, City of Fremont, Alameda County* (Apr. 16, 2025)

Gonzalez, David J.X. et al., *Upstream oil and gas production and ambient air pollution in California,* 806 Science of the Total Environment 150298 (2022)

Vanderplanck, M. et al., *Ozone pollution alters olfaction and behavior of pollinators*, 10 Antioxidants 636 (2021)

Ryalls, J.M.W. et al., *Anthropogenic air pollutants reduce insect mediated pollination services*, 297 Environmental Pollution 118847 (2022)

Ryalls, J.M.W. et al., *Air pollution disproportionately impairs beneficial invertebrates: a meta-analysis*, 15 Nature Communications 5447 (2024)

VI. The County must consider changed circumstances and new information pertaining to other environmental impacts.

Global Newswire, *Kern County Board of Supervisors Advance CRC's Carbon TerraVault I Project* (Oct. 21, 2024)

Kern County Planning and Natural Resources Department, *Planning Commission Staff Report Addendum* (Oct. 10, 2024)

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SECTION III

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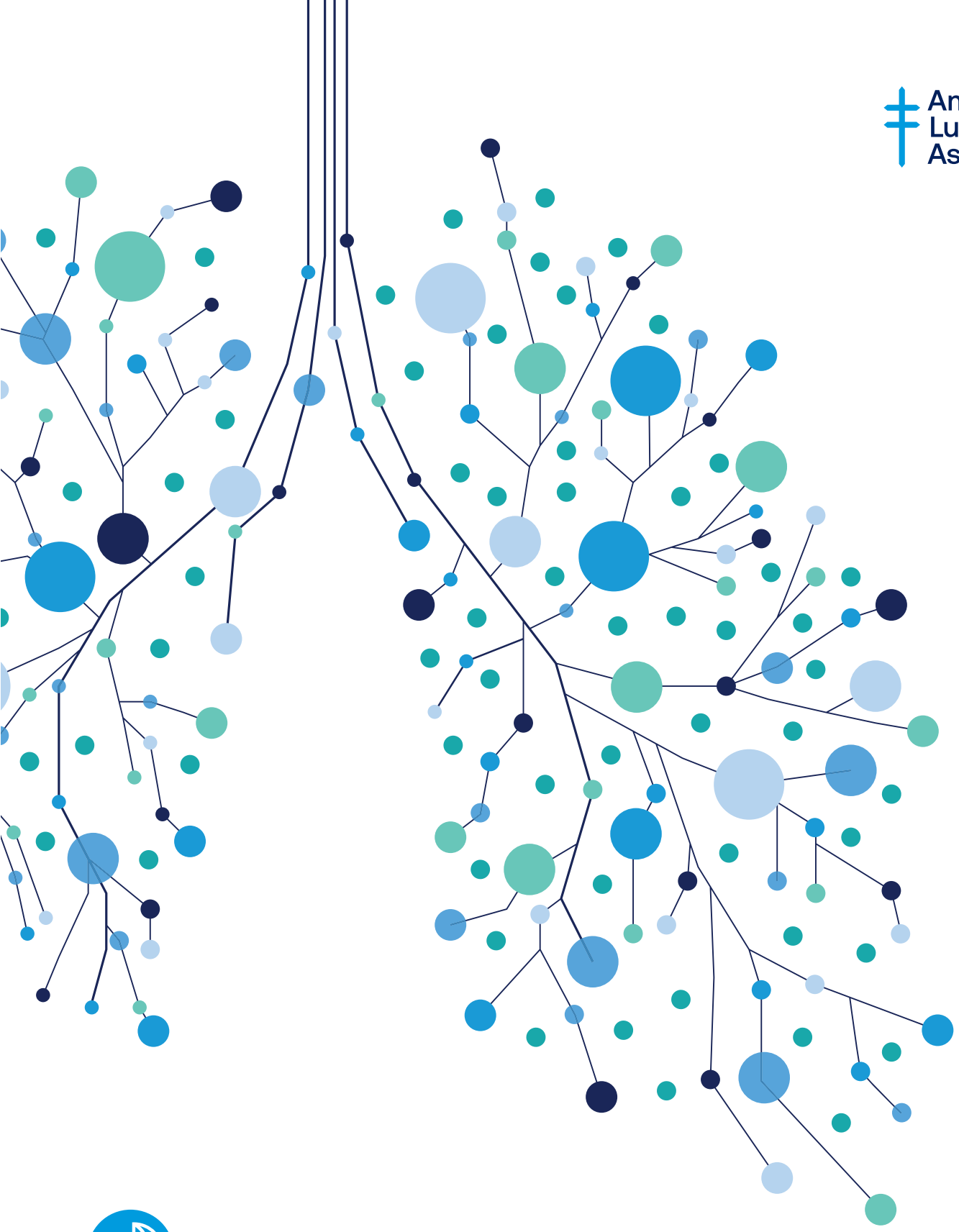
American Lung Association.



State of the Air

2025 Report

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Acknowledgments

The American Lung Association "State of the Air" 2025 is the result of the hard work of many.

We would like to thank Allen S. Lefohn, Ph.D., of A.S.L. and Associates, who compiled the data, and John Balmes, M.D., who served as expert volunteer reviewer for the health impacts section. Special thanks this year goes to the air quality professionals who agreed to share stories about how the work they do makes a difference.

Great appreciation goes to the National Association of Clean Air Agencies, who strove to make this report better through comments, review and concerns. Many of its members reviewed and commented on their state data to verify their accuracy. We also appreciate the assistance of members of the Association of Air Pollution Control Agencies, some of whom also reviewed data from their states. We appreciate them all as our partners in the fight against air pollution. The results in this report should in no way be construed as a comment on the work any of these agencies do.

"State of the Air" 2025 would not have been possible but for the first twenty formative years of inspiration, dedication and hard work of the late Janice E. Nolen. Her spirit still guides us all.

The American Lung Association assumes sole responsibility for the content of "State of the Air" 2025.

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Why "State of the Air"?

The Clean Air Act requires the U.S. Environmental Protection Agency (EPA) to set health-based limits, called National Ambient Air Quality Standards (NAAQS), for six dangerous outdoor air pollutants: particulate matter, ozone, nitrogen dioxide, sulfur dioxide, carbon monoxide and lead. "State of the Air" looks at two of the most widespread and dangerous pollutants from this group, fine particulate matter and ozone.

The NAAQS identify what is considered a safe level of each pollutant to breathe, based on the most recent health and medical science, including an adequate margin of safety for those most at risk. These standards require states and local governments to take steps to reduce emissions to attain the standards. The standards also serve to alert families with children, seniors, individuals with lung or heart conditions, and others about dangerous air pollution levels through color-coded air quality alerts. This enables them to take necessary precautions to minimize their exposure. Under the Clean Air Act, the standards must be based solely on what is needed to protect health and must be periodically updated as the science evolves.

Setting national health-based standards and requiring states that violate the standards to enact plans to clean up their air pollution problems have been a great benefit to the public health of the nation. Since the Clean Air Act was passed in 1970, the combined emissions of six key air pollutants have fallen by 78%, according to EPA. But as "State of the Air" 2025 shows, many millions of people in this country are still breathing unhealthy air.

Purpose and history of "State of the Air"

In the year 2000, the American Lung Association launched its annual "State of the Air" report to provide the public with easy-to-understand information about the quality of the air in their communities based on the credible data and sound science that EPA is required to use to set and enforce the air quality standards.

For the first several years, "State of the Air" focused solely on ozone pollution and included data for five populations at increased risk—children, older adults, children with asthma, adults with asthma and people with emphysema. In 2004, changes to the air quality standards and the deployment of air pollution monitoring enabled the addition of short-term and year-round fine particle pollution ($PM_{2.5}$) to the report. Over time, accumulating scientific evidence has shown significant health harms from both ozone and particle pollution among other groups of vulnerable individuals. "State of the Air" has accommodated this new information by gradually adding populations-at-risk categories to its reporting. "State of the Air" 2025 now includes data for 10 vulnerable groups.

Since its inception, "State of the Air" has been tremendously successful in raising awareness about particle pollution and ozone, two of the most dangerous and pervasive air pollutants nationwide. The American Lung Association is proud and grateful that the public, the media, clean air advocates and decision-makers have used this report every day, year after year, to call attention to the work that remains to be done to protect the public from the threat of air pollution.

How "State of the Air" can be used

We write and release "State of the Air" every year to make information on air quality and health clear and accessible to everyone. We show the progress each community has made and how much more needs to be done to achieve healthy air. In this report, you'll find information on local air quality nationwide. You'll also find the latest research on how air pollution affects health. With these tools, you can take proactive steps to safeguard both your lungs and your family's lungs from unhealthy air.

Every year, "State of the Air" also includes recommendations for actions that both policymakers and individual people can take to improve air quality. This year, the report highlights threats to the staff, funding and work of the U.S. Environmental Protection Agency that put clean air at risk for people across the country. We ask that you join

us in taking advocacy action to protect EPA and its clean air progress. Your voice and your individual perspective are more powerful now than ever. Please share your story and add your name to our petition – and then, take the next step. Reach out to your representatives at every level of government, share the "State of the Air" results for your community, and call on them to take action to protect EPA in the interest of public health.

State of the Air 2025 Methodology

Statistical Methodology: The Air Quality Data

Data Sources

Ozone and short-term particle pollution. The data on air quality throughout the United States were obtained from the U.S. Environmental Protection Agency's Air Quality System (AQS). The American Lung Association contracted with Dr. Allen S. Lefohn, A.S.L. & Associates, Montana, to characterize the hourly averaged ozone concentration information and the 24-hour averaged $PM_{2.5}$ concentration information for the three-year period for 2021-2023 for each monitoring site.

Year-round particle pollution. Design values for the annual $PM_{2.5}$ concentrations by county for the period 2021-2023 were retrieved November 18, 2024 from data posted on August 8, 2024 at the U.S. Environmental Protection Agency's website at https://www.epa.gov/air-trends/air-quality-design-values.

The Lung Association received critical assistance from members of the National Association of Clean Air Agencies and the Association of Air Pollution Control Agencies. With their assistance, all state and local agencies were provided the opportunity to review and comment on the data in draft tabular form. The Lung Association reviewed any discrepancies with the agencies and, if needed, with Dr. Lefohn at A.S.L. & Associates. The American Lung Association wishes to express its continued appreciation to the state and local air directors for their willingness to assist in ensuring that the characterized data used in this report are correct.

Ozone Data Analysis

The 2021, 2022 and 2023 AQS hourly ozone data were used to calculate the daily 8-hour maximum concentration for each ozone-monitoring site. The hourly averaged ozone data were downloaded on June 26, 2024, following the close of the authorized period for quality review and assurance certification of data. Only the hourly average ozone concentrations derived from FRM and FEM monitors were used in the analysis. The data were considered for a three-year period for the same reason that EPA uses three years of data to determine compliance with the ozone standard: to prevent a situation in which anomalies of weather or other factors in any single year create air pollution levels that inaccurately reflect normal conditions. For each county, the highest 8-hour daily maximum concentration was identified for each day with sufficient data based on the EPA-defined ozone season for 2021, 2022, and 2023.

The current national ambient air quality standard for ozone is 70 parts per billion (ppb) measured over eight hours. The EPA's Air Quality Index (AQI) reflects the 70 ppb standard. A.S.L. & Associates prepared a table by county that summarized, for each of the three years, the number of days the ozone level was within the ranges identified by EPA based on the Air Quality Index:

8-hour Ozone Concentration	Air Quality Index Levels
0-54 ppb	Good (Green)
55-70 ppb	Moderate (Yellow)
71-85 ppb	Unhealthy for Sensitive Groups (Orange)
86-105 ppb	Unhealthy (Red)
106-200 ppb	Very Unhealthy (Purple)
>200 ppb	Hazardous (Maroon)

For this report, the objective was to identify the number of days that 8-hour daily maximum concentrations in each county occurred within the defined ranges. This approach provided an indication of the level of pollution for all monitored days, not just those days that fell under the requirements for attaining the national ambient air quality standards. Therefore, no data capture criteria were applied to eliminate monitoring sites or to require a number of valid days for the ozone season.

The daily maximum 8-hour average concentration for a given day is derived from the highest of the 17 consecutive 8-hour averages beginning with the 8-hour period from 7:00 a.m. to 3:00 p.m. and ending with the 8-hour period from 11:00 p.m. to 7:00 a.m. the following day. This follows the process EPA uses for the current ozone standard adopted in 2015. All valid days of data within the ozone season were used in the analysis. However, for computing an 8-hour average, at least 75 percent of the hourly concentrations (i.e., 6-8 hours) had to be available for the 8-hour period. In addition, an 8-hour daily maximum average was identified if valid 8- hour averages were available for at least 75 percent of possible hours in the day (i.e., at least 13 of the possible 17 8-hour averages). Because EPA includes days with inadequate data (i.e., not 75 percent complete) if the standard value is exceeded, our data capture methodology also included the site's 8-hour value if at least one valid 8-hour period were available, and it was 71 ppb or higher.

As instructed by the Lung Association, A.S.L. & Associates included the exceptional (e.g., wildfires) and natural events (e.g., stratospheric intrusions) that were identified in the database and identified for the Lung Association the dates and monitoring sites that experienced such events. Some data have been flagged by the state or local air pollution control agency to indicate that they had raised issues with EPA about those data. For each day across all sites within a specific county, the highest daily maximum 8-hour average ozone concentration was recorded and then the results were summarized by county for the number of days the ozone levels were within the ranges identified above.

Following receipt of the above information, the American Lung Association identified the number of days each county, with at least one ozone monitor, experienced air quality designated as orange (Unhealthy for Sensitive Groups), red (Unhealthy) or purple (Very Unhealthy). When some monitored data were collected sometime during the three-year period, but insufficient data were available in any year, an "incomplete" was identified for the 3-year period. Insufficient data exist for various reasons. For example, when a specific monitor was used for a special study and the monitor was then discontinued in other years, an "incomplete" is assigned.

ii Analysis of the daily $PM_{2.5}$ data for "State of the Air" 2024 was completed in January 2024, before EPA announced the finalization of the revised $PM_{2.5}$ NAAQS and Air Quality Index. The values used in this report are based on the 2012 Air Quality Index.

Short-Term Particle Pollution Data Analysis

For each county, A.S.L. & Associates identified the maximum daily 24-hour AQS $PM_{2.5}$ concentration for each day with sufficient monitoring information in 2021, 2022 and 2023. The 24-hour averaged $PM_{2.5}$ data were downloaded on August 27, 2024 from the EPA website following the correction of the hourly values by the EPA of the $PM_{2.5}$ data associated with monitors using method codes 236 and 238. Using the downloaded $PM_{2.5}$ daily data from the EPA website, A.S.L. & Associates prepared a table by county that summarized, for each of the three years, the number of days the $PM_{2.5}$ concentration was within the ranges identified by EPA based on the Air Quality Index, as adopted by the EPA on February 7, 2024:

24-hour $PM_{2.5}$ Concentration	Air Quality Index Levels
0.0 µg/m³ to 9.0 µg/m³	Good (Green)
9.1 µg/m³ to 35.4 µg/m³	Moderate (Yellow)
35.5 µg/m³ to 55.4 µg/m³	Unhealthy for Sensitive Groups (Orange)
55.5 µg/m³ to 125.4 µg/m³	Unhealthy (Red)
125.5 µg/m³ to 225.4 µg/m³	Very Unhealthy (Purple)
greater than or equal to 225.5 µg/m³	Hazardous (Maroon)

All previous data collected for 24-hour average $PM_{2.5}$ were characterized using the AQI thresholds listed above.

For this report, the objective was to identify the number of days that the maximum in each county of the daily $PM_{2.5}$ concentration occurred within the defined ranges. This approach provided an indication of the level of pollution for all monitored days, not just those days that fell under the requirements for attaining the national ambient air quality standards. Therefore, no data capture criteria were used to eliminate monitoring sites. Included in the analysis are data collected using only FRM and FEM methods, which reported 24-hour averaged data.

As instructed by the Lung Association, A.S.L. & Associates included the exceptional and natural events that were identified in the database and identified for the Lung Association the dates and monitoring sites that experienced such events. Some data have been flagged by the state or local air pollution control agency to indicate that they had raised issues with EPA about those data. For each day across all sites within a specific county, the highest daily maximum 24-hour $PM_{2.5}$ concentration was recorded and then the results were summarized by county for the number of days the concentration levels were within the ranges identified above.

Following receipt of the above information, the American Lung Association identified the number of days each county, with at least one $PM_{2.5}$ monitor, experienced air quality designated as orange (Unhealthy for Sensitive Groups), red (Unhealthy), purple (Very Unhealthy) or maroon (Hazardous).

Description of County Grading System

Ozone and Short-Term Particle Pollution (24-hour $PM_{2.5}$)

The grades for ozone and short-term particle pollution (24-hour $PM_{2.5}$) were based on a weighted average calculation. To determine weighted averages, the Lung Association followed these four steps separately for each pollutant in each county:

1. Assigned weighting factors to each category of the Air Quality Index. Days of poor air quality were given the following weighting factors:

   Orange days 1.0
   Red days 1.5
   Purple days 2.0
   Maroon days 2.5

   This ensured that days when the air pollution levels were worse received appropriately greater weight.

2. Multiplied the total number of days within each AQI category by its assigned factor, and added all the categories to calculate a total:

   Total = [Orange days x 1] + [Red days x 1.5] + [Purple days x 2] + [Maroon days x 2.5]

3. Divided the total by three to determine the weighted average, since the monitoring data were collected over a three-year period:

   Weighted Average = Total ÷ 3

Weighted average was then used to determine each county's grades for ozone and 24-hour $PM_{2.5}$ according to the following table:

Weighted Average	Grade
0.0	A
0.3 to 0.9	B
1.0 to 2.0	C
2.1 to 3.2	D
3.3 or higher	F

All counties with a weighted average of zero (corresponding to no exceedances of the standard over the three-year period) were given a grade of "A."

For ozone, an "F" grade was set to generally correlate with the number of unhealthy air days that would place a county in nonattainment for the ozone standard.

For short-term particle pollution, fewer unhealthy air days are required for an F than for nonattainment under the $PM_{2.5}$ standard. The 2006 24-hour $PM_{2.5}$ standard is set to allow two percent of the days during the three years to exceed 35 $\mu g/m^3$ (called a "98th percentile" form) before violating the standard. That would be roughly 21 unhealthy days in three years. The grading used in this report would allow only about one percent of the days to be over 35 $\mu g/m^3$ (called a "99th percentile" form) of the $PM_{2.5}$. The American Lung Association supports using the tighter limits in a 99th percentile form as a more appropriate standard that is intended to protect the public from short-term episodes or spikes in pollution.

Weighted averages allow comparisons to be drawn based on severity of air pollution. For example, if one county had nine orange days and no red days, it would earn a weighted average of 3.0 and a D grade. However, another county that had only seven orange days but also two red days, which signify days with more serious air pollution, would have a weighted average of 3.3, and would receive an F.

Note that this system differs significantly from the methodology EPA uses to determine violations of both the ozone and the 24-hour $PM_{2.5}$ standards. EPA determines whether a county violates the ozone standard based on the fourth maximum daily 8-hour ozone reading each year averaged over three years. Multiple days of unhealthy air beyond the highest four in each year are not considered. By contrast, the system used in this report recognizes when a community's air quality repeatedly results in unhealthy air throughout the three years. Consequently, some counties will receive grades of "F" in this report, showing repeated instances of unhealthy air, while still meeting the EPA's 2015 ozone standard. The American Lung Association's position is that the evidence shows that the 2015 ozone standard fails to adequately protect public health.

Counties were ranked by weighted average. Metropolitan areas were ranked by the highest weighted average among the counties within a given Metropolitan Statistical Area as of 2023 as defined by the White House Office of Management and Budget (OMB).

Weighted average values that appeared in prior reports may not be directly comparable to values in the current report as standards and the AQI may have changed. Therefore, for use in the Lung Association's online resources for the "State of the Air" report at Lung.org/sota, values from earlier years are updated according to the current standard and Air Quality Index.

Year-Round Particle Pollution (Annual $PM_{2.5}$)

Since no comparable Air Quality Index exists for year-round particle pollution (annual $PM_{2.5}$), the grading was based on the 2024 National Ambient Air Quality Standard for annual $PM_{2.5}$ of 9.0 µg/m^3. Counties that EPA listed as being at or below 9.0 µg/m^3 were given grades of "Pass." Counties that EPA listed as being at or above 9.1 µg/m^3 were given grades of "Fail." Where insufficient data existed for EPA to determine a design value, those counties received a grade of "Incomplete."

A design value is the calculated concentration of a pollutant based on the form of the national ambient air quality standard and is used by EPA to determine whether the air quality in a county meets the standard. Counties were ranked by design value. Metropolitan areas were ranked by the highest design value among the counties within a given Metropolitan Statistical Area as of 2023 as defined by the OMB.

Statistical Methodology: Population Data

The Lung Association calculates the county populations at risk from these pollutants based on the population from the entire county where the monitor is located. The Lung Association then calculates the metropolitan populations at risk based upon the largest metropolitan area that contains that county. Not only do people from that county or metropolitan area circulate within the county and the metropolitan area, but the air pollution also circulates to that monitor from throughout the county and metropolitan area.

Details about how the populations-at-risk numbers are derived can be found in Understanding Grades and Tables.

Key Findings

Nearly half of the U.S. population live with unhealthy levels of air pollution

A changing climate is making the job of cleaning up the air more difficult

The "State of the Air" 2025 report finds that even after decades of successful efforts to reduce sources of air pollution, 46% of Americans—156.1 million people—are living in places that get failing grades for unhealthy levels of ozone or particle pollution. This is nearly 25 million more people breathing unhealthy air compared to last year's report, and more than in any other "State of the Air" report in the last ten years.

Extreme heat, drought and wildfires are contributing to worsening levels of air pollution across much of the U.S., exposing a growing proportion of the population to ozone and particle pollution that put their health at risk.

The "State of the Air" report looks at two of the most widespread and dangerous air pollutants, fine particles and ozone. The air quality data used in the report are collected at official monitoring sites across the United States by federal, state, local and Tribal governments. The Lung Association calculates values reflecting the air pollution problem and assigns grades for daily and long-term measures of particle pollution and daily measures of ozone. Those values are also used to rank cities (metropolitan areas) and counties. This year's report presents data from 2021, 2022 and 2023, the most recent three years of quality-assured nationwide air pollution data publicly available. See ***About This Report*** for more detail about the methodology for data collection and analysis.

"State of the Air" 2025 is the 26th edition of this annual report, which was first published in 2000. From the beginning, the findings in "State of the Air" have reflected the successes of the Clean Air Act, as emissions from transportation, power plants and manufacturing have been reduced over time. Over the last decade, however, the findings of the report have added to the extensive evidence that a changing climate is making it harder to protect this hard-fought progress on air quality and human health. Increases in high ozone days and spikes in particle pollution related to extreme heat, drought and wildfires are putting millions of people at risk and adding challenges to the work that states and cities are doing across the nation to clean up air pollution.

After several years of reporting that the worst of the nation's air quality problems were increasingly concentrated in western states, "State of the Air" 2025 finds the geographic distribution of air pollution shifting back East. The year 2023, which is included in this year's report for the first time, brought improved conditions to the west coast but also a deadly heat wave in Texas and an unprecedented blanket of smoke from wildfires in Canada that drove levels of ozone and particle pollution in dozens of central and eastern states higher than they have been in many years.

Again this year, "State of the Air" finds that the burden of living with unhealthy air is not shared equally. Research has shown that communities of color are disproportionately exposed to unhealthy air and are also more likely to be living with one or more chronic conditions that make them more vulnerable to air pollution, including asthma, diabetes and heart disease. Although people of color make up 41.2% of the overall population of the U.S., they are 50.2% of the people living in a county with at least one failing grade. Notably, Hispanic individuals are nearly three times as likely as white individuals to live in a community with three failing grades.

In "State of the Air" 2025, the metropolitan areas that ranked worst in the country for each of the three pollutant measures are unchanged from last year's report. Bakersfield, California tops the list for worst short-term particle pollution for the third straight year. Bakersfield also continues to be the metropolitan area with the worst level of year-round particle pollution for the 6th year in a row. Los Angeles is the city with the worst ozone pollution in the nation, as it has been in 25 of the 26 years of reporting in "State of the Air"—although city residents are exposed to an average of 77 fewer days of unhealthy levels of ozone each year than they were in 2000.

More than 125 million people live in counties with **F grades** for ozone smog.

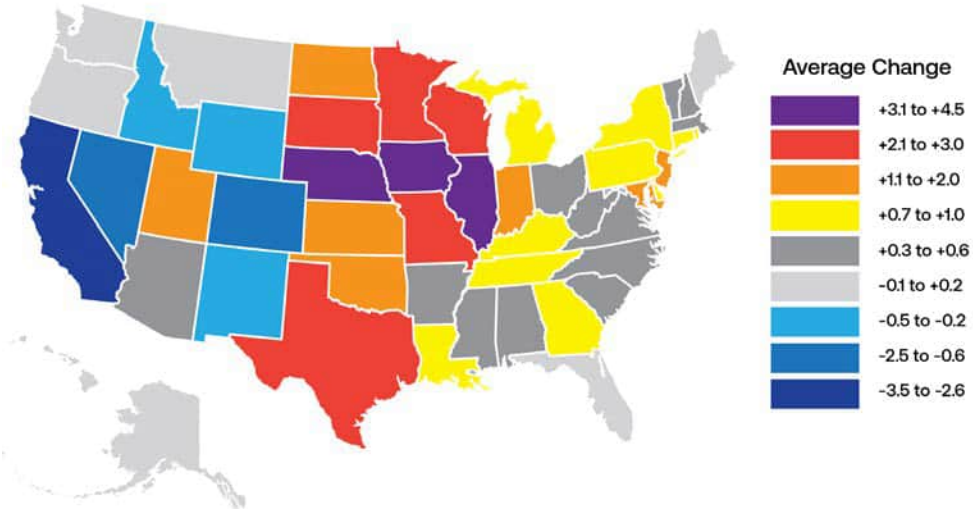
Ozone Pollution Trends

Ozone air pollution is making breathing difficult for more people living in the U.S. than any other single pollutant. In the years 2021, 2022, and 2023, 37% of the population, some 125.2 million people, were exposed to levels of ozone that put their health at risk. This is an increase of 24.6 million people over last year's figure, and includes tens of millions of infants and children, people age 65 or older and others whose conditions make them especially vulnerable to health harm from air pollution.

After several years of successful reductions in ozone pollution in many parts of the country thanks to clean-up measures enacted under the Clean Air Act, the results in "State of the Air" 2025 are a distressing reversal of that progress. The places that earned an "F" grade for ozone in this year's report were spread across 211 counties in 35 states and Washington DC. Ninety-three more counties earned an "F" grade than in last year's report, and 10 more states saw at least one of their counties added to the list. Many places that were considered untroubled by ozone smog in recent years of the report saw their air quality worsen, sometimes by quite a lot—137 counties lost their A grade, including 10 that went from an A to an F.

The hardest hit region of the country for this change is a large swath of states extending north to south from the Midwest and the Plains down to Texas. The worsening ozone was due in large part to two factors that came together in 2023—in the North, the transport of ozone-forming pollutants generated by the extensive, climate change-driven wildfires in Canada, and in the South, high temperatures combined with emissions creating ideal conditions for ozone formation.

Average Change in Ozone Weighted Average by State 2020-2022 to 2021-2023



The severity of the problem and the abruptness of the change are unprecedented in magnitude. Nationwide, nearly five times as many counties' ozone levels worsened as improved. Nine states saw the number of unhealthy days for ozone get worse in every one of their counties monitored for this pollutant, including all 27 monitored counties in Indiana, all 23 in Illinois, and all 17 in Missouri.

The Role of Wildfires in Ozone Formation

In May and June of 2023, Canada experienced its worst wildfire season on record. Smoke plumes from those fires spread across the states of the Upper Midwest and Northeast. In addition to smoke blanketing those states with high levels of particle pollution, the Upper Midwest experienced the highest regional-scale surface ozone levels ever recorded so early in the season. By analyzing findings from air quality monitors, satellites and measurements of atmospheric chemistry taken from research aircraft, scientists found a clear link between the fires and the extreme levels of ozone pollution hundreds of miles downwind.

Wildfire smoke is a very visible and well-recognized source of unhealthy levels of particle pollution. As worsening heat and drought driven by a changing climate have increased the number, size and intensity of wildfires in the U.S. and neighboring Canada, the number and severity of high particle pollution days have also been increasing.

At the same time, the role of wildfires in the development of ozone smog has been less obvious and less well-documented. The chemistry of ozone formation is complex and variable. Many different potential emission sources contribute its precursor components. That complexity, together with the variable mixture of pollutants in wildfire smoke, have made understanding and quantifying the relationship between wildfires and ozone a challenge for atmospheric scientists.

Burning of plants and other organic material, known as biomass, in wildland fires produces particulate matter along with hundreds of reactive gases, including nitrogen dioxide (NO_2), volatile organic compounds (VOCs) and carbon monoxide. All of these gases can play a role in ozone formation, especially in sunny and hot conditions. These emissions undergo a series of chemical reactions as the smoke plume moves away from the source of the fire. In general, ozone production increases as the plume ages and moves downwind. Plumes that drift over reservoirs of NO_2 pollution, such as urban centers and industrial corridors with highways, railroads and ports, are also more likely to produce elevated ozone levels.

Whether or not a particular wildfire event produces significantly elevated levels of ozone depends on a number of factors that affect the emission and transport of precursor gases. This includes the temperature of the combustion, the duration of active flame production (more NO_2 is produced during periods of active flaming than when a fire is smoldering), wind direction and how close to the surface the plume is transported.

Years of successful cleanup of emissions from transportation, energy generation and industrial processes have contributed to falling ozone levels across much of the country since the first “State of the Air” report was published in 2000. Unfortunately, as was shown in 2023, one bad fire season has the potential to offset that progress, at least temporarily, creating new challenges for air pollution control efforts and putting the health of the communities affected at increased risk.

Sources

Cooper O.R. et al. Early surface 2023 wildfires generated record-breaking surface ozone anomalies across the U.S. Upper Midwest. Geophysical Research Letters. 2024; 51:e2024GL111481.

Lin M et.al. Reactive nitrogen partitioning enhances the contribution of Canadian wildfire plumes to U.S. ozone air quality. Geophysical Research Letters. 2024; 51:e2024GL10969.

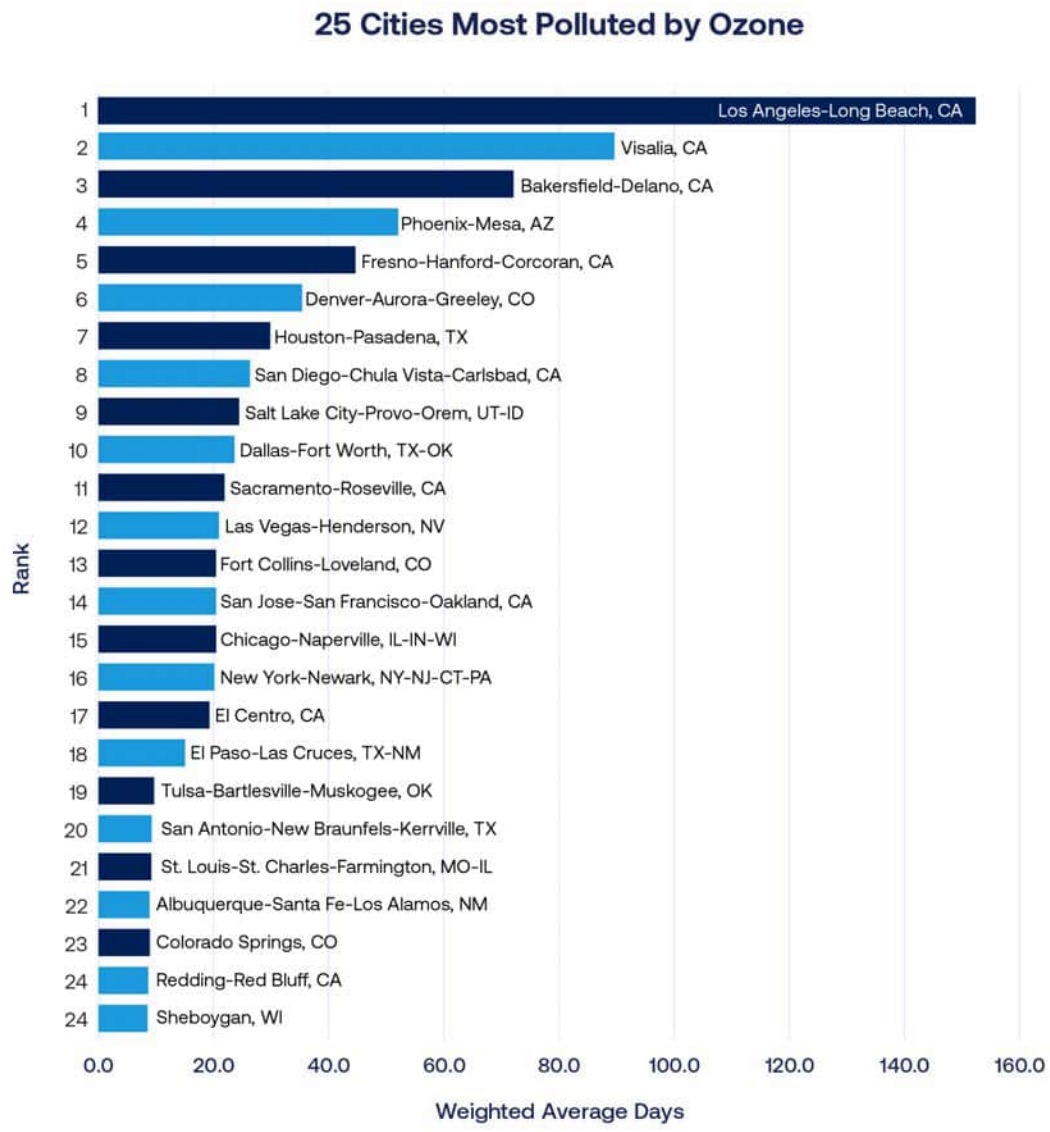
In spite of these startling results, it is worthwhile pointing out that a handful of western states experienced something of a respite in this year's report. More counties improved than worsened in California, Idaho, Nevada, New Mexico and Wyoming, even though ozone levels in many of their counties continued to be unhealthy on many days.

Despite the widespread worsening in parts of the country, the list of the Worst 25 cities for ozone pollution in "State of the Air" 2025 and their order of ranking remains relatively stable compared with last year's report.

The largest changes in rank are for Tulsa, OK, worsening from 31st to 19th worst, and for St. Louis, MO, from 30th to 21st worst. Both were most recently on the Worst 25 list in the 2016 report. Sheboygan, WI is the only other city to join the list this year, having last appeared on the 2021 most polluted list. Those three new cities take the places of San Luis Obispo, CA and Reno, NV, which improved enough to move off the worst 25 list, and Grand Rapids, MI, which worsened significantly, but not enough to remain on the list.

In one small piece of good news, none of the cities on the Worst 25 list reported a worst-ever average number of days of ozone smog. In fact, four cities, all in California—Fresno (for its fifth year in a row), Bakersfield, Sacramento, and Visalia—recorded their fewest-ever number of unhealthy days for ozone, though they all still earned "F" grades.

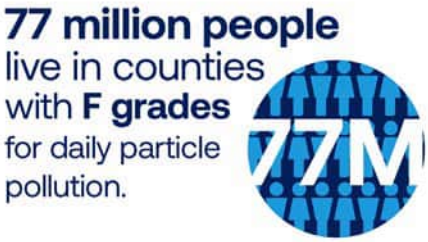
The geographical distribution of cities on the Worst 25 list repeats the pattern seen over



the last decade—the highest levels of ozone air pollution continue to occur in the West. California retains its position of being the state with the most metro areas on the list with 9 of the 25 most-polluted cities. Arizona, Colorado, Nevada, New Mexico, Oklahoma, Texas and Utah account for 12 others. They are joined this year by four more easterly cities, Chicago, New York, St. Louis, and Sheboygan.

Although cleanup of ozone precursor pollutants from industrial, power generation, and mobile sources has been working to reduce ozone concentrations, the impact of climate change has resulted in widespread wildfire disasters and has also meant higher temperatures, dry, sunny skies and more frequent stagnation events. Taken together, these conditions produced much higher numbers of unhealthy ozone days than would otherwise be the case.

Short-term Particle Pollution Trends

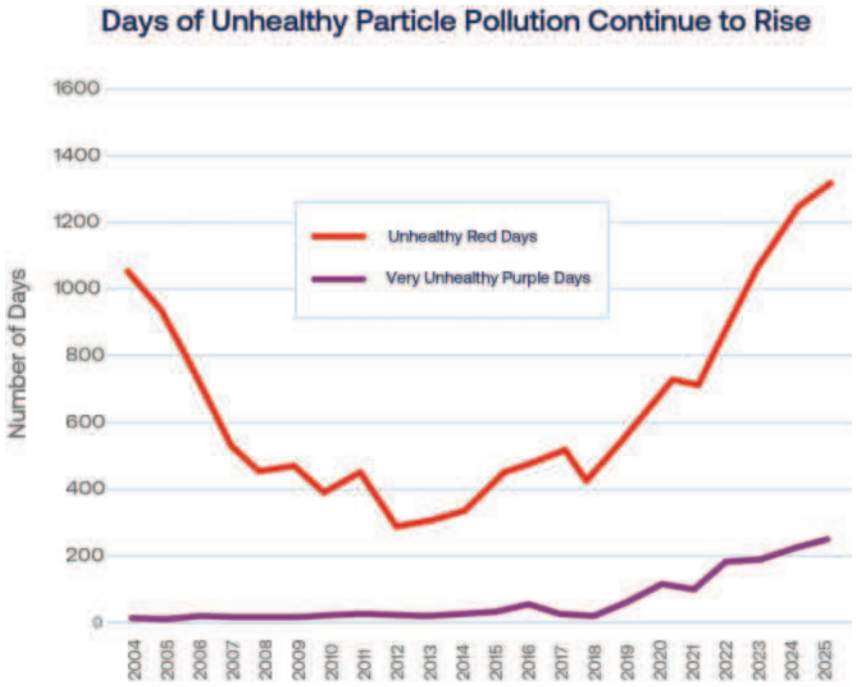


In the years 2021, 2022 and 2023, there were 77.2 million people living in counties across the U.S. that earned an F grade for unhealthy spikes in particle pollution. This represents an increase of 12.1 million more people than in last year's report, the seventh straight year of increasing health threat from this deadly pollutant.

Even compared with the past several years of "State of the Air" reports—in which many cities and counties experienced their highest weighted average number of days ever reported for fine particle pollution—results this year are again worse. In "State of the Air" 2025, 154 counties in 27 states get failing grades for short-term particle pollution. This is 44 more counties and 8 more states, plus Washington DC, than in last year's report. Although 27 counties in the West, including 17 counties in California, improved enough to get passing grades this year, those improvements are more than offset by the 68 counties that have been added, many of them in the Midwest and East. Connecticut, DC, Georgia, Illinois, New York, Ohio, South Dakota, Virginia and Wisconsin are all represented on the F list for the first time in years.

Wildfire has clearly emerged as a major driving factor in determining where in the country people are being exposed to unhealthy spikes in particle pollution. As states and counties experience shifting conditions of heat and precipitation—"good fire years" and "bad fire years"—their levels of air pollution can vary significantly. For example, compared to the disastrous 2020 fire year in California, the three years included in "State of the Air" 2025 were relatively better in the state, allowing counties like Santa Barbara and Marin to go from an F to an A grade in this year's report. In contrast, smoke from extensive wildfires in Canada in 2023 resulted in extremely high levels of fine particle pollution on many days throughout parts of the northeastern and north central U.S. that have not historically been thought of as "fire country."

Wildfires are also continuing to increase the severity of pollution, with smoke in eastern states resulting in this report's highest ever number of red and purple days for particle pollution (1,280 and 231 days, respectively). These are levels on the Air Quality Index that carry strong health warnings. On red Unhealthy days, not only are members of sensitive groups likelier to "experience more serious health effects," but also "some members of the general public may experience health effects." On purple Very Unhealthy days, "the risk of health effects is increased for everyone."

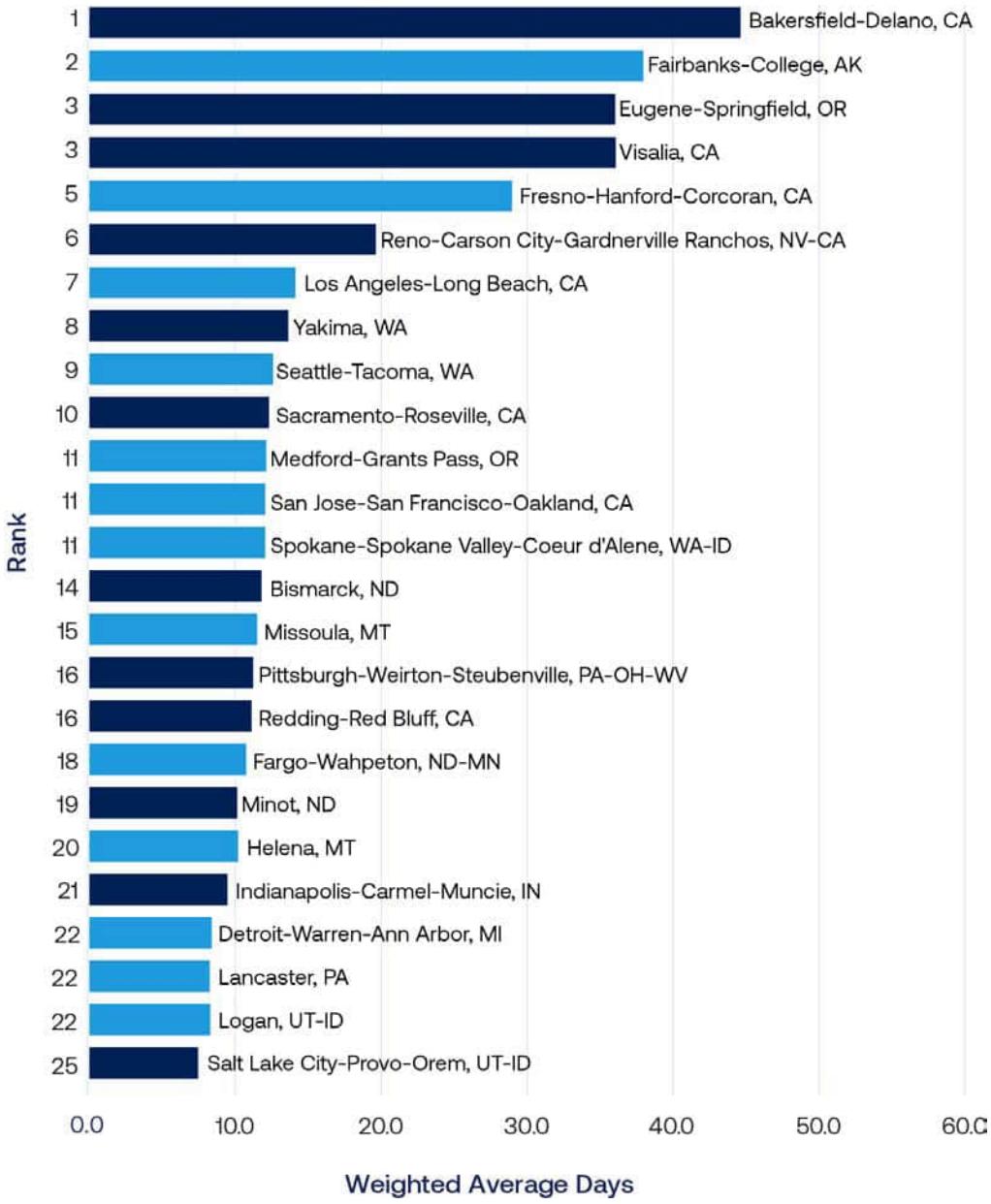


There were also 27 maroon Hazardous days, the highest category, days on which a health warning of emergency conditions is issued, saying, "Everyone is more likely to be affected." Although this is fewer maroon days than in "State of the Air" 2023 and 2024, it is a sharp change from the fewer than ten maroon days reported from 2004 to 2016.

This year's report finds that the health of 56.3 million people across 140 counties in 25 states was put at risk on severely polluted Very Unhealthy (purple) and Hazardous (maroon) days for fine particle pollution. This is 24 million more people than in last year's report. This is drastically worse than the findings in last year's "State of the Air" and a shocking demonstration of a trend that not only is continuing but worsening as a consequence of climate change.

In better news, comparing cities ranked the worst 25 in last year's report with those in this year's, the average number of days per year that residents were exposed to high levels of fine particle pollution decreased by about three days. (However, it was to a still seriously poor weighted average of 16.5 days.) All but one of the ten worst cities on the list improved in this year's report, including Bakersfield, California, which experienced a weighted average of 17.5 fewer bad air days in 2021-2023 for spikes in particle pollution. The exception was Visalia, California, which recorded its highest level of particle pollution spikes in the history of the report—for the third year in a row.

25 Cities Most Polluted by Daily PM



As a result of the geographic shifts in high levels of particle pollution, eight of last year's Worst 25 cities have been replaced in this year's report. Medford, Oregon and Lancaster and Pittsburgh, Pennsylvania rejoined the list after a one-year hiatus. Worsened air quality in Indianapolis, Indiana; Detroit, Michigan; and Bismarck, North Dakota led to them being added to the list. Helena, Montana and Minot, North Dakota, both newly designated Metropolitan Statistical Areas in 2023, join the list for the first time, though Helena's air quality would have put it among the worst 25 in last year's report had it been classified as a metro region.

Improved enough to leave the Worst 25 list this year are the western cities of Phoenix, Arizona; Chico, Salinas, and San Diego, California; Denver, Colorado; Boise City, Idaho; Las Vegas, Nevada and Portland, Oregon.

Year-round Particle Pollution Trends

85 million people
live in counties with failing grades for year-round particle pollution

"State of the Air" 2025 finds that 85 million people living in 115 counties across 31 states have been exposed to year-round levels of particle pollution that do not meet the annual air quality standard. This is a small improvement over the 90.7 million people living in places that got failing marks in last year's report, but still a sobering reminder of the widespread, chronic nature of this deadly form of air pollution.

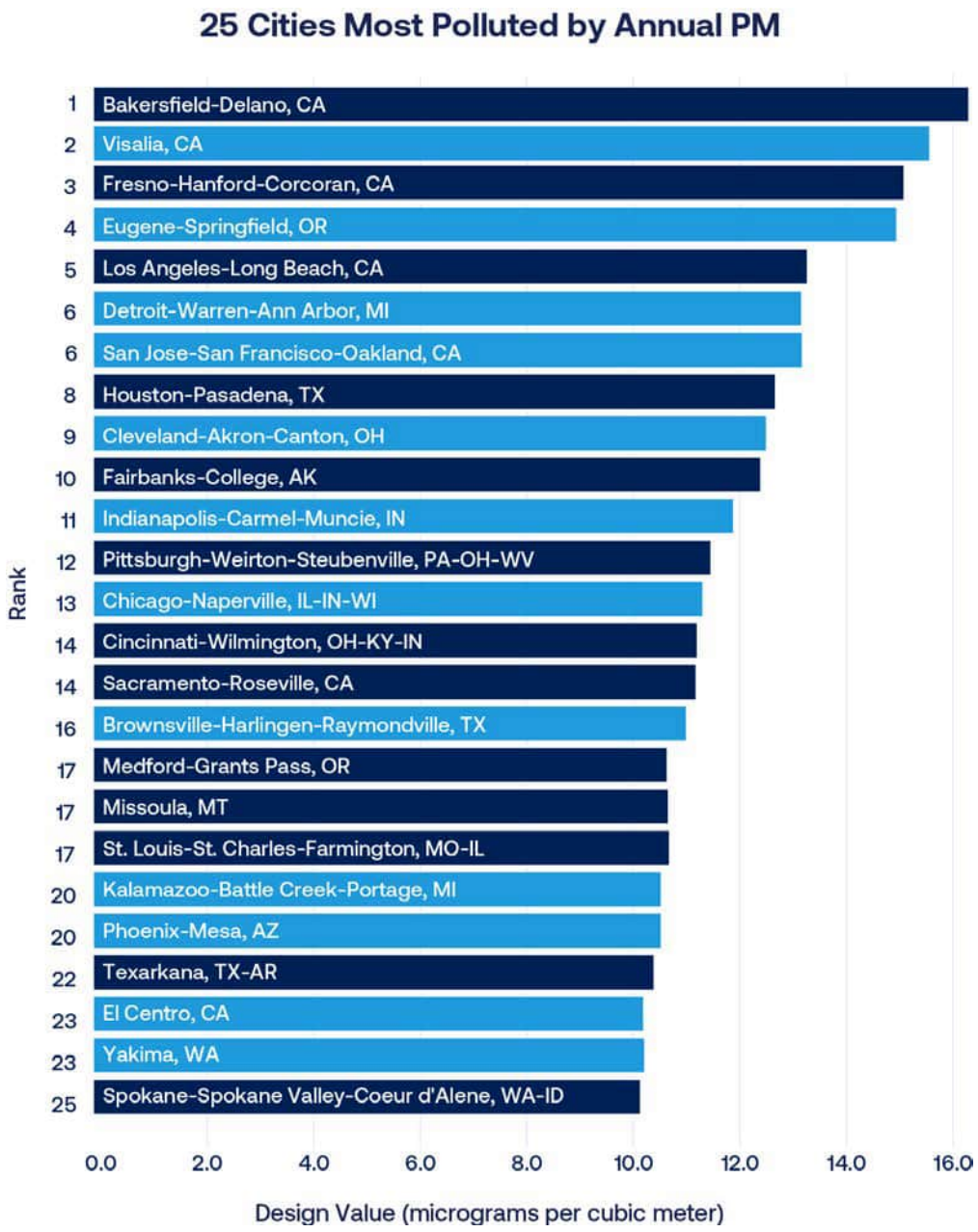
When looking nationwide at all the counties with measurements for this pollutant, the average severity of annual particle pollution is effectively unchanged since last year's report. By its nature, the year-round measure of average particle pollution is not as changeable from year to year as the daily measure. Variations over time may look smaller, but because they typically represent recurring exposures over many days and weeks, seemingly minor differences can have a big impact on public health.

Annual particle pollution levels are most often highest in places that are subject to multiple sources of emissions all year long, such as from highways, oil and gas extraction, power generation and industry. The additional pollution load from wildfire smoke, though comparatively short-lived in any one location, can strongly influence that location's annual average. In this year's report, this influence can be seen reflected in geographic shifts similar to that seen with short-term particle pollution.

Unsurprisingly, given the transport of wildfire smoke across the country, the states with the worst changes from last year's report are mainly in the north central and eastern parts of the U.S. Ten states, ranging from North Dakota to Maryland, saw the year-round average for fine particle pollution get worse in every one of their counties monitored for this pollutant.

In contrast, though California still ranks near the top for worst statewide average, there were 37 million more people living with improved levels than with worse levels compared with last year's report. All but one of California's 42 counties for which comparisons could be made show improvement.

In "State of the Air" 2025, the 25 most polluted cities for year-round particle pollution bucked the worsening trend of recent years by improving an average of about 0.4 micrograms per cubic meter (from 12.35 to 11.98 $\mu g/m^3$). Thirteen of them, all in western states, improved. Fresno-Hanford-Corcoran and Los Angeles-Long Beach, California, posted their lowest levels ever, though they are still among the worst five. Eleven metro areas worsened compared with their levels in last year's report. One (Indianapolis-Carmel-Muncie, IN) was unchanged. None of the 25 most polluted cities for this measure posted their worst-ever levels of year-round particle pollution.



Because of the geographic shift in areas of worse or improved particle pollution, there are more shifts in the rankings on the Worst 25 list than usual. Though the four worst metro areas keep their same ranks as in last year's report, most of the others on the list have moved up or down quite a bit.

Six metro areas experienced levels of air pollution that moved them onto the Worst 25 list. Cleveland, Ohio posted the most dramatic shift in the country, resulting in its rank dropping from 54th to 9th worst. Kalamazoo, Michigan and Brownsville and Texarkana, Texas are all making an appearance on this list for the first time. Missoula, Montana rejoins the list after a three-year absence. St. Louis, Missouri rounds out the additions this year.

Improving enough to leave the list are Augusta, Georgia; Chico, California; Kansas City, Missouri; Las Vegas and Reno, Nevada; Oklahoma City, Oklahoma and Corpus Christi, Texas.

Populations at Risk

More than 265 million people live in the 885 counties with enough monitoring data to be assigned a grade for at least one pollutant in this year's report. The majority of U.S. counties actually don't have monitors—which means that many communities, especially rural ones, don't have official monitored information on their air quality.

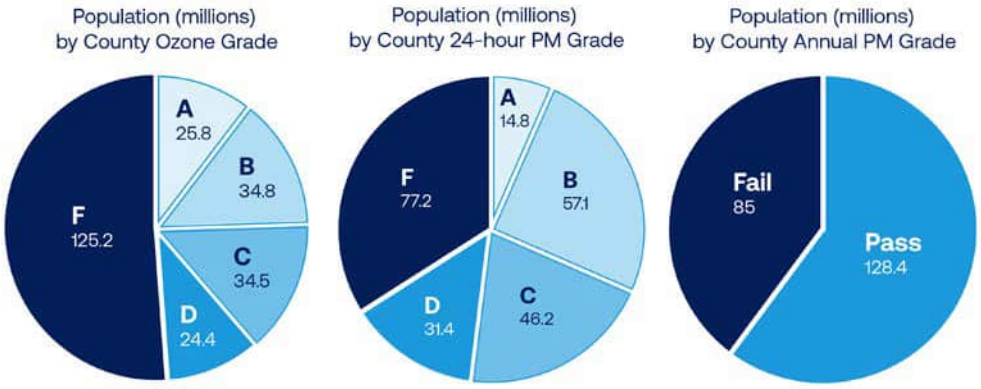
Addressing Data Gaps in Unmonitored Counties

"State of the Air" has long served as a trusted resource for tracking national trends in ozone and particle pollution, but many counties remain unmonitored, leaving communities without access to vital air quality information. To help close these gaps, the American Lung Association's "Something in the Air" reports explore the potential of using emerging technologies to expand the understanding of pollution exposure in under-monitored regions.

The "Something in the Air" series is intended to supplement the "State of the Air" report, providing a clearer picture of air quality where monitoring is limited. By utilizing satellite data and other emerging data tools to complement monitoring networks and expand air quality assessment, community members and decision-makers can better identify pollution hotspots, strengthen research and advocate for more comprehensive clean air protections. Together, these efforts work toward the same goal of ensuring all communities, especially those most at risk, have the information needed to fight for cleaner, healthier air. Learn more at Lung.org/something-in-the-air.

It is important to note that the population numbers included in this section are only for those places that collect air pollution data, and do not reflect the entire population of these groups in the U.S. The availability of data, and hence the population that is included in this report, differs for each pollutant.

All 156.1 million people in the U.S. living in places with failing grades for unhealthy levels of ozone or particle pollution are at risk of harm to their health. But some groups of people are especially vulnerable to illness and death from their exposure. See ***People at Risk*** for more detail about the factors that contribute to increased risk.



The number of people in these high-risk groups in "State of the Air" 2025 are as follows:

- **Children and older adults—**More than 34.6 million children under age 18 and some 25.2 million adults age 65 and over live in counties that received an F for at least one pollutant. Close to 9.5 million children and more than 6.7 million seniors live in counties failing all three measures.
- **People with underlying health conditions**
  - **Asthma—**More than 2.5 million children and nearly 11.8 million adults with asthma live in counties that received an F for at least one pollutant. More than 638,000 children and some 3.1 million adults with asthma live in counties failing all three measures.
  - **Chronic Obstructive Pulmonary Disease (COPD)—**Some 6.8 million people with COPD live in counties that received an F for at least one pollutant. Close to 1.7 million people with COPD live in counties failing all three measures.
  - **Lung Cancer—**Nearly 72,000 people diagnosed with lung cancer as of 2021 live in counties that received an F for at least one pollutant, and about 17,500 people ever diagnosed with lung cancer live in counties failing all three measures.
  - **Cardiovascular Disease—**Close to 9.7 million people with cardiovascular disease live in counties that received an F for at least one pollutant. Nearly 2.5 million people live in counties failing all three measures.
  - **Pregnancy—**Adverse impacts from air pollution have been shown both for those who are pregnant as well as for the developing fetus. More than 1.7 million pregnancies were recorded in 2023 in counties that received at least one failing grade for air pollution. Of those, close to 453,000 were in counties that received failing grades for all three measures.
- **People experiencing poverty**—Nineteen million people with incomes meeting the federal poverty definition live in counties that received an F for at least one pollutant. Close to 5.7 millig grade for ozone and/or particle pollution. Over 26.0 million people of color live in counties that received failing grades on all three measures, including some 15.2 million Hispanics.

For more detail about the number of people at risk by grade and by pollutant, see ***Data Table 1***. The populations at risk are also included by county in the ***State Data Tables***.

Most Polluted Places to Live

In addition to the 25 worst cities for each pollutant listed above, the 25 most polluted counties for ozone and particle pollution are ranked in the tables below.

Ozone Ranking	State	County	WA	PM Ranking	State	County	WA	Annual PM Ranking	State	County	DV
1	California	San Bernardino	153.7	1	California	Kern	44.3	1	California	Kern	16.2
2	California	Riverside	113.7	2	Alaska	Fairbanks North Star Borough	38.7	2	California	Tulare	15.7
3	California	Los Angeles	98.5	3	California	Tulare	36.5	3	California	Fresno	14.8
4	California	Tulare	88.7	3	Oregon	Lane	36.5	4	Oregon	Lane	14.4
5	California	Kern	72.8	5	California	Fresno	28.8	5	California	Kings	14.1
6	Arizona	Maricopa	54.8	6	California	Kings	26.5	6	California	Plumas	14
7	California	Fresno	46.8	7	California	Siskiyou	26.2	7	California	San Bernardino	13.1
8	Colorado	Jefferson	36.7	8	Oregon	Klamath	20.8	8	California	Stanislaus	13
9	Texas	Harris	34.8	9	Nevada	Douglas	19.2	8	Michigan	Wayne	13
10	California	San Diego	27.5	10	California	Inyo	18.7	10	Montana	Lincoln	12.8
11	Utah	Salt Lake	25.7	11	Nevada	Washoe	18.5	11	California	Riverside	12.6
12	Texas	Denton	25.5	12	Nevada	Carson City	17.5	12	Texas	Harris	12.5
13	Colorado	Douglas	25.2	13	California	Plumas	17.3	13	Washington	Okanogan	12.3
14	Utah	Uintah	24.5	14	Montana	Ravalli	14.5	14	California	Los Angeles	12.2
15	New Mexico	Eddy	24.3	15	California	Riverside	14	14	Ohio	Cuyahoga	12.2
16	California	Placer	22.5	16	Washington	Yakima	13.8	16	Alaska	Fairbanks North Star Borough	12.1
17	Nevada	Clark	22.2	17	Washington	Okanogan	13.3	17	Oregon	Klamath	12
18	Texas	Tarrant	21.5	18	Idaho	Lemhi	12.8	18	Indiana	Marion	11.9
19	Colorado	Larimer	20.8	19	Montana	Silver Bow	12.3	19	California	Siskiyou	11.7
20	California	Stanislaus	20.5	19	Washington	Snohomish	12.3	20	Pennsylvania	Allegheny	11.6
21	Illinois	Cook	20.3	21	California	Nevada	12.2	21	Illinois	Cook	11.3
22	Connecticut	Fairfield	20.2	22	California	Stanislaus	12	22	California	San Joaquin	11.2
23	Colorado	Arapahoe	19.5	22	Oregon	Jackson	12	22	California	Sutter	11.2
24	California	Imperial	19.3	22	Washington	Stevens	12	22	Ohio	Butler	11.2
25	Arizona	Pinal	19.2	25	North Dakota	Burleigh	11.7	25	California	Mendocino	11

Twenty-seven counties, listed alphabetically by state below, received failing grades for all three measures of pollution:

Arizona	Maricopa, Pinal
California	Fresno, Imperial, Kern, Kings, Los Angeles, Madera, Merced, Orange, Riverside, Sacramento, San Bernardino, Stanislaus, Sutter, Tulare
Illinois	Cook
Indiana	Lake, Marion
Michigan	Wayne
Ohio	Butler, Cuyahoga
Pennsylvania	Philadelphia
Nevada	Washoe
Utah	Salt Lake
Wisconsin	Milwaukee, Waukeshaw

Cleanest Places to Live

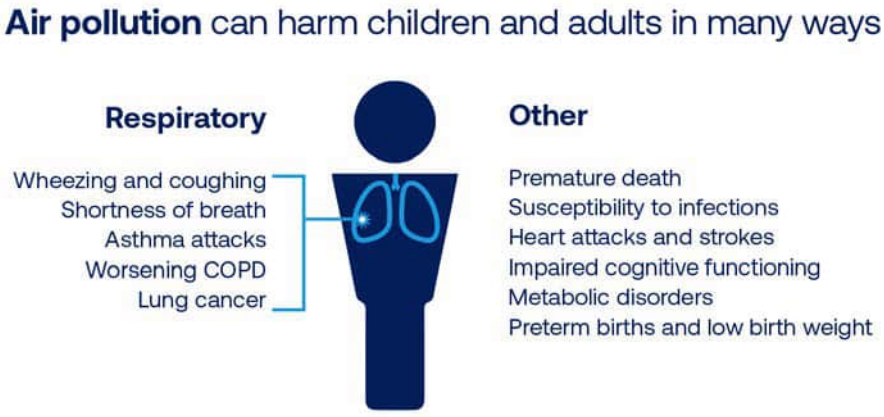
Many cities in the U.S. enjoy air that is considered clean for one or more of the pollution measures tracked in "State of the Air." In this year's report, 35 of the cities for which there is monitoring data had zero high ozone days and 22 cities had zero days with high levels of short-term particle pollution. This is a considerable worsening from last year's report, when 55 cities had no days of high ozone and 75 had no spikes in particle pollution. Because year-round particle pollution is scored differently, the cleanest cities for this measure can be ranked, and the best 25 are considered cleanest. See ***Data Tables 3a-c.***

In another grim indicator of the deterioration of air quality nationwide in this year's report, only two cities—Bangor, Maine and San Juan-Bayamón, Puerto Rico—rank on all three cleanest cities lists. They both earned an A for ozone and short-term particle pollution and are among the 25 cities with the lowest year-round particle levels.

The other four cities that made the Cleanest Places to Live list last year, Johnson City-Kingsport-Bristol, TN-VA, Lincoln-Beatrice, NE, Urban Honolulu, HI and Wilmington NC, all had at least one bad particle pollution day that cost them an A and a return to the cleanest cities list.

Health Impact of Air Pollution

Years of scientific research have clearly established that particle pollution and ozone are a threat to human health at every stage of life, increasing the risk of premature birth, causing or worsening lung and heart disease, and shortening lives. Some groups of people are more at risk of illness and death than others, because they are more likely to be exposed, or are more vulnerable to health harm, or often both.



Health Effects of Particle Pollution

Particle pollution – also known as particulate matter or soot – is a deadly and growing threat to public health in communities around the country. The more researchers learn about the health effects of particle pollution, the more dangerous it is recognized to be.

What is particle pollution?

Particle pollution refers to a mixture of tiny bits of solids and liquids in the air we breathe. Particle pollution comes from many sources. Factories, power plants, and diesel- and gasoline-powered vehicles and equipment either directly emit fine particles or generate other pollutants, such as nitrogen oxides (NO_X) and sulfur oxides (SO_X), known as precursors because they can then form into fine particles in the atmosphere. Other sources of particle pollution include wildfires, burning wood in wood stoves or residential fireplaces and burning biomass for electricity.

Researchers and regulators categorize particles according to size, grouping them as coarse, fine and ultrafine. Coarse particles, called PM_{10}, can include wind-blown dust, ash, pollen and smoke. Fine particles, $PM_{2.5}$, are most often a by-product of burning wood or fossil fuels, and may include components such as toxic compounds, salts and metals. The tiniest are called ultrafine particles, or $PM_{0.1}$. They are also produced by combustion and are included in the larger category of $PM_{2.5}$.

Individual fine particles are too small to be visible, but when pollution levels are high, they can make the air appear thick and hazy.

The differences in size make a difference in how particles affect our health. Our bodies' natural defenses help us to keep the coarse particles we inhale out of the deepest parts of our lungs, although these particles do deposit in the larger airways. However, those defenses do not keep smaller fine or ultrafine particles from penetrating deep into the lungs and even all the way into the air sacs. Many of these particles get trapped there, while the smallest are so tiny that they can pass from the air sacs into the bloodstream and disperse to other organs of the body.

What can particles do to your health?

Particle pollution can be very dangerous to breathe, especially at higher concentrations. It can trigger illness, hospitalization and premature death. Researchers estimate that $PM_{2.5}$ is responsible for more than 50,000 premature deaths in the United States every year.[1]

Short-Term Exposure

Short-term spikes in fine particle pollution that last from a few hours to a few days can kill. Premature deaths from breathing these particles can occur on the very day that particle levels are high, or up to a month or two afterward. Most premature deaths are from respiratory and cardiovascular causes. Fine particle pollution does not just make people die a few days earlier than they might otherwise—in many cases these deaths would not have occurred for years if the air were cleaner.[2]

Studies linking short-term exposure to $PM_{2.5}$ to death from all causes have been accumulating for a number of years. Taken together, this body of research provides consistent evidence of positive associations between fine particle pollution and mortality across diverse geographic locations and in populations with a wide range of demographic characteristics. In 2019, an international study looking at 499 cities across the globe reinforced these consistent findings.[3]

Exposure to even low levels of fine particles can be deadly. Looking nationwide in a 2017 study, researchers found that older adults faced a higher risk of premature death even when levels of short-term particle pollution remained well below the current national standard. This was consistent whether the older adults lived in cities, suburbs or rural areas.[4] Another study published in 2018 using data from 135 U.S. cities found a causal relationship between mortality and exposure to $PM_{2.5}$ at concentrations below the federal standard.[5]

Particle pollution also has many other harmful effects, ranging from decreased lung function to heart attacks. Extensive research has linked short-term increases in particle pollution to:

- increased mortality in infants;[6]
- increased hospital admissions for cardiovascular disease, including heart attacks and strokes;[7]
- increased hospital admissions and emergency department visits for chronic obstructive pulmonary disease (COPD);[8]
- increased severity of asthma attacks and hospitalization for asthma among children.[9,10]

Year-Round Exposure

Decades of research have firmly established that breathing particle pollution day in and day out can also be deadly. Across numerous seminal studies that looked at different groups of people living in different parts of the country, the results consistently showed a clear relationship between long-term exposure to particulate matter and mortality.[11]

Research using publicly available data on a cohort of more than one million adults in the U.S. reconfirmed that long-term exposure to $PM_{2.5}$ was associated with elevated risk of early death. The increased risk was primarily associated with death from cardiovascular and respiratory causes, including heart disease, stroke, influenza and pneumonia. Researchers also found a similar association between exposure to fine particle pollution and an increased risk of death from lung cancer among never-smokers.[12] Another study of 68.5 million Medicare-enrolled adults in the United States between 2000 and 2016 found a 6-8% increase in risk of all-cause mortality for every 10μg/m^3 increase in the annual average $PM_{2.5}$.[13]

Research has also linked year-round exposure to particle pollution to a wide array of serious health effects at every stage of life, from conception through old age. Among

individuals who are pregnant, fetuses and children, long-term particle pollution exposure is linked to:

- Increased risk of preterm birth and low birth weight;[14]
- Increased fetal and infant mortality;[15]
- Impaired neurological development and cognition;[16]
- Reduced lung development and impaired lung function in children;[17]
- Higher likelihood of children developing asthma.[18]

In adults, long-term particle pollution exposure is linked to:

- Increased risk from existing cardiovascular and respiratory disease, including a worsening of heart disease, atherosclerosis and COPD;[19,20]
- Higher likelihood of developing diabetes and subsequent complications;[21,22]
- Higher likelihood of getting lung cancer and of dying from it;[23]
- Impaired cognitive functioning and an increased risk of Parkinson's disease, Alzheimer's disease and other dementias later in life;[24,25]
- Increased risk of clinical depression and anxiety.[26]

The good news is that cleaning up particle pollution makes a difference. Research has shown a consistent relationship between decreasing $PM_{2.5}$ concentrations and improving respiratory health in children and reduced mortality of adults in communities that have reduced their levels of year-round particle pollution.[27,28]

Who is most at risk from particle pollution?

Anyone who lives where particle pollution levels are high is at risk. Some people face greater risk, however, based on their underlying health and other characteristics. [See the ***People at Risk*** section for more information about vulnerable groups] Research has shown that the groups at the greatest risk from particle pollution include:

- Pregnant people and fetuses;[29]
- Infants, children and people age 65 and older;[30]
- People with lung disease, especially asthma, but also people with COPD;[31]
- People with cardiovascular disease;[32]
- People with lung cancer;[33]
- People of color;[34]
- Current or former smokers;[35]
- People with low incomes;[36] and
- People who are obese or have diabetes.[37]

Health Effects of Ozone Pollution

Ground-level ozone, sometimes known as smog, is one of the most widespread and dangerous pollutants in the United States. Scientists have studied the effects of ozone on human health for decades. Hundreds of studies have confirmed that ozone harms people at levels currently found in many parts of the United States.

What is Ozone Pollution?

Ozone is a gas composed of molecules with three oxygen atoms. (The oxygen we need for life is made up of molecules with two oxygen atoms.) Ozone forms in the lower atmosphere when a combination of pollutants, usually nitrogen oxides (NOx) and volatile organic compounds (VOCs), "cook" together in sunlight through a series of chemical reactions. NOx and VOCs are produced primarily when fossil fuels such as gasoline, diesel, oil, natural gas or coal are burned or when solvents and some other chemicals evaporate. NOx is emitted from power plants, motor vehicles and other sources of

high-heat combustion. VOCs are emitted from motor vehicles, oil and gas operations, chemical plants, refineries, factories, gas stations, paint, consumer products and other sources. If these ingredients are present under the right conditions, they react to form ozone. Sunlight is key, with higher temperatures increasing ozone production. Because the reactions take place in the atmosphere, ozone often shows up downwind of the sources of the original emissions, sometimes many miles from where it formed.

Ozone air pollution is sometimes called ground-level ozone, to distinguish it from the much higher-altitude stratospheric ozone layer that protects people from damaging ultraviolet rays from the sun.

What Can Ozone Pollution Do to Your Health?

Ozone gas is a powerful lung irritant. When it is inhaled into the lungs, it reacts with the delicate lining of the small airways, causing inflammation and other damage that can impact multiple body systems. Ozone exposure can also shorten lives.

Ozone has a serious effect on the respiratory system, both in the short term and over the course of years of exposure.

When ozone levels are high, many people experience breathing problems such as chest tightness, coughing and shortness of breath, often within hours of exposure. Even healthy young adults may experience respiratory symptoms and decreased lung function.[38]

Other breathing problems that have been tied to short-term exposure to ozone include:

- Worsening of symptoms, increased medication use, and increased emergency department visits and hospital admissions for people with asthma and COPD;[39]
- Susceptibility to respiratory infections such as pneumonia, resulting in an increased likelihood of emergency department visits and hospitalizations.[40]

Living with ozone pollution long term may cause lasting damage to respiratory health, including:

- Development of new cases of asthma in children;[41]
- Damage to the airways, leading to development of COPD;[42]
- Increased allergic response.[43]

The inflammation and oxidative stress caused by short- and long-term exposure to ozone can also do damage to tissues, genes and proteins throughout the body, which can cause or worsen other disease conditions over time. These include:

- Potential increased risk of metabolic disorders, including glucose intolerance, hyperglycemia and diabetes;[44]
- Potential impact on the central nervous system, including brain inflammation, structural changes and increased risk of cognitive decline;[45,46]
- Increased likelihood of reproductive and developmental harm, including reduced fertility, pregnancy complications, preterm birth, stillbirth and low birth weight;[47,48]
- Possible cardiovascular effects.[49]

The damage ozone does to the body can be deadly. Recent research has affirmed earlier findings that short-term exposure to ozone, even at levels below the current standard, likely increases the risk of premature death, particularly for older adults.[50]

There is also a growing body of evidence that long-term exposures to ambient ozone may be associated with an increased risk of cardiovascular and respiratory disease mortality.[51]

Who is Most at Risk from Ozone Pollution?

Anyone who spends time outdoors where ozone pollution levels are high may be at risk. Some people face a higher-than-average risk, however, because of their underlying health and other characteristics. [See the ***People at Risk*** section for more information about vulnerable groups.] Research has shown that the groups at greatest risk from ozone pollution include:

- Pregnant people and fetuses;[52]
- Children;
- Anyone 65 and older;
- People with existing lung disease such as asthma and COPD;
- People who work or exercise outdoors.[53]

People at Risk

The health burden of air pollution is not evenly shared. Some people are more at risk of illness and death from air pollution than others. Several key factors affect an individual's level of risk:

- Exposure – Where someone lives, where they go to school and where they work makes a big difference in how much air pollution they breathe. In general, the higher the exposure, the greater the risk of harm.
- Susceptibility – Individuals who are pregnant and their fetuses, children, older adults and people living with chronic conditions, especially heart and lung disease, may be physically more susceptible to the health impacts of air pollution than other adults.
- Access to healthcare – Whether or not a person has health coverage, a healthcare provider, and access to linguistically and culturally appropriate health information may influence their overall health status and how they are impacted by environmental stressors like air pollution.
- Psychosocial stress – There is increasing evidence that non-physical stressors such as poverty, racial/ethnic discrimination and residency status can amplify the harmful effects of air pollution.

These risk factors are not mutually exclusive and often interact in ways that lead to significant health inequities among subgroups of the population. Taken all together, these high-risk categories account for a large proportion of the U.S. population.

People of color

Research has shown that people of color are more likely to be exposed to air pollution and more likely to suffer harm to their health from air pollution than white people.[54,55] Much of this inequity can be traced to the long history of systemic racism in the United States. Practices such as redlining, the discriminatory outlining of so-called "riskier" neighborhoods by mortgage lenders, institutionalized residential segregation in the 20th century, impairing the ability of many people of color to build wealth and limiting their mobility and political power. Over the years, decision-makers have found it easier to place sources of pollution such as power plants, industrial facilities, landfills and highways, in economically disadvantaged communities of color than in more affluent, predominantly white neighborhoods. The resulting disproportionate exposure to air pollution has contributed to high rates of emergency department visits for asthma and other diseases.[56,57]

People of color are also more likely than white people to be living with one or more

chronic conditions that make them more susceptible to the health impacts of air pollution, including asthma and diabetes.[58]

People experiencing poverty

There is evidence that having low income or living in lower income areas puts people at increased risk from air pollution, although the correlation is not as strong as with race and ethnicity.[59,60] People living in poverty are more likely to live in close proximity to sources of pollution and have fewer resources to relocate than people with more financial security.[61] Poverty itself, along with the problems that beset many low-income communities, such as lack of safety, green space, and high-quality food access, have been associated with increased psychosocial distress and chronic stress, which in turn make people more vulnerable to pollution-related health effects.[62] People with low income also have lower rates of health coverage and less access to quality and affordable health care to provide relief to them when they get sick.

Children

Children are both more susceptible to harm from air pollution and more likely to be exposed than adults. The growth and development of a child's lungs and breathing ability start in utero and continue into early adulthood. Long-term exposure to particle pollution during pregnancy and early childhood has been linked to reduced lung growth and long-term exposure to ozone has been linked to increased potential for the development of asthma. The developing brain and heart may also be affected, with life-long consequences.[63] In addition, the body's defenses that help adults fight off infections are still developing in children. Children have more respiratory infections than adults, which also seem to increase their susceptibility to air pollution.[64]

Children breathe more rapidly and inhale more air relative to their size than do adults. They are more likely to spend time outdoors, running around, being active and breathing hard. Consequently, they are more exposed to polluted outdoor air than adults typically are.

Older adults

Much of the illness and premature death caused by air pollution occurs in older adults, who are at increased risk of harm for several reasons. As a person ages, the normal process of thinning and weakening of the lung tissue and the supporting muscle and bones of the ribcage results in diminishing lung function over time. The impairment that results from exposure to air pollutants then has an add-on effect, putting stress on the lungs and heart. Older people are also more likely to be living with chronic diseases, and there is evidence that co-existing chronic lung, heart or circulatory conditions may worsen following exposure to environmental pollutants.[65]

The strength of the immune system also declines with age, leaving older people at greater risk of contracting infections and less able to get them under control before they become serious. Because exposure to air pollution increases susceptibility to respiratory infections, it also increases the risk of severe illness and death in older adults.

People with underlying health conditions

For the millions of people in the U.S. living with illnesses such as asthma, COPD, diabetes, heart disease and lung cancer, exposure to air pollution places them at greater risk of harm to their health than those without disease. The cellular injury and systemic inflammation triggered by breathing ozone and particle pollution put additional stress on people's lungs, heart and other organs already compromised by disease. This can result in a worsening of symptoms, increased medication use, more frequent emergency department visits and hospitalizations, an overall reduced quality of life and far too often premature death.

Individuals who are pregnant and fetuses

Pregnancy is always a susceptible time for both the person who is pregnant and the developing fetus. The pregnant body undergoes dramatic physiological changes in hormone levels, metabolism and circulation throughout the months of gestation. The rapid and complex development of the fetus is a precisely timed and sequenced process. The inflammation and oxidative stress resulting from exposure to air pollution during pregnancy can increase the risk of hypertensive disorders, including preeclampsia, and lead to intrauterine inflammation and damage to the placenta that can disrupt the growth and development of the fetus. Fetal health may also be impacted in a number of ways by environmental contaminants that have been shown to cross the placenta.[66]

Exposure to both ozone and particle pollution during pregnancy is associated with premature birth, low birth weight and stillbirth. These risks are amplified when the individual who is pregnant is also at higher risk of health harm from air pollution in other ways, such living in poverty or having asthma.[67]

People with a smoking history

There is some evidence suggesting that current and former smokers are at greater risk of health harm from exposure to fine particle pollution compared with never-smokers. They are more likely to develop lung cancer and to die prematurely.[68] Smoking damages the lungs, heart, blood vessels and other organs.[69] This impairment leaves the person with a smoking history more vulnerable to the health impact of air pollution than a never-smoker.

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Recommendations for Action

"State of the Air" 2025 illustrates the profound impact that climate change is having on air quality and the continued urgency of reducing the sources of emissions that contribute to ozone and particle pollution.

Under the Clean Air Act, the U.S. Environmental Protection Agency has driven decades of progress in cleaning up the transportation, electricity, buildings and industrial sectors. At the same time, EPA has tracked, analyzed and expanded the nation's understanding of air pollution at the community level. Now, however, all of that progress is at risk.

Sweeping staff cuts and reduction of federal funding are stymieing the agency's ability to ensure that people have clean air to breathe. This year's "State of the Air" focuses on an overarching clarion call to people nationwide: support and defend EPA.

Defend EPA Staff and Funding

EPA is, first and foremost, a public health agency. The agency works at every level to address air pollution. People breathe easier every day because of the work of EPA's staff, but they may not realize just how much these workers matter.

EPA staff are the reason the nation has access to air quality data in the first place, including through "State of the Air." A team of environmental scientists, modelers and statisticians and other experts enable the Airnow.gov site to work, which allows people across the country to get air quality forecasts online. They work with state and local governments to share those forecasts with communities across the country. They review the health science and write and update guidance on what people should do to protect themselves when the air quality index hits yellow, orange, red, purple and maroon. They share resources with schools that help them keep students safe when air pollution reaches unhealthy levels.

EPA staff are vital to ensuring that unhealthy levels of air pollution are not just monitored but also cleaned up. This is done in part by writing strong, sound safeguards under the Clean Air Act. For example, EPA is required to regularly update the National Ambient Air Quality Standards – the national limits on ozone and particle pollution on which this report is based. The scientific staff keep abreast of what the scientific research shows about air pollution, come up with different policy options, lead the work of analyzing the benefits to health of each option, and gather public input. For other types of standards, like limits on specific pollutants from power plants and vehicles, EPA staff do complex technical analyses of what technologies are available to reduce pollution, how and where they're being used, and what the impacts would be to health and to industry of pursuing different options.

Another part of ensuring pollution cleanup is making sure these strong safeguards are enforced. EPA staff do that too. They work with state and local governments to make sure new facilities are reviewed before they get built so that they don't add to the burden of unhealthy air in a place that's already too polluted. They test cars and trucks in labs to make sure they're not emitting more pollutants than they're supposed to. They inspect facilities to ensure their compliance with air quality standards to protect communities in the area. They bring cases against companies that violate the laws that protect public health.

EPA also gives grants and other funding to state and local governments, community organizations, businesses and more to help them monitor and reduce air pollution. Many of these grants are from programs to reduce emissions and invest in clean transportation and clean electricity under the Inflation Reduction Act. Many more are under longstanding programs that fund the everyday efforts that state and local governments make to ensure clean air. Without these funds, state and local governments would have a hard time running local air quality monitors, tracking where pollution is coming from and writing and implementing plans to reduce that pollution.

For all of these funds, EPA staff work hand-in-hand with these partners to make sure the funding goes where it needs to go and supports the work that needs to be done.

EPA's key principles are to follow the science, follow the law, and be transparent. Those principles have guided decades of progress toward cleaner air. But efforts to undercut them put the agency's core mission at risk.

The bottom line is this: EPA staff, working in communities across country, are doing crucial work to keep your air clean. Staff cuts are already impacting people's health across the country. Further cuts mean more dirty air.

Defend EPA Rules

In "State of the Air" 2024, we celebrated the fact that several lifesaving new air pollution safeguards were finalized by EPA, thanks to the hard work of agency staff and the health and environmental advocates who supported them. Now, that progress is at risk.

Executive orders issued in January 2025 and EPA announcements in March seek to overturn regulatory policies that reduce pollution from electricity generation and transportation. But a regulation cannot be overturned simply by an executive order or a press statement. That means that the clean air safeguards are still on the books, still the law of the land, and still need to be defended and protected, especially as new actions are announced to reconsider these lifesaving programs. They include:

Updated national particle pollution standards. EPA strengthened the annual fine particulate matter pollution standards from 12 $\mu g/m^3$ to 9 $\mu g/m^3$. States have submitted to EPA their recommendations for which areas should be cleaned up. Now the agency is required to review those recommendations and conduct its own analyses to finalize the areas that need additional pollution control by February 6, 2026.

Rules to clean up methane and other air pollutants from the oil and gas industry. EPA finalized rules to address leaks of methane from the oil and gas production process, like drilling operations. This is a crucial climate measure and will also reduce emissions of dangerous volatile organic compounds (VOCs). While Congress voted in February to overturn a separate methane prevention rule, these limits are still on the books.

Stronger standards for future cars. EPA finalized a rule that will make future light- and medium-duty vehicles cleaner. The rule will help get more zero-emission vehicles on the road and make new gasoline-powered cars less polluting too.

Stronger carbon pollution limits on future trucks and buses. EPA finalized a rule that will make sure future heavy-duty vehicles emit fewer greenhouse gases, including trucks and buses. A separate, 2023 rule also ensures future trucks and buses emit less nitrogen oxide emissions.

Stronger limits on mercury and air toxics from power plants. EPA tightened limits on toxic emissions from coal- and oil-fired power plants and strengthened monitoring requirements to help ensure that cleanup happens quickly.

Limits on carbon pollution from power plants. EPA set limits on carbon emissions from future gas-fired power plants, current coal-fired power plants and some current gas plants.

These rules are on the books. They were adopted by following the law, and EPA must uphold the rule of law now. The rules must stay in place and be implemented and enforced. Anything less means people will suffer health harms from dirty air that could have been prevented.

Move Forward at the State, City, Community and Individual Levels

States and cities still have many tools in their toolbox to reduce emissions that harm people's health, like cleaning up vehicles by adopting the Advanced Clean Cars II and Advanced Clean Trucks policies, investing in charging infrastructure for electric vehicles, and requiring more electricity to come from truly clean sources like wind, solar, geothermal and tidal. They can also adopt policies to reduce emissions from buildings, manufacturing facilities and freight activities.

Cities, communities and individuals can also adopt a suite of "smart surfaces" solutions – things like cool roofs, porous pavement, more green space and solar panels that help reduce heat in their neighborhoods and protect health from the combined health harms of pollution and dangerously high temperatures.

Individuals can keep themselves safe and help their friends and families do the same – things like checking daily air pollution forecasts at Airnow.gov, preparing for wildfires, floods and other disasters at Lung.org/disaster, and reducing emissions from their vehicle or home energy use in their own lives.

Above all: you can also use the power of your personal voice. Even in a time when clean air protections are under threat, the fact remains: people nationwide want clean air. The need for clean air is universal, nonpartisan and knows no boundaries. And sharing a story is powerful–whether it's a time when you had asthma symptoms on a smoggy day, your child spent days indoors because of wildfire smoke, or the concerns you have about how losses of staff and funding at EPA may impact the air you breathe. That's true when you take your story to your elected officials, but it's also true with family, friends, and other members of your community.

Understanding Grades and Tables

*See **Methodology** for a full explanation of data sources and calculations made for state grades.*

Notes for state grades tables

1. Not all counties have monitors for either ozone or particle pollution. If a county does not have any monitoring data for either pollutant, that county's name is not on the list in these tables. The decision about siting monitors in a county is made by the state and the U.S. Environmental Protection Agency, not by the American Lung Association.
2. **INC** (Incomplete) indicates that monitoring data is available for at least one year in that county, but not all three years.
3. **DNC** (Data Not Collected) indicates that data on that particular pollutant was not collected in that county during the three years covered in the report.
4. The **Weighted Average (Wgt. Avg.)** is derived by adding the three years of individual level data (2021-2023), multiplying the sums of each level by the assigned standard weights (i.e., 1=orange, 1.5=red, 2.0=purple and 2.5=maroon) and calculating the average. Grades are assigned based on the weighted averages as follows: A=0.0, B=0.3-0.9, C=1.0-2.0, D=2.1-3.2, F=3.3+.
5. The **Design Value** is the calculated concentration of a pollutant based on the annual National Ambient Air Quality Standard for $PM_{2.5}$, which is 9.0 $\mu g/m^3$. Counties with design values of 9.0 or lower received a grade of "Pass" for Annual $PM_{2.5}$. Counties with design values of 9.1 or higher received a grade of "Fail."

Notes for at-risk groups tables

1. Adding across rows does not produce valid estimates. Adding the at-risk categories (asthma, COPD, poverty, etc.) will double-count people who fall into more than one category.
2. **Total Population** is based on 2023 U.S. Census and represents the at-risk populations in counties with ozone or $PM_{2.5}$ pollution monitors; it does not represent the entire state's sensitive populations.
3. Those **18 & under** and **65 & over** are vulnerable to ozone and $PM_{2.5}$. Do not use them as population denominators for disease estimates—that will lead to incorrect estimates.
4. **Pediatric asthm**a estimates are for those under 18 years of age and represent the estimated number of people in that age group who had asthma in 2023 based on the state rates, when available, or national rates when not (Behavioral Risk Factor Surveillance System, or BRFSS), applied to county population estimates (U.S. Census).
5. **Adult asthma** estimates are for those 18 years of age and older and represent the estimated number of people in that age group who had asthma during 2023 based on state rates (BRFSS) applied to county population estimates (U.S. Census).
6. **COPD** estimates are for adults 18 and over who had ever been diagnosed with chronic obstructive pulmonary disease, which includes chronic bronchitis and emphysema, based on state rates (BRFSS) applied to county population estimates (U.S. Census).
7. **Lung cancer** estimates are for all ages and represent the estimated number of people newly diagnosed with lung cancer in 2021 based on state rates (StateCancerProfiles.gov) applied to county population estimates (U.S. Census).
8. **Cardiovascular (CV) disease** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to county population estimates (U.S. Census). CV disease includes coronary heart disease, stroke and heart attack.
9. **Pregnancy** estimates are for females 18-49 and based on state rates of pregnancies resulting in live births applied to population estimates (U.S. Census).
10. **Poverty** estimates include all ages and come from the U.S. Census Bureau's Small Area Income and Poverty Estimates program. The estimates are derived from a model using estimates of income or poverty from the Annual Social and Economic Supplement and the Current Population Survey, 2023. Puerto Rico poverty estimates come from the U.S. Census Bureau's American Community Survey, 2019-2023.
11. **People of color** are defined as anyone Hispanic or as non-Hispanic Black, Asian, American Indian/Alaska Native, Native Hawaiian and Other Pacific Islander, or two or more races, based on 2023 county population estimates (U.S Census). Puerto Rico race and ethnicity estimates come from the U.S. Census Bureau's American Community Survey, 2019-2023.
12. Based on a request from Connecticut, the Census Bureau shifted from providing population estimates by county to county-equivalent Planning Regions for the state starting with 2022 data. As air quality data continues to be county-based and Planning Regions are incompatible with historic Connecticut counties, Census Bureau population estimates from 2021 are used in this year's report. Disease rates are still from the latest year available.

Table 1 Populations at Risk by Grade and by Pollutant

People at Risk from Short-Term Particle Pollution (Daily $PM_{2.5}$)

	Chronic Diseases					Age Groups							
In Counties Where the Grades Were:	Adult Asthma	Pediatric Asthma	COPD	Lung Cancer	CV Disease	Under 18	65 and Over	Pregnancies	Poverty	People of Color	Total Population	Number of Counties
Grade A (0.0)	1,124,915	247,119	762,250	7,208	1,092,866	3,102,575	2,727,090	157,238	2,130,229	6,588,285	14,764,458	62
Grade B (0.3-0.9)	4,289,395	902,647	2,777,553	28,165	3,969,488	12,088,644	9,863,933	633,944	7,077,114	27,984,148	57,142,408	160
Grade C (1.0-2.0)	3,578,296	777,059	2,115,172	22,314	2,924,564	10,284,615	7,315,386	518,938	5,392,423	22,628,156	46,214,218	132
Grade D (2.1-3.2)	2,494,526	488,473	1,516,172	16,743	2,033,166	6,701,796	5,520,433	333,157	3,772,420	12,136,398	31,357,228	100
Grade F (3.3+)	5,957,863	1,188,978	3,262,762	33,910	4,724,253	16,774,897	12,669,711	822,523	9,432,925	39,123,137	77,178,968	154
National Population in Counties with $PM_{2.5}$ Monitors	17,961,644	3,707,933	10,774,444	111,852	15,242,636	50,483,527	39,407,042	2,541,883	28,671,471	111,697,262	233,762,815	648

People at Risk from Year-Round Particle Pollution (Annual $PM_{2.5}$)

	Chronic Diseases					Age Groups						
In Counties Where the Grades Were:	Adult Asthma	Pediatric Asthma	COPD	Lung Cancer	CV Disease	Under 18	65 and Over	Pregnancies	Poverty	People of Color	Total Population	Number of Counties
Pass	10,122,909	2,011,982	6,078,482	63,610	8,596,829	26,953,506	22,409,791	1,381,553	15,058,221	55,546,609	128,380,895	426
Fail	6,258,046	1,379,394	3,663,712	38,256	5,202,276	19,216,717	13,211,682	946,632	11,101,103	48,309,996	84,997,574	115
National Population in Counties with $PM_{2.5}$ Monitors	17,961,644	3,707,933	10,774,444	111,852	15,242,636	50,483,527	39,407,042	2,541,883	28,671,471	111,697,262	233,762,815	648

People at Risk from Ozone

	Chronic Diseases				Age Groups						
In Counties Where the Grades Were:	Adult Asthma	Pediatric Asthma	COPD	CV Disease	Under 18	65 and Over	Pregnancies	Poverty	People of Color	Total Population	Number of Counties
Grade A (0.0)	1,948,670	361,826	1,370,724	2,035,209	5,050,342	5,443,296	255,197	3,091,849	10,345,036	25,758,934	137
Grade B (0.3-0.9)	2,702,269	568,383	1,781,636	2,536,346	7,307,754	6,368,314	364,608	4,330,183	14,141,417	34,802,173	148
Grade C (1.0-2.0)	2,789,756	579,640	1,821,933	2,442,236	7,631,976	6,005,211	364,325	3,849,007	12,587,711	34,492,823	174
Grade D (2.1-3.2)	1,977,825	394,791	1,186,794	1,635,315	5,233,078	4,212,129	266,456	2,646,545	9,154,408	24,448,296	81
Grade F (3.3+)	9,392,704	1,980,591	5,322,148	7,585,423	27,684,476	19,946,133	1,379,521	15,054,422	66,483,656	125,231,723	211
National Population in Counties with Ozone Monitors	19,014,829	3,932,701	11,597,147	16,401,883	53,502,295	42,448,315	2,657,497	29,329,395	113,897,030	247,396,139	780

Table 2a People at Risk in 25 U.S. Cities Most Polluted by Short-Term Particle Pollution (Daily $PM_{2.5}$)

2025 Rank	Metropolitan Statistical Areas	Total Population	Under 18	65 and Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	People of Color	Poverty
1	Bakersfield-Delano, CA	913,820	259,728	111,264	16,473	57,210	25,454	313	42,581	9,148	639,578	169,857
2	Fairbanks-College, AK	94,840	22,535	12,395	1,565	7,941	3,951	49	4,980	1,202	30,209	7,015
3	Eugene-Springfield, OR	381,181	65,661	81,956	4,563	37,332	20,889	159	26,719	3,537	78,370	54,725
3	Visalia, CA	479,468	140,917	58,469	8,938	29,621	13,260	164	22,217	4,853	355,437	83,050
5	Fresno-Hanford-Corcoran, CA	1,332,702	364,673	175,198	23,129	84,749	38,374	457	64,440	13,466	972,180	229,167
6	Reno-Carson City-Gardnerville Ranchos, NV-CA	699,307	139,687	141,044	9,992	49,010	41,135	289	44,011	6,481	258,037	67,410
7	Los Angeles-Long Beach, CA	18,316,743	3,923,848	2,876,482	248,870	1,263,845	602,613	6,262	1,025,571	189,174	13,036,866	2,228,294
8	Yakima, WA	256,643	73,483	37,805	5,371	19,664	7,921	121	12,204	2,502	154,962	40,910
9	Seattle-Tacoma, WA	4,993,725	1,019,521	804,469	74,525	426,849	171,424	2,352	263,032	53,000	1,964,673	453,095
10	Sacramento-Roseville, CA	2,706,315	593,708	474,959	37,656	185,863	91,589	924	156,808	27,170	1,368,720	297,127
11	Medford-Grants Pass, OR	308,589	61,414	76,999	4,268	29,192	18,034	129	23,597	2,417	62,148	40,445
11	San Jose-San Francisco-Oakland, CA	9,001,024	1,861,823	1,497,266	118,086	627,407	303,409	3,078	517,775	91,577	5,990,798	872,151
11	Spokane-Spokane Valley-Coeur d'Alene, WA-ID	785,302	168,696	148,630	12,182	65,934	30,875	359	45,908	8,007	126,868	90,163
14	Bismarck, ND	135,786	31,657	25,018	2,060	10,507	5,524	72	8,727	1,606	17,796	10,229
15	Missoula, MT	126,939	22,681	22,869	1,532	12,369	6,916	57	7,793	1,473	15,909	14,224
16	Pittsburgh-Weirton-Steubenville, PA-OH-WV	2,727,866	508,773	605,974	50,022	227,806	173,588	1,468	250,600	25,746	410,735	313,183
16	Redding-Red Bluff, CA	245,262	54,424	52,782	3,452	16,873	8,997	84	15,642	2,158	65,965	33,160
18	Fargo-Wahpeton, ND-MN	285,484	64,560	40,164	3,994	22,676	9,854	150	15,535	3,909	47,884	28,800
19	Minot, ND	75,742	18,142	11,835	1,180	5,912	2,825	40	4,353	931	13,526	5,684
20	Helena, MT	96,091	20,040	20,545	1,354	8,952	5,576	44	6,602	891	9,097	8,618
21	Indianapolis-Carmel-Muncie, IN	2,651,953	629,614	417,423	42,718	234,648	164,452	1,645	195,165	31,238	763,082	292,453
22	Detroit-Warren-Ann Arbor, MI	5,361,927	1,139,647	989,127	82,844	467,408	359,574	2,846	405,547	53,288	1,795,028	739,466
22	Lancaster, PA	558,589	127,940	112,749	12,689	43,953	32,546	298	46,971	5,306	111,949	46,567
22	Logan, UT-ID	157,887	45,666	16,972	2,851	12,407	4,168	41	6,457	2,211	26,848	15,751
25	Salt Lake City-Provo-Orem, UT-ID	2,805,734	771,304	314,357	47,547	225,519	74,264	690	121,225	37,296	720,985	235,887

Notes:

Cities are ranked using the highest weighted average for any county within that Combined Metropolitan Statistical Area or Metropolitan Statistical Area.

Adding across rows does not produce valid estimates. Adding the disease categories (asthma, COPD, etc.) will double-count people who fall into more than one category.

Table 2b People at Risk in 25 U.S. Cities Most Polluted by Year-Round Particle Pollution (Annual $PM_{2.5}$)

2025 Rank	Metropolitan Statistical Areas	Total Population	Under 18	65 and Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	People of Color	Poverty
1	Bakersfield-Delano, CA	913,820	259,728	111,264	16,473	57,210	25,454	313	42,581	9,148	639,578	169,857
2	Visalia, CA	479,468	140,917	58,469	8,938	29,621	13,260	164	22,217	4,853	355,437	83,050
3	Fresno-Hanford-Corcoran, CA	1,332,702	364,673	175,198	23,129	84,749	38,374	457	64,440	13,466	972,180	229,167
4	Eugene-Springfield, OR	381,181	65,661	81,956	4,563	37,332	20,889	159	26,719	3,537	78,370	54,725
5	Los Angeles-Long Beach, CA	18,316,743	3,923,848	2,876,482	248,870	1,263,845	602,613	6,262	1,025,571	189,174	13,036,866	2,228,294
6	Detroit-Warren-Ann Arbor, MI	5,361,927	1,139,647	989,127	82,844	467,408	359,574	2,846	405,547	53,288	1,795,028	739,466
6	San Jose-San Francisco-Oakland, CA	9,001,024	1,861,823	1,497,266	118,086	627,407	303,409	3,078	517,775	91,577	5,990,798	872,151
8	Houston-Pasadena, TX	7,706,626	1,967,004	990,110	148,098	486,725	282,905	3,288	429,147	97,728	5,106,048	1,058,803
9	Cleveland-Akron-Canton, OH	3,732,803	773,498	767,567	52,388	326,574	241,288	2,289	300,854	38,634	928,916	477,528
10	Fairbanks-College, AK	94,840	22,535	12,395	1,565	7,941	3,951	49	4,980	1,202	30,209	7,015
11	Indianapolis-Carmel-Muncie, IN	2,651,953	629,614	417,423	42,718	234,648	164,452	1,645	195,165	31,238	763,082	292,453
12	Pittsburgh-Weirton-Steubenville, PA-OH-WV	2,727,866	508,773	605,974	50,022	227,806	173,588	1,468	250,600	25,746	410,735	313,183
13	Chicago-Naperville, IL-IN-WI	9,794,558	2,121,326	1,642,328	135,642	747,355	491,566	5,583	611,557	99,967	4,756,478	1,066,086
14	Cincinnati-Wilmington, OH-KY-IN	2,313,417	530,030	395,801	38,809	197,431	151,078	1,509	177,422	25,551	527,325	251,071
14	Sacramento-Roseville, CA	2,706,315	593,708	474,959	37,656	185,863	91,589	924	156,808	27,170	1,368,720	297,127
16	Brownsville-Harlingen-Raymondville, TX	446,747	125,079	64,917	9,417	27,393	16,644	191	25,463	5,200	406,406	103,978
17	Medford-Grants Pass, OR	308,589	61,414	76,999	4,268	29,192	18,034	129	23,597	2,417	62,148	40,445
17	Missoula, MT	126,939	22,681	22,869	1,532	12,369	6,916	57	7,793	1,473	15,909	14,224
17	St. Louis-St. Charles-Farmington, MO-IL	2,900,730	625,580	538,402	47,592	224,152	182,663	1,746	229,436	30,409	777,225	302,295
20	Kalamazoo-Battle Creek-Portage, MI	456,459	100,251	80,613	7,287	39,453	29,110	242	32,526	4,841	105,192	58,511
20	Phoenix-Mesa, AZ	5,124,113	1,127,488	883,602	90,893	412,019	217,161	1,942	303,431	55,017	2,382,001	562,977
22	Texarkana, TX-AR	145,907	34,333	26,385	2,511	10,172	7,693	75	11,124	1,592	52,952	23,723
23	El Centro, CA	179,057	50,348	25,158	3,193	11,282	5,219	61	8,804	1,651	163,029	29,810
23	Yakima, WA	256,643	73,483	37,805	5,371	19,664	7,921	121	12,204	2,502	154,962	40,910
25	Spokane-Spokane Valley-Coeur d'Alene, WA-ID	785,302	168,696	148,630	12,182	65,934	30,875	359	45,908	8,007	126,868	90,163

Notes:

Cities are ranked using the highest design value for any county within that Combined Metropolitan Statistical Area or Metropolitan Statistical Area.

Adding across rows does not produce valid estimates. Adding the disease categories (asthma, COPD, etc.) will double-count people who have been diagnosed with more than one disease.

Table 2c People at Risk in 25 Most Ozone-Polluted Cities

2025 Rank	Metropolitan Statistical Areas	Total Population	Under 18	65 and Over	Pediatric Asthma	Adult Asthma	COPD	CV Disease	Pregnancies	People of Color	Poverty
1	Los Angeles-Long Beach, CA	18,316,743	3,923,848	2,876,482	248,870	1,263,845	602,613	1,025,571	189,174	13,036,866	2,228,294
2	Visalia, CA	479,468	140,917	58,469	8,938	29,621	13,260	22,217	4,853	355,437	83,050
3	Bakersfield-Delano, CA	913,820	259,728	111,264	16,473	57,210	25,454	42,581	9,148	639,578	169,857
4	Phoenix-Mesa, AZ	5,124,113	1,127,488	883,602	90,893	412,019	217,161	303,431	55,017	2,382,001	562,977
5	Fresno-Hanford-Corcoran, CA	1,332,702	364,673	175,198	23,129	84,749	38,374	64,440	13,466	972,180	229,167
6	Denver-Aurora-Greeley, CO	3,691,404	766,337	542,420	53,221	334,291	129,858	182,148	39,810	1,355,755	321,700
7	Houston-Pasadena, TX	7,706,626	1,967,004	990,110	148,098	486,725	282,905	429,147	97,728	5,106,048	1,058,803
8	San Diego-Chula Vista-Carlsbad, CA	3,269,973	675,125	520,284	42,820	227,652	107,004	181,254	34,028	1,859,156	319,714
9	Salt Lake City-Provo-Orem, UT-ID	2,805,734	771,304	314,357	47,547	225,519	74,264	121,225	37,296	720,985	235,887
10	Dallas-Fort Worth, TX-OK	8,654,750	2,133,317	1,119,043	160,881	554,301	322,518	488,815	110,764	4,832,096	895,943
11	Sacramento-Roseville, CA	2,706,315	593,708	474,959	37,656	185,863	91,589	156,808	27,170	1,368,720	297,127
12	Las Vegas-Henderson, NV	2,392,293	521,126	397,842	37,280	164,626	130,769	138,996	24,076	1,450,276	305,770
13	Fort Collins-Loveland, CO	370,771	66,613	65,986	4,626	34,727	14,077	19,851	4,094	72,996	36,698
14	San Jose-San Francisco-Oakland, CA	9,001,024	1,861,823	1,497,266	118,086	627,407	303,409	517,775	91,577	5,990,798	872,151
15	Chicago-Naperville, IL-IN-WI	9,794,558	2,121,326	1,642,328	135,642	747,355	491,566	611,557	99,967	4,756,478	1,066,086
16	New York-Newark, NY-NJ-CT-PA	22,731,508	4,585,113	4,014,254	380,490	1,720,642	881,039	1,353,213	240,627	12,232,605	2,789,907
17	El Centro, CA	179,057	50,348	25,158	3,193	11,282	5,219	8,804	1,651	163,029	29,810
18	El Paso-Las Cruces, TX-NM	1,098,541	274,904	156,492	20,500	72,104	39,813	61,937	13,219	940,363	202,525
19	Tulsa-Bartlesville-Muskogee, OK	1,165,140	282,064	195,327	27,637	99,871	68,921	91,038	13,481	448,694	168,495
20	San Antonio-New Braunfels-Kerrville, TX	2,785,647	667,183	406,533	50,232	180,151	107,861	164,557	34,720	1,836,422	367,038
21	St. Louis-St. Charles-Farmington, MO-IL	2,900,730	625,580	538,402	47,592	224,152	182,663	229,436	30,409	777,225	302,295
22	Albuquerque-Santa Fe-Los Alamos, NM	1,168,363	229,761	243,368	16,413	91,815	47,095	79,693	11,425	717,410	158,778
23	Colorado Springs, CO	768,832	173,860	114,069	12,074	68,042	26,518	37,167	7,835	251,164	55,091
24	Redding-Red Bluff, CA	245,262	54,424	52,782	3,452	16,873	8,997	15,642	2,158	65,965	33,160
24	Sheboygan, WI	117,752	25,055	23,936	1,543	10,063	5,698	8,928	1,088	21,989	10,197

Notes:

Cities are ranked using the highest weighted average for any county within that Combined Metropolitan Statistical Area or Metropolitan Statistical Area.

Adding across rows does not produce valid estimates. Adding the disease categories (asthma, COPD, etc.) will double-count people who have been diagnosed with more than one disease.

Table 3a Cleanest U.S. Cities for Short-Term Particle Pollution (Daily $PM_{2.5}$)

Metropolitan Statistical Area	Population
Asheville-Waynesville-Brevard, NC	513,720
Bangor, ME	155,312
Burlington-Fort Madison, IA-IL	76,906
Charleston-North Charleston, SC	849,417
College Station-Bryan, TX	281,445
Fayetteville-Springdale-Rogers, AR	590,337
Gadsden, AL	103,241
Gulfport-Biloxi, MS	421,916
Hot Springs-Malvern, AR	133,042
Killeen-Temple, TX	501,333
Little Rock-North Little Rock, AR	913,536
Midland-Odessa-Andrews, TX	365,482
Mobile-Daphne-Fairhope, AL	665,147
Montgomery-Selma, AL	421,645
Pensacola-Ferry Pass-Brent, FL	530,090
Peoria-Canton, IL	394,781
Ponce-Coamo, PR	319,592
San Juan-Bayamón, PR	2,360,082
San Luis Obispo-Paso Robles, CA	281,639
Santa Maria-Santa Barbara, CA	441,257
Shreveport-Bossier City-Minden, LA	418,533
Tuscaloosa, AL	278,290

Note:
Monitors in these cities reported no days when $PM_{2.5}$ levels reached the unhealthful range using the Air Quality Index based on the 2012 NAAQS.

Table 3b Top 25 Cleanest U.S. Cities for Year-Round Particle Pollution (Annual $PM_{2.5}$)

2025 Rank	Design Value	Metropolitan Statistical Area	Population
1	3.7	Casper, WY	79,941
1	3.7	Urban Honolulu, HI	989,408
3	4.0	Kahului-Wailuku, HI	164,264
4	4.1	Bozeman, MT	126,409
5	4.8	Bangor, ME	155,312
6	5.1	St. George, UT	202,452
6	5.1	Anchorage, AK	401,314
8	5.2	Cheyenne, WY	100,984
9	5.3	Colorado Springs, CO	768,832
9	5.3	Grand Junction, CO	159,681
11	5.4	Wilmington, NC	467,337
12	5.7	Lubbock-Plainview, TX	396,955
13	5.9	Elmira-Corning, NY	173,487
13	5.9	Salinas, CA	430,723
15	6.0	Duluth-Grand Rapids, MN-WI	326,968
15	6.0	Gainesville-Lake City, FL	425,189
15	6.0	Amarillo-Borger, TX	292,428
18	6.1	Syracuse-Auburn, NY	727,441
19	6.2	Santa Rosa-Petaluma, CA	481,812
20	6.3	Asheville-Waynesville-Brevard, NC	513,720
21	6.4	Burlington-South Burlington-Barre, VT	288,084
22	6.6	Pittsfield, MA	126,818
23	6.7	San Juan-Bayamón, PR	2,360,082
23	6.7	Portland-Vancouver-Salem, OR-WA	3,286,669
23	6.7	Lynchburg, VA	264,590

Notes:
Cities are ranked by using the highest design value for any county within that metropolitan area.

Table 3c Cleanest U.S. Cities for Ozone Air Pollution

Metropolitan Statistical Area	Population
Augusta-Richmond County, GA-SC	629,429
Bangor, ME	155,312
Bellingham, WA	231,919
Brunswick-St. Simons, GA	116,074
Charleston-Huntington-Ashland, WV-OH-KY	643,394
Charlottesville, VA	225,127
Crestview-Fort Walton Beach-Destin, FL	304,818
Fairbanks-College, AK	94,840
Florence, SC	199,630
Gadsden, AL	103,241
Gainesville-Lake City, FL	425,189
Grand Junction, CO	159,681
Greenville-Washington, NC	219,600
Johnson City-Kingsport-Bristol, TN-VA	598,800
Mayagüez-Aguadilla, PR	458,312
Middlesborough-Corbin, KY	172,880
Missoula, MT	126,939
Monroe-Ruston, LA	269,847
Montgomery-Selma, AL	421,645
Myrtle Beach-Conway, SC	463,209
North Port-Bradenton, FL	1,152,221
Palm Bay-Melbourne-Titusville, FL	643,979
Panama City-Panama City Beach, FL	216,371
Pocatello, ID	90,400
Prescott Valley-Prescott, AZ	249,081
Roanoke, VA	314,314
Rocky Mount-Wilson-Roanoke Rapids, NC	288,366
Salinas, CA	430,723
San Juan-Bayamón, PR	2,360,082
Santa Rosa-Petaluma, CA	481,812
Tallahassee-Bainbridge, FL-GA	421,732
Tuscaloosa, AL	278,290
Urban Honolulu, HI	989,408
Victoria-Port Lavaca, TX	118,504
Wilmington, NC	467,337

Notes:

1. This list represents cities with no monitored ozone air pollution in unhealthful ranges using the Air Quality Index based on 2015 NAAQS.

Table 4a Cleanest Counties for Short-Term Particle Pollution (Daily $PM_{2.5}$)

County	State	Metropolitan Statistical Area
Juneau City and Borough	AK	
Baldwin	AL	Mobile-Daphne-Fairhope, AL
Clay	AL	
DeKalb	AL	Huntsville-Decatur-Albertville, AL-TN
Etowah	AL	Gadsden, AL
Mobile	AL	Mobile-Daphne-Fairhope, AL
Montgomery	AL	Montgomery-Selma, AL
Sumter	AL	
Tuscaloosa	AL	Tuscaloosa, AL
Arkansas	AR	
Crittenden	AR	Memphis-Clarksdale-Forrest City, TN-MS-AR
Garland	AR	Hot Springs-Malvern, AR
Jackson	AR	
Polk	AR	
Pulaski	AR	Little Rock-North Little Rock, AR
Washington	AR	Fayetteville-Springdale-Rogers, AR
Apache	AZ	
Pima	AZ	Tucson-Nogales, AZ
Marin	CA	San Jose-San Francisco-Oakland, CA
San Francisco	CA	San Jose-San Francisco-Oakland, CA
San Luis Obispo	CA	San Luis Obispo-Paso Robles, CA
Santa Barbara	CA	Santa Maria-Santa Barbara, CA
Ventura	CA	Los Angeles-Long Beach, CA
Escambia	FL	Pensacola-Ferry Pass-Brent, FL
Polk	FL	Orlando-Lakeland-Deltona, FL
Clayton	GA	Atlanta--Athens-Clarke County--Sandy Springs, GA-AL
Hawaii	HI	
Lee	IA	Burlington-Fort Madison, IA-IL
Madison	IL	St. Louis-St. Charles-Farmington, MO-IL
Peoria	IL	Peoria-Canton, IL
Caddo Parish	LA	Shreveport-Bossier City-Minden, LA
Iberville Parish	LA	Baton Rouge-Hammond, LA
Orleans Parish	LA	New Orleans-Metairie-Slidell, LA-MS
St. Bernard Parish	LA	New Orleans-Metairie-Slidell, LA-MS
Tangipahoa Parish	LA	Baton Rouge-Hammond, LA
Androscoggin	ME	Portland-Lewiston-South Portland, ME
Hancock	ME	
Kennebec	ME	
Penobscot	ME	Bangor, ME
Allegan	MI	Grand Rapids-Wyoming, MI
Manistee	MI	
Cedar	MO	
Hancock	MS	Gulfport-Biloxi, MS
Harrison	MS	Gulfport-Biloxi, MS
Jackson	MS	Gulfport-Biloxi, MS
Buncombe	NC	Asheville-Waynesville-Brevard, NC
Essex	NY	
Suffolk	NY	New York-Newark, NY-NJ-CT-PA
Bayamón	PR	San Juan-Bayamón, PR
Caguas	PR	San Juan-Bayamón, PR
Fajardo	PR	San Juan-Bayamón, PR
Guaynabo	PR	San Juan-Bayamón, PR
Ponce	PR	Ponce-Coamo, PR
Charleston	SC	Charleston-North Charleston, SC
Edgefield	SC	Augusta-Richmond County, GA-SC
Lawrence	TN	Nashville-Davidson--Murfreesboro, TN
Shelby	TN	Memphis-Clarksdale-Forrest City, TN-MS-AR
Bell	TX	Killeen-Temple, TX
Brazos	TX	College Station-Bryan, TX
Ector	TX	Midland-Odessa-Andrews, TX
Carbon	UT	
Norfolk City	VA	Virginia Beach-Chesapeake, VA-NC

Notes:

Monitors in these counties reported no days when $PM_{2.5}$ levels reached the unhealthful range using the Air Quality Index based on the 2012 NAAQS.

Table 4b Top 25 Cleanest Counties for Year-Round Particle Pollution (Annual $PM_{2.5}$)

2024 Rank	County	State	Design Value	Metropolitan Statistical Area
1	Fremont	WY	2.1	
2	Cook	MN	2.7	
3	La Paz	AZ	3.4	
4	Hughes	SD	3.6	
5	Honolulu	HI	3.7	Urban Honolulu, HI
5	Hancock	ME	3.7	
5	Carlton	MN	3.7	Duluth-Grand Rapids, MN-WI
5	Natrona	WY	3.7	Casper, WY
5	Sublette	WY	3.7	
10	Hillsborough	NH	3.9	Boston-Worcester-Providence, MA-RI-NH
11	Maui	HI	4.0	Kahului-Wailuku, HI
11	Essex	NY	4.0	
11	Teton	WY	4.0	
14	Gallatin	MT	4.1	Bozeman, MT
15	Matanuska-Susitna Borough	AK	4.3	Anchorage, AK
16	Hawaii	HI	4.4	
17	Park	WY	4.5	
18	Juneau City and Borough	AK	4.6	
18	Scotts Bluff	NE	4.6	
18	Custer	SD	4.6	Rapid City-Spearfish, SD
21	Penobscot	ME	4.8	Bangor, ME
21	Belknap	NH	4.8	Boston-Worcester-Providence, MA-RI-NH
23	Lake	CA	4.9	
23	San Benito	CA	4.9	San Jose-San Francisco-Oakland, CA
23	Litchfield	CT	4.9	New Haven-Hartford-Waterbury, CT
23	Lake	MN	4.9	
23	Taos	NM	4.9	
23	Kent	RI	4.9	Boston-Worcester-Providence, MA-RI-NH

Notes:
Counties are ranked by Design Value.

Table 4c Cleanest Counties for Ozone Air Pollution

County	State	Metropolitan Statistical Area
Denali Borough	AK	
Fairbanks North Star Borough	AK	Fairbanks-College, AK
Baldwin	AL	Mobile-Daphne-Fairhope, AL
Elmore	AL	Montgomery-Selma, AL
Etowah	AL	Gadsden, AL
Montgomery	AL	Montgomery-Selma, AL
Russell	AL	Columbus-Auburn-Opelika, GA-AL
Sumter	AL	
Tuscaloosa	AL	Tuscaloosa, AL
Clark	AR	
Yavapai	AZ	Prescott Valley-Prescott, AZ
Colusa	CA	
Glenn	CA	
Humboldt	CA	
Lake	CA	
Marin	CA	San Jose-San Francisco-Oakland, CA
Mendocino	CA	
Monterey	CA	Salinas, CA
San Benito	CA	San Jose-San Francisco-Oakland, CA
San Francisco	CA	San Jose-San Francisco-Oakland, CA
San Mateo	CA	San Jose-San Francisco-Oakland, CA
Santa Cruz	CA	San Jose-San Francisco-Oakland, CA
Siskiyou	CA	
Sonoma	CA	Santa Rosa-Petaluma, CA
Archuleta	CO	
Mesa	CO	Grand Junction, CO
Alachua	FL	Gainesville-Lake City, FL
Baker	FL	Jacksonville-Kingsland-Palatka, FL-GA
Bay	FL	Panama City-Panama City Beach, FL
Brevard	FL	Palm Bay-Melbourne-Titusville, FL
Broward	FL	Miami-Port St. Lucie-Fort Lauderdale, FL
Collier	FL	Cape Coral-Fort Myers-Naples, FL
Columbia	FL	Gainesville-Lake City, FL
Flagler	FL	Orlando-Lakeland-Deltona, FL
Holmes	FL	
Indian River	FL	Miami-Port St. Lucie-Fort Lauderdale, FL
Lake	FL	Orlando-Lakeland-Deltona, FL
Leon	FL	Tallahassee-Bainbridge, FL-GA
Liberty	FL	
Manatee	FL	North Port-Bradenton, FL
Martin	FL	Miami-Port St. Lucie-Fort Lauderdale, FL
Okaloosa	FL	Crestview-Fort Walton Beach-Destin, FL
Osceola	FL	Orlando-Lakeland-Deltona, FL
Palm Beach	FL	Miami-Port St. Lucie-Fort Lauderdale, FL
Pasco	FL	Tampa-St. Petersburg-Clearwater, FL
Santa Rosa	FL	Pensacola-Ferry Pass-Brent, FL
Sarasota	FL	North Port-Bradenton, FL
Seminole	FL	Orlando-Lakeland-Deltona, FL
St. Lucie	FL	Miami-Port St. Lucie-Fort Lauderdale, FL
Volusia	FL	Orlando-Lakeland-Deltona, FL
Wakulla	FL	Tallahassee-Bainbridge, FL-GA
Chattooga	GA	Chattanooga-Cleveland-Dalton, TN-GA-AL
Columbia	GA	Augusta-Richmond County, GA-SC
Glynn	GA	Brunswick-St. Simons, GA
Richmond	GA	Augusta-Richmond County, GA-SC
Sumter	GA	
Honolulu	HI	Urban Honolulu, HI
Bannock	ID	Pocatello, ID
Neosho	KS	
Bell	KY	Middlesborough-Corbin, KY
Boyd	KY	Charleston-Huntington-Ashland, WV-OH-KY
Carter	KY	Charleston-Huntington-Ashland, WV-OH-KY
Greenup	KY	Charleston-Huntington-Ashland, WV-OH-KY
Morgan	KY	
Perry	KY	
Pike	KY	
Pulaski	KY	
Bossier Parish	LA	Shreveport-Bossier City-Minden, LA
Ouachita Parish	LA	Monroe-Ruston, LA
Garrett	MD	
Androscoggin	ME	Portland-Lewiston-South Portland, ME
Aroostook	ME	
Kennebec	ME	
Oxford	ME	
Penobscot	ME	Bangor, ME
Washington	ME	
Carlton	MN	Duluth-Grand Rapids, MN-WI
Lake	MN	
Lauderdale	MS	
Flathead	MT	
Missoula	MT	Missoula, MT
Avery	NC	
Buncombe	NC	Asheville-Waynesville-Brevard, NC
Caldwell	NC	Charlotte-Concord, NC-SC
Caswell	NC	
Durham	NC	Raleigh-Durham-Cary, NC
Edgecombe	NC	Rocky Mount-Wilson-Roanoke Rapids, NC
Macon	NC	
Martin	NC	
Montgomery	NC	
New Hanover	NC	Wilmington, NC

Note:
This list represents counties with no monitored ozone air pollution in unhealthful ranges using the Air Quality Index based on 2015 NAAQS.

Table 4c Cleanest Counties for Ozone Air Pollution (cont.)

County	State	Metropolitan Statistical Area
Pitt	NC	Greenville-Washington, NC
Yancey	NC	
Belknap	NH	Boston-Worcester-Providence, MA-RI-NH
Grafton	NH	
Atlantic	NJ	Philadelphia-Reading-Camden, PA-NJ-DE-MD
Warren	NJ	Allentown-Bethlehem-East Stroudsburg, PA-NJ
Hamilton	NY	
Lawrence	OH	Charleston-Huntington-Ashland, WV-OH-KY
Washington	OH	Parkersburg-Marietta-Vienna, WV-OH
Washington	OR	Portland-Vancouver-Salem, OR-WA
Somerset	PA	Johnstown-Somerset, PA
Tioga	PA	
Bayamón	PR	San Juan-Bayamón, PR
Mayagüez	PR	Mayagüez-Aguadilla, PR
Aiken	SC	Augusta-Richmond County, GA-SC
Anderson	SC	Greenville-Spartanburg-Anderson, SC
Charleston	SC	Charleston-North Charleston, SC
Chesterfield	SC	
Darlington	SC	Florence, SC
Edgefield	SC	Augusta-Richmond County, GA-SC
Horry	SC	Myrtle Beach-Conway, SC
DeKalb	TN	
Knox	TN	Knoxville-Morristown-Sevierville, TN
Loudon	TN	Knoxville-Morristown-Sevierville, TN
Sullivan	TN	Johnson City-Kingsport-Bristol, TN-VA
Polk	TX	
Rockwall	TX	Dallas-Fort Worth, TX-OK
Victoria	TX	Victoria-Port Lavaca, TX
Albemarle	VA	Charlottesville, VA
Charles City	VA	Richmond, VA
Hampton City	VA	Virginia Beach-Chesapeake, VA-NC
Prince Edward	VA	
Roanoke	VA	Roanoke, VA
Rockbridge	VA	
Wythe	VA	
Rutland	VT	
Clallam	WA	
Columbia	WA	
Pierce	WA	Seattle-Tacoma, WA
Skagit	WA	Seattle-Tacoma, WA
Whatcom	WA	Bellingham, WA
Cabell	WV	Charleston-Huntington-Ashland, WV-OH-KY
Greenbrier	WV	
Kanawha	WV	Charleston-Huntington-Ashland, WV-OH-KY
Tucker	WV	
Weston	WY	

Note:
This list represents counties with no monitored ozone air pollution in unhealthful ranges using the Air Quality Index based on 2015 NAAQS.

ALABAMA

American Lung Association in Alabama

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Baldwin	0	0	0	0.0	A
Clay	DNC	DNC	DNC	DNC	DNC
DeKalb	2	0	0	0.7	B
Elmore	0	0	0	0.0	A
Etowah	0	0	0	0.0	A
Jefferson	15	0	0	5.0	F
Madison	4	0	0	1.3	C
Mobile	1	0	0	0.3	B
Montgomery	0	0	0	0.0	A
Morgan	2	0	0	0.7	B
Russell	0	0	0	0.0	A
Shelby	2	0	0	0.7	B
Sumter	0	0	0	0.0	A
Tuscaloosa	0	0	0	0.0	A

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Baldwin	0	0	0	0	0.0	A	7.4	Pass
Clay	0	0	0	0	0.0	A	7.3	Pass
DeKalb	0	0	0	0	0.0	A	7.8	Pass
Elmore	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Etowah	0	0	0	0	0.0	A	INC	INC
Jefferson	2	0	0	0	0.7	B	9.6	Fail
Madison	1	0	0	0	0.3	B	7.7	Pass
Mobile	0	0	0	0	0.0	A	8.1	Pass
Montgomery	0	0	0	0	0.0	A	8.6	Pass
Morgan	1	0	0	0	0.3	B	7.8	Pass
Russell	3	0	0	0	1.0	C	9.5	Fail
Shelby	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Sumter	0	0	0	0	0.0	A	6.2	Pass
Tuscaloosa	0	0	0	0	0.0	A	7.8	Pass

ALABAMA

American Lung Association in Alabama

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Baldwin	253,507	53,110	55,923	4,547	17,840	19,436	145	27,152	2,512	24,942	44,952
Clay	14,111	2,954	3,084	253	995	1,088	8	1,517	138	2,337	2,818
DeKalb	72,569	17,272	13,132	1,479	4,911	5,075	42	6,935	744	15,494	16,441
Elmore	90,441	19,431	15,445	1,664	6,291	6,301	52	8,510	1,038	10,562	25,360
Etowah	103,241	22,589	20,695	1,934	7,162	7,554	59	10,433	1,087	19,921	24,165
Jefferson	662,895	151,180	114,194	12,944	45,093	44,486	376	60,275	7,914	103,120	344,111
Madison	412,600	88,468	66,539	7,575	28,627	27,931	236	37,431	4,759	41,983	154,711
Mobile	411,640	95,366	73,219	8,165	27,932	28,064	234	38,218	4,704	65,684	184,204
Montgomery	224,980	54,247	37,666	4,645	15,047	14,810	127	20,036	2,661	39,395	158,506
Morgan	125,133	29,034	23,040	2,486	8,530	8,821	72	12,070	1,275	14,759	34,132
Russell	58,744	14,401	9,408	1,233	3,923	3,885	33	5,230	674	10,957	32,660
Shelby	233,000	52,318	40,691	4,480	16,031	16,294	133	22,111	2,610	19,207	61,029
Sumter	11,727	2,293	2,408	196	825	818	7	1,130	148	3,607	8,618
Tuscaloosa	237,373	48,286	34,292	4,134	16,491	14,799	135	19,472	3,275	41,429	97,183

ALASKA

American Lung Association in Alaska

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Anchorage Municipality	DNC	DNC	DNC	DNC	DNC
Denali Borough	0	0	0	0.0	A
Fairbanks North Star Borough	0	0	0	0.0	A
Juneau City and Borough	DNC	DNC	DNC	DNC	DNC
Matanuska-Susitna Borough	DNC	DNC	DNC	DNC	DNC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Anchorage Municipality	3	0	0	0	1.0	C	5.1	Pass
Denali Borough	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Fairbanks North Star Borough	51	39	2	1	38.7	F	12.1	Fail
Juneau City and Borough	0	0	0	0	0.0	A	4.6	Pass
Matanuska-Susitna Borough	3	1	0	0	1.5	C	4.3	Pass

ALASKA

American Lung Association in Alaska

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Anchorage Municipality	286,075	66,690	38,032	4,632	24,072	12,385	149	15,882	3,771	24,807	128,186
Denali Borough	1,584	293	213	20	142	76	1	100	19	123	407
Fairbanks North Star Borough	94,840	22,535	12,395	1,565	7,941	3,951	49	4,980	1,202	7,015	30,209
Juneau City and Borough	31,555	6,288	5,356	437	2,762	1,553	16	2,075	395	2,815	11,610
Matanuska-Susitna Borough	115,239	29,114	16,390	2,022	9,433	5,087	60	6,672	1,362	10,906	26,141

ARIZONA

American Lung Association in Arizona

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Apache	DNC	DNC	DNC	DNC	DNC
Cochise	4	0	0	1.3	C
Coconino	2	0	0	0.7	B
Gila	31	2	0	11.3	F
La Paz	2	0	0	0.7	B
Maricopa	149	9	1	54.8	F
Navajo	1	0	0	0.3	B
Pima	13	0	0	4.3	F
Pinal	56	1	0	19.2	F
Santa Cruz	DNC	DNC	DNC	DNC	DNC
Yavapai	0	0	0	0.0	A
Yuma	8	0	0	2.7	D

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Apache	0	0	0	0	0.0	A	INC	INC
Cochise	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Coconino	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Gila	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
La Paz	1	0	0	0	0.3	B	3.4	Pass
Maricopa	8	6	1	0	6.3	F	10.1	Fail
Navajo	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Pima	0	0	0	0	0.0	A	6.2	Pass
Pinal	14	1	0	0	5.2	F	10.4	Fail
Santa Cruz	3	1	0	0	1.5	C	9.4	Fail
Yavapai	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Yuma	5	2	0	0	2.7	D	8.5	Pass

ARIZONA

American Lung Association in Arizona

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Apache	65,036	16,671	11,219	1,344	4,976	2,711	25	3,798	632	18,929	52,439
Cochise	124,640	25,421	31,957	2,049	10,149	6,423	47	9,081	1,073	19,759	55,187
Coconino	144,472	27,607	21,678	2,226	12,139	5,635	55	7,780	1,891	23,888	67,256
Gila	54,003	10,035	17,047	809	4,467	3,183	20	4,532	407	9,431	20,312
La Paz	16,710	2,554	7,281	206	1,429	1,182	6	1,693	107	3,097	6,923
Maricopa	4,585,871	1,013,496	762,598	81,703	368,476	191,419	1,738	267,191	50,097	498,844	2,145,576
Navajo	109,175	27,120	22,446	2,186	8,414	4,958	41	6,983	988	26,533	61,677
Pima	1,063,162	205,102	234,094	16,534	88,255	50,455	403	70,848	11,131	144,676	516,317
Pinal	484,239	103,957	103,957	8,381	39,076	22,559	184	31,708	4,513	54,702	216,113
Santa Cruz	49,158	12,346	9,762	995	3,781	2,173	19	3,055	484	9,831	41,385
Yavapai	249,081	37,931	86,556	3,058	21,401	15,827	94	22,584	1,780	31,465	52,930
Yuma	213,221	52,032	44,803	4,195	16,613	9,363	81	13,124	1,994	32,657	150,663

ARKANSAS

American Lung Association in Arkansas

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Arkansas	DNC	DNC	DNC	DNC	DNC
Ashley	DNC	DNC	DNC	DNC	DNC
Clark	0	0	0	0.0	A
Crittenden	12	1	0	4.5	F
Garland	DNC	DNC	DNC	DNC	DNC
Jackson	DNC	DNC	DNC	DNC	DNC
Newton	1	0	0	0.3	B
Polk	2	0	0	0.7	B
Pulaski	6	0	0	2.0	C
Union	DNC	DNC	DNC	DNC	DNC
Washington	8	0	0	2.7	D

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Arkansas	0	0	0	0	0.0	A	8.0	Pass
Ashley	1	0	0	0	0.3	B	8.1	Pass
Clark	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Crittenden	0	0	0	0	0.0	A	8.2	Pass
Garland	0	0	0	0	0.0	A	INC	INC
Jackson	0	0	0	0	0.0	A	INC	INC
Newton	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Polk	0	0	0	0	0.0	A	8.3	Pass
Pulaski	0	0	0	0	0.0	A	10.0	Fail
Union	1	0	0	0	0.3	B	9.3	Fail
Washington	0	0	0	0	0.0	A	7.7	Pass

ARKANSAS

American Lung Association in Arkansas

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Arkansas	16,307	3,758	3,342	261	1,248	1,194	11	1,624	171	2,697	5,272
Ashley	18,262	4,157	4,035	289	1,398	1,375	12	1,891	181	3,338	5,905
Clark	21,274	4,309	3,579	299	1,683	1,389	14	1,780	291	3,512	6,782
Crittenden	47,139	12,725	7,303	884	3,444	3,009	31	3,939	555	9,578	29,052
Garland	99,784	19,595	25,335	1,361	7,889	7,961	65	11,077	984	18,604	19,905
Jackson	16,784	3,318	3,071	230	1,340	1,178	11	1,549	192	3,513	4,136
Newton	7,071	1,313	1,970	91	565	592	5	836	61	1,313	484
Polk	19,436	4,295	4,578	298	1,495	1,493	13	2,067	184	3,619	2,586
Pulaski	400,009	92,612	68,573	6,432	30,633	26,789	261	35,145	4,846	61,392	204,294
Union	37,397	8,976	7,472	623	2,821	2,653	24	3,587	388	6,969	15,026
Washington	261,549	60,562	32,950	4,206	20,133	15,598	171	19,313	3,489	34,017	83,294

CALIFORNIA

American Lung Association in California

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Alameda	15	1	0	5.5	F	6	0	0	0	2.0	C	8.9	Pass
Amador	5	0	0	1.7	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Butte	9	0	0	3.0	D	8	7	0	0	6.2	F	8.9	Pass
Calaveras	6	0	0	2.0	C	4	3	0	0	2.8	D	6.7	Pass
Colusa	0	0	0	0.0	A	10	6	1	0	7.0	F	8.9	Pass
Contra Costa	6	0	0	2.0	C	5	0	0	0	1.7	C	9.6	Fail
El Dorado	37	2	0	13.3	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Fresno	121	13	0	46.8	F	71	9	1	0	28.8	F	14.8	Fail
Glenn	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Humboldt	0	0	0	0.0	A	6	1	4	0	5.2	F	6.9	Pass
Imperial	52	4	0	19.3	F	17	3	0	0	7.2	F	10.2	Fail
Inyo	14	0	0	4.7	F	28	13	3	1	18.7	F	7.4	Pass
Kern	172	31	0	72.8	F	104	18	1	0	44.3	F	16.2	Fail
Kings	46	2	0	16.3	F	66	9	0	0	26.5	F	14.1	Fail
Lake	0	0	0	0.0	A	0	1	0	0	0.5	B	4.9	Pass
Los Angeles	169	79	4	98.5	F	22	5	0	0	9.8	F	12.2	Fail
Madera	41	4	0	15.7	F	17	4	0	0	7.7	F	10.9	Fail
Marin	0	0	0	0.0	A	0	0	0	0	0.0	A	6.4	Pass
Mariposa	26	3	0	10.2	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Mendocino	0	0	0	0.0	A	12	2	0	0	5.0	F	11.0	Fail
Merced	42	1	0	14.5	F	19	2	0	0	7.3	F	10.4	Fail
Mono	DNC	DNC	DNC	DNC	DNC	11	11	0	0	9.2	F	8.0	Pass
Monterey	0	0	0	0.0	A	1	0	0	0	0.3	B	5.9	Pass
Napa	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC
Nevada	47	6	0	18.7	F	6	15	4	0	12.2	F	6.5	Pass
Orange	21	3	0	8.5	F	11	0	0	0	3.7	F	10.2	Fail
Placer	60	5	0	22.5	F	7	10	5	0	10.7	F	8.9	Pass
Plumas	DNC	DNC	DNC	DNC	DNC	30	12	2	0	17.3	F	14.0	Fail
Riverside	205	84	5	113.7	F	24	12	0	0	14.0	F	12.6	Fail
Sacramento	46	3	0	16.8	F	19	5	1	1	10.3	F	9.9	Fail
San Benito	0	0	0	0.0	A	1	0	0	0	0.3	B	4.9	Pass
San Bernardino	190	150	23	153.7	F	14	7	0	0	8.2	F	13.1	Fail
San Diego	81	1	0	27.5	F	1	0	0	0	0.3	B	9.2	Fail
San Francisco	0	0	0	0.0	A	0	0	0	0	0.0	A	INC	INC
San Joaquin	3	0	1	1.7	C	26	1	0	0	9.2	F	11.2	Fail
San Luis Obispo	13	0	0	4.3	F	0	0	0	0	0.0	A	8.0	Pass
San Mateo	0	0	0	0.0	A	1	0	0	0	0.3	B	7.0	Pass
Santa Barbara	1	0	0	0.3	B	0	0	0	0	0.0	A	7.5	Pass
Santa Clara	13	0	0	4.3	F	4	0	0	0	1.3	C	9.1	Fail

CALIFORNIA (cont.)

American Lung Association in California

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Santa Cruz	0	0	0	0.0	A	1	0	0	0	0.3	B	5.4	Pass
Shasta	15	0	0	5.0	F	5	3	0	0	3.2	D	INC	INC
Siskiyou	0	0	0	0.0	A	15	31	6	2	26.2	F	11.7	Fail
Solano	3	0	0	1.0	C	1	0	0	0	0.3	B	7.3	Pass
Sonoma	0	0	0	0.0	A	2	0	0	0	0.7	B	6.2	Pass
Stanislaus	57	3	0	20.5	F	30	4	0	0	12.0	F	13.0	Fail
Sutter	17	1	0	6.2	F	9	5	0	0	5.5	F	11.2	Fail
Tehama	29	0	0	9.7	F	10	15	0	0	10.8	F	7.5	Pass
Tulare	209	38	0	88.7	F	64	26	2	1	36.5	F	15.7	Fail
Tuolumne	5	0	0	1.7	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Ventura	32	0	0	10.7	F	0	0	0	0	0.0	A	7.5	Pass
Yolo	6	0	0	2.0	C	1	0	0	0	0.3	B	8.2	Pass

CALIFORNIA

American Lung Association in California

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Alameda	1,622,188	315,933	261,127	20,038	114,690	54,586	554	92,845	17,467	151,872	1,169,893
Amador	41,811	6,512	11,749	413	3,139	1,823	14	3,219	271	4,400	10,582
Butte	207,172	42,199	38,881	2,676	14,503	7,075	71	12,053	2,167	40,532	69,617
Calaveras	46,565	8,156	13,834	517	3,425	2,062	16	3,663	334	5,639	10,667
Colusa	22,037	5,915	3,519	375	1,417	689	8	1,177	207	2,677	15,235
Contra Costa	1,155,025	250,439	204,829	15,884	79,697	40,145	394	69,177	11,214	95,369	708,220
El Dorado	192,215	37,109	46,788	2,354	13,764	7,746	66	13,622	1,566	13,438	49,095
Fresno	1,017,162	280,038	134,321	17,761	64,544	29,306	348	49,247	10,334	177,171	748,856
Glenn	28,129	7,470	4,853	474	1,819	908	10	1,559	254	3,769	14,758
Humboldt	133,985	24,839	27,304	1,575	9,615	4,851	46	8,330	1,398	21,856	38,892
Imperial	179,057	50,348	25,158	3,193	11,282	5,219	61	8,804	1,651	29,810	163,029
Inyo	18,527	3,668	4,751	233	1,319	747	6	1,312	149	2,169	7,602
Kern	913,820	259,728	111,264	16,473	57,210	25,454	313	42,581	9,148	169,857	639,578
Kings	152,682	40,721	17,031	2,583	9,770	4,163	53	6,884	1,409	23,950	109,842
Lake	67,878	14,900	16,670	945	4,702	2,653	23	4,660	538	11,790	23,796
Los Angeles	9,663,345	1,952,770	1,520,769	123,854	676,891	321,289	3,302	546,261	102,191	1,299,957	7,221,232
Madera	162,858	43,914	23,846	2,785	10,435	4,905	56	8,309	1,723	28,046	113,482
Marin	254,407	48,217	62,745	3,058	18,319	10,472	87	18,488	1,972	21,535	83,352
Mariposa	16,919	3,036	5,243	193	1,239	753	6	1,338	122	2,899	4,129
Mendocino	89,108	18,532	22,654	1,175	6,266	3,552	30	6,241	739	12,295	33,870
Merced	291,920	82,900	34,885	5,258	18,274	8,064	100	13,461	2,981	53,192	223,791
Mono	13,066	2,257	2,520	143	952	481	4	829	123	1,013	4,555
Monterey	430,723	109,668	66,686	6,956	28,193	13,461	147	22,887	4,142	58,136	313,544
Napa	133,216	25,378	29,031	1,610	9,534	5,076	46	8,831	1,206	11,581	67,693
Nevada	102,037	17,159	30,744	1,088	7,567	4,544	35	8,064	783	10,990	17,386
Orange	3,135,755	645,880	529,921	40,965	219,019	107,518	1,072	184,240	31,411	284,696	1,962,915
Placer	423,561	91,096	88,767	5,778	29,391	15,629	145	27,189	3,820	27,088	139,188
Plumas	19,131	3,233	6,306	205	1,421	887	7	1,584	137	2,418	3,459
Riverside	2,492,442	593,261	392,274	37,628	166,819	79,992	853	136,219	24,848	278,442	1,719,040
Sacramento	1,584,288	357,753	250,123	22,690	107,691	51,284	541	87,181	16,417	185,867	936,276
San Benito	68,175	17,040	9,503	1,081	4,484	2,090	23	3,540	675	6,204	48,484
San Bernardino	2,195,611	553,808	283,489	35,125	143,727	64,943	751	109,152	22,803	284,772	1,656,876
San Diego	3,269,973	675,125	520,284	42,820	227,652	107,004	1,119	181,254	34,028	319,714	1,859,156
San Francisco	808,988	110,389	149,189	7,001	61,356	29,395	277	49,982	8,980	95,298	505,899
San Joaquin	800,965	207,474	110,407	13,159	52,028	24,103	274	40,743	8,082	99,266	587,263
San Luis Obispo	281,639	48,467	64,370	3,074	20,582	10,717	96	18,502	2,703	34,227	95,701
San Mateo	726,353	139,218	135,673	8,830	51,727	26,063	248	44,880	7,100	52,747	468,135
Santa Barbara	441,257	98,119	75,338	6,223	30,126	14,357	151	24,344	4,585	62,891	258,914
Santa Clara	1,877,592	374,375	289,344	23,745	131,880	61,922	643	105,005	19,418	139,084	1,359,960

CALIFORNIA (CONT.)

American Lung Association in California

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Santa Cruz	261,547	47,101	51,848	2,987	18,889	9,494	89	16,308	2,684	31,840	117,201
Shasta	180,366	38,814	39,483	2,462	12,516	6,683	62	11,618	1,607	23,527	42,035
Siskiyou	42,905	8,468	12,308	537	3,067	1,820	15	3,222	319	7,273	11,133
Solano	449,218	97,528	80,908	6,186	30,961	15,423	154	26,470	4,292	45,402	299,076
Sonoma	481,812	90,254	107,472	5,724	34,625	18,507	165	32,207	4,431	43,143	196,911
Stanislaus	551,430	145,831	77,777	9,249	35,568	16,576	189	28,045	5,506	68,761	351,831
Sutter	97,948	24,291	16,478	1,541	6,479	3,186	33	5,451	940	14,849	57,146
Tehama	64,896	15,610	13,299	990	4,357	2,314	22	4,024	551	9,633	23,930
Tulare	479,468	140,917	58,469	8,938	29,621	13,260	164	22,217	4,853	83,050	355,437
Tuolumne	54,204	9,352	15,553	593	3,989	2,324	19	4,099	399	5,390	11,882
Ventura	829,590	178,129	150,029	11,298	57,389	28,871	284	49,699	7,921	80,427	476,803
Yolo	220,544	43,139	30,613	2,736	15,494	6,717	75	11,132	2,779	31,960	125,905

COLORADO

American Lung Association in Colorado

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Adams	38	0	0	12.7	F	3	3	0	0	2.5	D	8.5	Pass
Alamosa	DNC	DNC	DNC	DNC	DNC	INC	INC	INC	INC	INC	INC	INC	INC
Arapahoe	54	3	0	19.5	F	1	0	0	0	0.3	B	5.9	Pass
Archuleta	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Boulder	41	2	0	14.7	F	10	2	0	0	4.3	F	7.3	Pass
Chaffee	11	0	0	3.7	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Clear Creek	34	2	0	12.3	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Delta	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC
Denver	38	2	0	13.7	F	8	4	0	0	4.7	F	8.7	Pass
Douglas	65	7	0	25.2	F	4	2	0	0	2.3	D	5.5	Pass
El Paso	30	0	0	10.0	F	2	1	0	0	1.2	C	5.3	Pass
Garfield	12	0	0	4.0	F	INC	INC	INC	INC	INC	INC	INC	INC
Gilpin	26	1	0	9.2	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Grand	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Gunnison	3	0	0	1.0	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Jackson	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC	INC
Jefferson	92	12	0	36.7	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
La Plata	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Larimer	55	5	0	20.8	F	3	0	0	0	1.0	C	7.1	Pass
Mesa	0	0	0	0.0	A	3	0	0	0	1.0	C	5.3	Pass
Montezuma	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Park	19	1	0	6.8	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Prowers	DNC	DNC	DNC	DNC	DNC	INC	INC	INC	INC	INC	INC	INC	INC
Pueblo	INC	INC	INC	INC	INC	1	0	0	0	0.3	B	INC	INC
Rio Blanco	8	1	0	3.2	D	3	1	0	0	1.5	C	7.2	Pass
San Miguel	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Weld	49	1	0	16.8	F	8	1	0	0	3.2	D	8.1	Pass

COLORADO

American Lung Association in Colorado

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Adams	533,365	129,601	61,708	9,001	46,373	16,768	183	23,155	5,802	51,247	289,604
Alamosa	16,655	3,983	2,583	277	1,452	567	6	793	181	3,416	9,062
Arapahoe	656,061	145,860	97,962	10,130	58,188	23,070	224	32,527	6,857	65,646	287,559
Archuleta	14,189	2,363	4,130	164	1,310	711	5	1,061	103	1,577	3,116
Boulder	326,831	55,707	55,764	3,869	30,918	12,462	112	17,599	3,548	34,478	77,878
Chaffee	20,617	3,008	5,401	209	1,973	975	7	1,431	162	1,829	3,203
Clear Creek	9,147	1,209	2,234	84	887	433	3	636	76	704	1,225
Delta	31,746	5,974	9,087	415	2,864	1,535	11	2,281	238	4,071	5,766
Denver	716,577	126,866	91,876	8,811	68,121	23,789	245	32,374	9,028	73,632	319,343
Douglas	383,906	87,740	55,644	6,093	33,580	13,727	131	19,581	3,748	14,173	83,231
El Paso	744,215	169,937	107,504	11,802	65,747	25,314	255	35,375	7,658	53,047	247,868
Garfield	62,707	15,110	9,523	1,049	5,410	2,209	21	3,139	596	5,606	22,824
Gilpin	5,926	765	1,271	53	575	276	2	408	52	425	891
Grand	15,935	2,431	3,473	169	1,519	700	5	1,018	140	1,311	2,299
Gunnison	17,321	2,697	2,633	187	1,676	635	6	885	188	1,741	2,462
Jackson	1,309	237	359	16	119	63	0	95	9	174	205
Jefferson	576,366	103,852	105,941	7,212	53,623	22,710	197	32,437	5,820	42,071	135,494
La Plata	56,407	9,598	12,270	667	5,275	2,418	19	3,505	539	6,305	12,113
Larimer	370,771	66,613	65,986	4,626	34,727	14,077	127	19,851	4,094	36,698	72,996
Mesa	159,681	32,013	34,642	2,223	14,405	6,621	55	9,586	1,488	18,546	32,051
Montezuma	26,531	5,499	6,665	382	2,351	1,185	9	1,744	215	3,664	7,454
Park	18,117	2,607	4,488	181	1,724	871	6	1,291	135	1,457	2,373
Prowers	11,751	3,007	2,226	209	989	442	4	637	104	2,286	5,252
Pueblo	169,422	36,514	33,884	2,536	15,012	6,747	58	9,741	1,568	22,336	81,610
Rio Blanco	6,569	1,527	1,282	106	569	256	2	370	58	688	1,082
San Miguel	7,868	1,226	1,484	85	748	331	3	479	73	618	1,269
Weld	359,442	90,702	47,427	6,299	30,758	11,713	123	16,359	3,716	32,284	133,581

CONNECTICUT

American Lung Association in Connecticut

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Fairfield	44	11	0	20.2	F
Hartford	9	0	0	3.0	D
Litchfield	8	0	0	2.7	D
Middlesex	20	1	0	7.2	F
New Haven	26	1	0	9.2	F
New London	15	0	0	5.0	F
Tolland	5	1	0	2.2	D
Windham	3	0	0	1.0	C

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Fairfield	3	3	1	0	3.2	D	7.4	Pass
Hartford	4	3	0	0	2.8	D	7.0	Pass
Litchfield	3	4	0	0	3.0	D	4.9	Pass
Middlesex	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
New Haven	5	2	1	0	3.3	F	7.4	Pass
New London	3	3	0	0	2.5	D	6.3	Pass
Tolland	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Windham	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

CONNECTICUT

American Lung Association in Connecticut

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Fairfield	959,768	195,188	158,603	15,463	81,758	35,190	537	56,117	9,064	85,452	386,212
Hartford	896,854	71,422	158,512	5,658	77,334	33,422	502	53,235	8,649	92,542	371,285
Litchfield	185,000	28,968	42,169	2,295	16,300	8,046	104	13,154	1,494	15,713	25,753
Middlesex	164,759	91,898	35,695	7,280	14,744	6,991	92	11,344	1,462	10,537	29,067
New Haven	863,700	17,576	156,201	1,392	75,199	32,671	483	52,088	8,557	100,433	345,820
New London	268,805	20,138	51,843	1,595	23,561	10,518	150	16,857	2,420	23,102	69,656
Tolland	150,293	110,222	25,398	8,732	13,667	5,537	84	8,685	1,598	15,039	26,007
Windham	116,418	53,152	20,814	4,211	10,221	4,456	65	7,117	1,097	13,043	21,471

DELAWARE

American Lung Association in Delaware

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Kent	5	0	0	1.7	C
New Castle	6	0	0	2.0	C
Sussex	2	0	0	0.7	B

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Kent	3	2	1	0	2.7	D	INC	INC
New Castle	4	1	2	0	3.2	D	7.5	Pass
Sussex	2	2	1	0	2.3	D	INC	INC

DELAWARE

American Lung Association in Delaware

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Kent	189,789	42,989	35,338	2,986	16,588	9,479	103	12,377	2,043	21,471	82,407
New Castle	578,592	122,260	101,888	8,491	51,927	28,904	315	37,406	6,279	61,487	272,580
Sussex	263,509	46,689	82,092	3,243	22,776	17,525	143	24,189	1,987	26,244	68,739

DISTRICT OF COLUMBIA

American Lung Association in the District of Columbia

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
District of Columbia	15	1	0	5.5	F

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
District of Columbia	5	4	0	0	3.7	F	8.9	Pass

DISTRICT OF COLUMBIA

American Lung Association in the District of Columbia

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
District of Columbia	678,972	126,592	88,732	12,235	59,581	21,881	293	30,313	7,799	98,811	423,333

FLORIDA

American Lung Association in Florida

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Alachua	0	0	0	0.0	A	1	0	0	0	0.3	B	6.0	Pass
Baker	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Bay	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Brevard	0	0	0	0.0	A	1	0	0	0	0.3	B	6.8	Pass
Broward	0	0	0	0.0	A	4	0	0	0	1.3	C	8.8	Pass
Collier	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Columbia	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Duval	1	0	0	0.3	B	1	0	0	0	0.3	B	7.8	Pass
Escambia	2	0	0	0.7	B	0	0	0	0	0.0	A	8.7	Pass
Flagler	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Highlands	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hillsborough	4	0	0	1.3	C	1	0	0	0	0.3	B	7.4	Pass
Holmes	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Indian River	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lake	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lee	1	0	0	0.3	B	INC	INC	INC	INC	INC	INC	INC	INC
Leon	0	0	0	0.0	A	1	0	0	0	0.3	B	7.4	Pass
Liberty	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Manatee	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Marion	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Martin	0	0	0	0.0	A	INC	INC	INC	INC	INC	INC	INC	INC
Miami-Dade	1	1	0	0.8	B	1	1	0	0	0.8	B	7.3	Pass
Okaloosa	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Orange	1	0	0	0.3	B	INC	INC	INC	INC	INC	INC	INC	INC
Osceola	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Palm Beach	0	0	0	0.0	A	1	0	0	0	0.3	B	6.3	Pass
Pasco	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Pinellas	2	0	0	0.7	B	1	0	0	0	0.3	B	6.9	Pass
Polk	1	0	0	0.3	B	0	0	0	0	0.0	A	7.1	Pass
St. Lucie	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Santa Rosa	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Sarasota	0	0	0	0.0	A	1	0	0	0	0.3	B	6.9	Pass
Seminole	0	0	0	0.0	A	1	0	0	0	0.3	B	6.5	Pass
Volusia	0	0	0	0.0	A	1	0	0	0	0.3	B	7.4	Pass
Wakulla	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

FLORIDA

American Lung Association in Florida

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Alachua	285,994	50,729	45,118	3,108	19,999	12,755	146	19,578	3,810	49,524	117,957
Baker	28,368	7,073	4,308	433	1,834	1,266	15	1,986	275	3,328	5,785
Bay	190,769	40,382	35,303	2,474	12,934	9,494	98	14,968	1,857	22,023	50,842
Brevard	643,979	115,705	160,285	7,089	45,234	37,187	330	59,000	5,608	65,640	182,935
Broward	1,962,531	403,240	362,776	24,704	134,226	98,466	1,005	155,355	19,882	247,799	1,324,897
Collier	404,310	65,028	138,906	3,984	28,753	27,329	207	43,547	2,915	41,998	151,513
Columbia	73,063	16,043	15,098	983	4,883	3,742	38	5,900	645	11,715	21,075
Duval	1,030,822	229,643	161,965	14,069	68,732	46,700	528	72,890	11,445	146,043	518,317
Escambia	326,928	68,296	59,553	4,184	22,137	15,807	168	24,742	3,357	43,284	120,414
Flagler	131,439	20,919	41,510	1,282	9,428	8,652	67	13,812	1,002	11,598	34,599
Highlands	107,614	17,869	38,978	1,095	7,568	7,377	55	11,739	767	19,796	38,775
Hillsborough	1,535,564	329,560	235,977	20,190	103,675	70,074	787	109,540	17,133	198,734	831,761
Holmes	19,944	4,118	4,095	252	1,359	1,038	10	1,639	161	3,324	2,951
Indian River	169,795	25,228	60,382	1,546	12,252	11,798	87	18,820	1,200	19,049	44,487
Lake	424,462	80,409	113,393	4,926	29,331	24,891	217	39,461	3,732	44,765	150,267
Lee	834,573	142,314	242,429	8,719	58,929	51,559	428	81,859	7,004	99,505	306,723
Leon	296,913	54,405	45,376	3,333	20,641	13,098	152	20,118	4,050	49,251	136,258
Liberty	7,706	1,364	1,363	84	544	379	4	594	57	1,292	2,194
Manatee	441,095	75,946	127,826	4,653	31,138	27,383	226	43,552	3,616	45,410	136,259
Marion	409,959	76,633	118,006	4,695	28,341	24,867	210	39,454	3,446	60,125	139,442
Martin	163,315	25,995	53,457	1,593	11,676	10,854	84	17,305	1,151	20,806	39,244
Miami-Dade	2,686,867	532,595	467,615	32,629	185,663	132,611	1,376	208,939	27,715	372,520	2,313,925
Okaloosa	218,464	49,218	37,044	3,015	14,497	10,139	112	15,848	2,176	21,517	63,592
Orange	1,471,416	310,911	198,456	19,048	99,811	64,014	754	99,565	17,538	177,726	909,255
Osceola	437,784	103,922	59,260	6,367	28,758	18,841	224	29,418	4,899	47,450	314,515
Palm Beach	1,533,801	286,032	389,700	17,524	106,532	88,130	785	139,570	13,788	163,357	739,381
Pasco	632,996	128,089	138,120	7,847	43,281	33,824	324	53,475	6,064	65,506	205,127
Pinellas	961,596	145,573	259,872	8,919	69,791	58,692	492	93,213	8,600	106,728	266,166
Polk	818,330	179,846	158,775	11,018	54,600	40,317	419	63,265	8,366	103,623	404,542
St. Lucie	373,586	73,315	92,491	4,492	25,656	21,117	191	33,449	3,324	38,539	180,917
Santa Rosa	203,162	44,333	34,610	2,716	13,681	9,767	104	15,379	1,931	15,981	40,197
Sarasota	469,013	65,140	177,167	3,991	34,185	33,866	240	54,096	3,216	43,818	87,735
Seminole	484,271	98,743	82,400	6,049	33,136	23,250	248	36,474	5,284	44,094	215,475
Volusia	590,357	102,443	151,689	6,276	41,687	34,481	302	54,638	5,247	68,507	187,757
Wakulla	36,449	7,573	6,301	464	2,489	1,783	19	2,811	327	3,501	8,053

GEORGIA

American Lung Association in Georgia

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Bibb	4	0	0	1.3	C	1	1	0	0	0.8	B	9.4	Fail
Chatham	1	0	0	0.3	B	1	0	0	0	0.3	B	INC	INC
Chattooga	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Clarke	2	0	0	0.7	B	3	0	0	0	1.0	C	8.7	Pass
Clayton	DNC	DNC	DNC	DNC	DNC	0	0	0	0	0.0	A	8.9	Pass
Cobb	1	0	0	0.3	B	2	0	0	0	0.7	B	8.9	Pass
Coffee	DNC	DNC	DNC	DNC	DNC	1	0	0	0	0.3	B	7.3	Pass
Columbia	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Dawson	3	0	0	1.0	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
DeKalb	8	0	0	2.7	D	3	0	0	0	1.0	C	8.7	Pass
Dougherty	DNC	DNC	DNC	DNC	DNC	14	0	0	0	4.7	F	9.0	Pass
Douglas	9	0	0	3.0	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Fulton	12	3	0	5.5	F	2	0	0	0	0.7	B	9.7	Fail
Glynn	0	0	0	0.0	A	1	0	0	0	0.3	B	7.9	Pass
Gwinnett	6	0	0	2.0	C	5	0	0	0	1.7	C	INC	INC
Hall	DNC	DNC	DNC	DNC	DNC	3	0	0	0	1.0	C	8.2	Pass
Henry	10	0	0	3.3	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Houston	DNC	DNC	DNC	DNC	DNC	2	1	0	0	1.2	C	8.7	Pass
Lowndes	DNC	DNC	DNC	DNC	DNC	3	0	0	0	1.0	C	8.6	Pass
Murray	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Muscogee	2	0	0	0.7	B	3	2	0	0	2.0	C	10.0	Fail
Pike	5	0	0	1.7	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Richmond	0	0	0	0.0	A	7	0	0	0	2.3	D	9.7	Fail
Rockdale	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Sumter	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Walker	DNC	DNC	DNC	DNC	DNC	5	0	0	0	1.7	C	10.0	Fail
Washington	DNC	DNC	DNC	DNC	DNC	6	1	0	0	2.5	D	10.0	Fail

GEORGIA

American Lung Association in Georgia

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Bibb	156,512	38,212	26,499	3,310	11,103	7,467	83	10,445	1,748	33,515	102,345
Chatham	303,655	62,024	52,167	5,372	22,699	14,849	161	20,703	3,596	44,111	162,886
Chattooga	25,222	5,504	4,844	477	1,845	1,313	14	1,852	231	4,958	4,611
Clarke	129,933	21,551	16,791	1,867	10,262	5,501	69	7,432	2,000	28,637	58,323
Clayton	298,300	78,701	33,424	6,817	20,835	12,421	158	16,783	3,650	50,474	275,007
Cobb	776,743	172,922	109,539	14,978	57,050	36,258	413	49,739	9,015	67,115	401,555
Coffee	43,317	10,716	6,393	928	3,073	1,983	23	2,739	433	9,093	19,084
Columbia	165,162	40,674	25,637	3,523	11,717	7,708	88	10,695	1,812	11,211	60,694
Dawson	31,732	6,420	6,401	556	2,366	1,703	17	2,408	314	2,534	4,298
DeKalb	762,992	171,061	108,754	14,817	55,889	34,962	404	48,016	9,360	100,015	544,259
Dougherty	82,645	20,027	14,694	1,735	5,867	4,000	44	5,620	966	21,140	63,844
Douglas	149,160	37,458	18,617	3,245	10,581	6,677	79	9,094	1,730	17,596	103,998
Fulton	1,079,105	222,303	141,433	19,255	81,123	49,036	574	66,709	13,616	136,621	674,918
Glynn	86,172	17,677	20,059	1,531	6,364	4,877	46	6,996	847	13,245	32,083
Gwinnett	983,526	252,540	115,777	21,874	69,318	42,799	524	58,041	11,180	111,168	685,238
Hall	217,267	50,878	36,099	4,407	15,638	10,593	116	14,768	2,253	23,740	90,408
Henry	254,613	63,307	32,259	5,484	18,116	11,499	135	15,677	2,970	26,087	176,387
Houston	171,974	43,682	24,130	3,784	12,107	7,689	91	10,582	1,958	21,823	83,566
Lowndes	120,712	29,648	16,370	2,568	8,597	5,117	64	7,014	1,490	22,576	59,281
Murray	41,035	9,594	6,583	831	2,959	2,004	22	2,784	429	5,870	8,184
Muscogee	201,877	50,137	30,911	4,343	14,282	9,169	107	12,714	2,307	40,634	126,853
Pike	20,461	4,755	3,345	412	1,478	1,020	11	1,418	215	2,248	2,808
Richmond	205,414	46,852	32,308	4,058	14,922	9,503	109	13,178	2,371	43,227	140,711
Rockdale	95,987	22,493	15,433	1,948	6,917	4,733	51	6,576	1,044	12,310	73,950
Sumter	28,890	6,510	5,305	564	2,096	1,426	15	2,006	322	7,187	17,765
Walker	69,489	14,691	13,877	1,273	5,123	3,711	37	5,248	683	10,248	7,437
Washington	19,820	4,212	3,651	365	1,463	1,025	11	1,439	176	3,878	11,5250

HAWAII

American Lung Association in Hawaii

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Hawaii	DNC	DNC	DNC	DNC	DNC
Honolulu	0	0	0	0.0	A
Kauai	DNC	DNC	DNC	DNC	DNC
Maui	DNC	DNC	DNC	DNC	DNC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Hawaii	0	0	0	0	0.0	A	4.4	Pass
Honolulu	1	0	0	0	0.3	B	3.7	Pass
Kauai	INC	INC	INC	INC	INC	INC	INC	INC
Maui	0	1	0	0	0.5	B	4.0	Pass

HAWAII

American Lung Association in Hawaii

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Hawaii	207,615	42,623	50,726	2,857	16,268	7,544	78	14,156	2,011	33,847	143,184
Honolulu	989,408	201,494	199,441	13,505	77,456	32,970	371	60,750	10,329	87,196	815,942
Kauai	73,851	15,577	17,034	1,044	5,755	2,615	28	4,890	719	6,851	52,320
Maui	164,183	33,913	35,277	2,273	12,917	5,709	62	10,629	1,646	15,300	114,782

IDAHO

American Lung Association in Idaho

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Ada	17	0	0	5.7	F
Bannock	0	0	0	0.0	A
Benewah	DNC	DNC	DNC	DNC	DNC
Butte	1	0	0	0.3	B
Canyon	DNC	DNC	DNC	DNC	DNC
Franklin	DNC	DNC	DNC	DNC	DNC
Idaho	3	0	0	1.0	C
Lemhi	DNC	DNC	DNC	DNC	DNC
Shoshone	DNC	DNC	DNC	DNC	DNC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Ada	3	1	0	0	1.5	C	INC	INC
Bannock	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Benewah	15	10	0	0	10.0	F	9.9	Fail
Butte	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Canyon	10	3	0	0	4.8	F	8.9	Pass
Franklin	8	0	0	0	2.7	D	6.6	Pass
Idaho	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lemhi	22	11	0	0	12.8	F	10.2	Fail
Shoshone	15	12	0	0	11.0	F	10.3	Fail

IDAHO

American Lung Association in Idaho

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Ada	524,673	112,818	88,036	7,835	43,445	24,581	219	30,321	6,393	40,703	93,346
Bannock	90,400	22,442	14,099	1,559	7,149	3,917	38	4,822	1,140	10,518	16,391
Benewah	10,369	2,305	2,486	160	859	566	4	743	95	1,341	1,570
Butte	2,758	632	722	44	227	153	1	205	26	402	309
Canyon	257,674	67,745	37,917	4,705	19,993	10,967	107	13,381	3,138	25,683	79,819
Franklin	15,494	4,647	2,290	323	1,144	646	6	795	172	1,084	1,551
Idaho	17,890	3,610	5,285	251	1,527	1,071	7	1,458	142	2,382	1,805
Lemhi	8,441	1,537	2,655	107	739	526	4	722	73	1,090	635
Shoshone	14,026	2,945	3,287	205	1,179	761	6	993	138	2,175	1,376

ILLINOIS

American Lung Association in Illinois

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Adams	12	0	0	4.0	F
Champaign	11	0	0	3.7	F
Clark	6	0	0	2.0	C
Cook	52	6	0	20.3	F
DuPage	15	3	0	6.5	F
Effingham	10	0	0	3.3	F
Hamilton	10	0	0	3.3	F
Jersey	23	0	0	7.7	F
Jo Daviess	8	1	0	3.2	D
Kane	21	3	0	8.5	F
Lake	24	2	0	9.0	F
McHenry	20	3	0	8.2	F
McLean	13	0	0	4.3	F
Macon	16	0	0	5.3	F
Macoupin	12	0	0	4.0	F
Madison	30	1	0	10.5	F
Peoria	21	1	0	7.5	F
Randolph	13	2	0	5.3	F
Rock Island	18	0	0	6.0	F
St. Clair	14	2	0	5.7	F
Sangamon	20	0	0	6.7	F
Will	18	1	0	6.5	F
Winnebago	14	1	0	5.2	F

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Adams	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Champaign	1	1	1	0	1.5	C	8.2	Pass
Clark	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Cook	5	1	2	0	3.5	F	11.3	Fail
DuPage	1	1	2	0	2.2	D	9.7	Fail
Effingham	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hamilton	3	1	0	0	1.5	C	8.4	Pass
Jersey	2	1	0	0	1.2	C	7.9	Pass
Jo Daviess	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Kane	1	2	0	0	1.3	C	9.7	Fail
Lake	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
McHenry	3	2	1	0	2.7	D	8.9	Pass
McLean	2	2	1	0	2.3	D	9.0	Pass
Macon	3	1	1	0	2.2	D	8.8	Pass
Macoupin	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Madison	0	0	0	0	0.0	A	10.5	Fail
Peoria	0	0	0	0	0.0	A	INC	INC
Randolph	1	0	0	0	0.3	B	7.7	Pass
Rock Island	2	3	1	0	2.8	D	9.1	Fail
St. Clair	0	1	0	0	0.5	B	10.1	Fail
Sangamon	2	1	1	0	1.8	C	8.9	Pass
Will	2	2	2	0	3.0	D	9.8	Fail
Winnebago	4	1	2	0	3.2	D	9.0	Pass

ILLINOIS

American Lung Association in Illinois

	AT-RISK GROUPS											
				Lung Diseases								
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Adams	64,441	14,469	13,635	920	4,671	3,367	37	4,358	563	7,631	6,137
Champaign	205,644	39,095	29,852	2,487	16,280	8,991	117	10,849	2,510	30,821	74,617
Clark	15,088	3,317	3,117	211	1,099	803	9	1,034	126	1,769	701
Cook	5,087,072	1,055,492	843,021	67,132	385,934	246,446	2,878	305,759	53,889	662,898	3,019,519
DuPage	921,213	201,578	166,141	12,821	68,137	46,391	522	58,474	8,718	59,722	340,338
Effingham	34,331	8,116	6,626	516	2,466	1,729	19	2,210	294	3,320	1,779
Hamilton	7,911	1,767	1,800	112	569	428	4	561	65	887	374
Jersey	21,091	4,157	4,525	264	1,581	1,157	12	1,492	184	2,204	1,114
Jo Daviess	21,756	3,879	6,704	247	1,607	1,379	12	1,879	148	1,849	1,621
Kane	514,982	120,525	83,142	7,666	37,558	24,959	292	31,028	4,875	42,685	232,110
Lake	708,760	162,209	116,830	10,317	51,993	34,694	402	43,222	6,602	56,595	305,714
McHenry	312,800	70,217	53,759	4,466	22,967	15,771	177	19,760	2,830	19,499	72,233
McLean	170,441	35,719	25,682	2,272	13,035	7,771	96	9,492	1,932	17,831	39,582
Macon	100,591	22,687	21,743	1,443	7,271	5,269	57	6,847	932	15,303	26,528
Macoupin	44,018	8,927	9,817	568	3,261	2,434	25	3,163	378	5,596	2,073
Madison	262,752	55,202	50,082	3,511	19,606	13,457	149	17,080	2,539	28,487	45,975
Peoria	177,513	42,247	33,157	2,687	12,795	8,665	100	11,024	1,709	29,050	58,384
Randolph	29,815	5,925	6,433	377	2,234	1,612	17	2,082	223	3,225	4,285
Rock Island	141,236	31,552	29,420	2,007	10,284	7,281	80	9,400	1,283	20,292	45,045
St. Clair	251,018	56,902	45,137	3,619	18,381	12,489	142	15,759	2,424	32,969	100,186
Sangamon	193,491	41,612	38,731	2,647	14,269	10,067	109	12,890	1,827	22,654	42,791
Will	700,728	163,101	105,745	10,374	51,377	33,629	397	41,388	6,788	49,733	287,900
Winnebago	280,922	65,428	53,385	4,161	20,307	14,108	159	17,981	2,603	40,617	100,140

INDIANA

American Lung Association in Indiana

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Allen	7	0	0	2.3	D
Bartholomew	7	0	0	2.3	D
Boone	10	1	0	3.8	F
Brown	2	0	0	0.7	B
Carroll	6	0	0	2.0	C
Clark	6	0	0	2.0	C
Delaware	5	0	0	1.7	C
Dubois	DNC	DNC	DNC	DNC	DNC
Elkhart	4	0	0	1.3	C
Floyd	3	1	0	1.5	C
Greene	10	0	0	3.3	F
Hamilton	5	0	0	1.7	C
Hendricks	4	0	0	1.3	C
Henry	DNC	DNC	DNC	DNC	DNC
Howard	12	0	0	4.0	F
Knox	10	0	0	3.3	F
Lake	21	0	0	7.0	F
LaPorte	19	0	0	6.3	F
Madison	9	0	0	3.0	D
Marion	12	2	0	5.0	F
Monroe	DNC	DNC	DNC	DNC	DNC
Perry	3	0	0	1.0	C
Porter	24	0	0	8.0	F
Posey	7	0	0	2.3	D
St. Joseph	14	0	0	4.7	F
Shelby	6	0	0	2.0	C
Spencer	DNC	DNC	DNC	DNC	DNC
Tippecanoe	DNC	DNC	DNC	DNC	DNC
Vanderburgh	7	0	0	2.3	D
Vigo	7	0	0	2.3	D
Wabash	5	0	0	1.7	C
Warrick	9	0	0	3.0	D
Whitley	DNC	DNC	DNC	DNC	DNC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Allen	INC	INC	INC	INC	INC	INC	INC	INC
Bartholomew	2	0	1	0	1.3	C	7.6	Pass
Boone	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Brown	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Carroll	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Clark	5	1	0	0	2.2	D	9.8	Fail
Delaware	1	0	0	0	0.3	B	8.2	Pass
Dubois	1	0	0	0	0.3	B	8.9	Pass
Elkhart	5	2	0	0	2.7	D	8.9	Pass
Floyd	INC	INC	INC	INC	INC	INC	INC	INC
Greene	1	1	1	0	1.5	C	7.9	Pass
Hamilton	4	2	0	0	2.3	D	10.0	Fail
Hendricks	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Henry	6	2	0	0	3.0	D	8.1	Pass
Howard	3	2	0	0	2.0	C	8.0	Pass
Knox	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lake	6	2	1	0	3.7	F	10.5	Fail
LaPorte	1	0	0	0	0.3	B	8.3	Pass
Madison	6	1	1	0	3.2	D	8.7	Pass
Marion	23	3	1	0	9.8	F	11.9	Fail
Monroe	3	1	1	0	2.2	D	7.9	Pass
Perry	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Porter	6	2	1	0	3.7	F	9.0	Pass
Posey	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
St. Joseph	4	2	1	0	3.0	D	9.4	Fail
Shelby	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Spencer	0	1	0	0	0.5	B	8.4	Pass
Tippecanoe	3	1	1	0	2.2	D	8.3	Pass
Vanderburgh	1	1	0	0	0.8	B	9.4	Fail
Vigo	2	1	1	0	1.8	C	9.5	Fail
Wabash	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Warrick	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Whitley	5	2	1	0	3.3	F	8.6	Pass

INDIANA

American Lung Association in Indiana

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Allen	394,545	99,640	63,254	6,760	34,124	23,965	245	28,659	4,596	50,579	116,597
Bartholomew	84,003	20,215	14,485	1,372	7,369	5,315	52	6,404	917	8,261	17,912
Boone	76,120	19,240	11,702	1,305	6,617	4,737	47	5,599	850	3,502	10,721
Brown	15,653	2,588	4,263	176	1,490	1,304	10	1,646	132	1,538	839
Carroll	20,525	4,422	4,343	300	1,852	1,467	13	1,805	201	1,881	1,426
Clark	125,467	27,311	21,563	1,853	11,376	8,240	78	9,851	1,450	11,588	24,791
Delaware	112,321	20,365	20,083	1,382	10,597	7,261	70	8,755	1,502	20,252	16,715
Dubois	43,546	10,529	8,429	714	3,806	2,942	27	3,592	422	3,281	5,497
Elkhart	206,409	55,809	32,658	3,786	17,439	12,421	128	14,852	2,267	23,765	60,641
Floyd	80,809	17,837	14,612	1,210	7,283	5,388	50	6,492	911	8,065	11,369
Greene	31,196	6,704	6,426	455	2,822	2,217	19	2,715	311	3,665	1,432
Hamilton	371,645	92,760	53,693	6,294	32,535	22,887	231	26,775	4,376	17,814	76,201
Hendricks	186,387	45,504	28,842	3,087	16,380	11,628	116	13,748	2,102	10,215	43,687
Henry	48,929	9,815	9,698	666	4,512	3,434	31	4,177	468	5,752	3,665
Howard	83,831	19,245	16,886	1,306	7,420	5,683	52	6,989	893	10,491	14,267
Knox	36,070	7,788	6,920	528	3,253	2,392	22	2,920	379	5,378	3,409
Lake	500,598	115,228	91,656	7,818	44,502	33,097	310	40,060	5,616	70,594	240,769
LaPorte	111,706	23,540	22,343	1,597	10,147	7,700	70	9,419	1,080	14,984	24,875
Madison	132,504	28,216	25,091	1,914	12,035	8,977	82	10,887	1,420	16,422	23,019
Marion	968,460	240,626	131,576	16,326	84,645	55,558	600	64,893	12,472	148,329	485,628
Monroe	139,342	21,960	21,295	1,490	13,557	8,314	87	9,820	2,089	22,533	25,823
Perry	19,209	3,927	3,820	266	1,760	1,328	12	1,621	173	2,513	1,398
Porter	175,335	37,031	33,101	2,512	15,968	11,911	109	14,429	1,969	15,959	34,991
Posey	25,040	5,355	5,431	363	2,260	1,800	16	2,224	244	2,315	1,245
St. Joseph	272,848	63,119	47,027	4,282	24,197	17,091	169	20,615	3,270	36,928	83,013
Shelby	45,231	10,025	8,774	680	4,064	3,121	28	3,794	465	4,945	4,526
Spencer	19,910	4,284	4,182	291	1,799	1,429	12	1,754	193	1,712	1,291
Tippecanoe	188,792	38,169	23,795	2,590	17,477	10,292	118	11,902	2,610	29,604	51,966
Vanderburgh	179,810	38,818	33,660	2,634	16,234	11,804	111	14,360	2,092	23,903	34,290
Vigo	106,153	21,784	18,749	1,478	9,721	6,739	66	8,140	1,253	19,591	16,106
Wabash	30,670	6,457	6,819	438	2,773	2,202	19	2,736	311	3,472	2,078
Warrick	65,867	14,969	12,635	1,016	5,871	4,469	41	5,437	706	5,365	6,205
Whitley	34,742	7,877	6,920	534	3,094	2,389	22	2,923	352	2,919	2,057

IOWA

American Lung Association in Iowa

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Black Hawk	DNC	DNC	DNC	DNC	DNC
Bremer	9	1	0	3.5	F
Clinton	12	1	0	4.5	F
Harrison	16	0	0	5.3	F
Johnson	DNC	DNC	DNC	DNC	DNC
Lee	DNC	DNC	DNC	DNC	DNC
Linn	14	0	0	4.7	F
Montgomery	5	0	0	1.7	C
Muscatine	DNC	DNC	DNC	DNC	DNC
Palo Alto	12	1	0	4.5	F
Polk	9	0	0	3.0	D
Pottawattamie	DNC	DNC	DNC	DNC	DNC
Scott	19	0	0	6.3	F
Van Buren	3	0	0	1.0	C
Woodbury	DNC	DNC	DNC	DNC	DNC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Black Hawk	0	1	0	0	0.5	B	8.4	Pass
Bremer	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Clinton	3	2	1	0	2.7	D	9.2	Fail
Harrison	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Johnson	3	3	1	0	3.2	D	8.4	Pass
Lee	0	0	0	0	0.0	A	INC	INC
Linn	2	3	1	0	2.8	D	8.6	Pass
Montgomery	1	0	0	0	0.3	B	7.2	Pass
Muscatine	1	2	1	0	2.0	C	8.6	Pass
Palo Alto	2	1	0	0	1.2	C	INC	INC
Polk	4	3	0	0	2.8	D	8.2	Pass
Pottawattamie	1	1	0	0	0.8	B	8.7	Pass
Scott	1	3	1	0	2.5	D	8.9	Pass
Van Buren	1	0	0	0	0.3	B	7.5	Pass
Woodbury	0	3	0	0	1.5	C	8.6	Pass

IOWA

American Lung Association in Iowa

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Black Hawk	130,471	28,522	23,549	1,642	9,183	5,779	77	7,795	1,620	17,837	27,765
Bremer	25,307	5,690	5,067	328	1,758	1,188	15	1,634	285	1,848	1,573
Clinton	46,158	10,509	9,622	605	3,183	2,282	27	3,152	468	6,040	4,744
Harrison	14,670	3,419	3,025	197	1,004	728	9	1,004	142	1,414	694
Johnson	157,528	30,155	21,803	1,736	11,594	6,320	93	8,052	2,342	22,903	38,005
Lee	32,565	6,942	7,307	400	2,283	1,663	19	2,324	314	4,509	3,033
Linn	228,972	50,973	40,961	2,934	16,009	10,540	136	14,152	2,657	22,062	38,339
Montgomery	10,139	2,266	2,333	130	700	518	6	729	97	1,286	701
Muscatine	42,218	9,944	7,893	572	2,895	1,979	25	2,685	440	4,852	10,337
Palo Alto	8,810	2,031	2,030	117	603	439	5	621	83	911	673
Polk	505,255	121,524	72,542	6,995	34,746	21,161	300	27,386	6,200	57,161	131,322
Pottawattamie	93,179	21,132	17,944	1,216	6,458	4,429	55	6,032	1,004	10,542	13,847
Scott	174,270	39,970	31,566	2,301	12,068	8,029	103	10,821	1,986	18,741	38,387
Van Buren	7,266	1,738	1,678	100	491	368	4	520	65	1,064	303
Woodbury	105,951	27,116	16,871	1,561	7,110	4,521	63	5,990	1,192	13,286	34,443

KANSAS

American Lung Association in Kansas

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Johnson	6	1	0	2.5	D
Leavenworth	12	0	0	4.0	F
Neosho	0	0	0	0.0	A
Sedgwick	8	0	0	2.7	D
Shawnee	7	0	0	2.3	D
Sherman	DNC	DNC	DNC	DNC	DNC
Sumner	5	0	0	1.7	C
Trego	2	0	0	0.7	B
Wyandotte	19	1	0	6.8	F

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Johnson	5	0	0	0	1.7	C	8.3	Pass
Leavenworth	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Neosho	3	1	0	0	1.5	C	9.3	Fail
Sedgwick	4	1	0	0	1.8	C	9.7	Fail
Shawnee	3	2	0	0	2.0	C	INC	INC
Sherman	INC	INC	INC	INC	INC	INC	8.8	Pass
Sumner	4	1	0	0	1.8	C	8.9	Pass
Trego	5	1	0	0	2.2	D	6.8	Pass
Wyandotte	3	1	0	0	1.5	C	9.6	Fail

KANSAS

American Lung Association in Kansas

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Johnson	622,237	144,378	102,852	9,925	47,852	30,206	309	39,981	7,375	32,942	141,047
Leavenworth	83,518	19,682	13,788	1,353	6,392	4,028	42	5,335	858	6,431	17,974
Neosho	15,420	3,722	3,216	256	1,150	805	8	1,102	156	2,224	1,766
Sedgwick	528,469	130,091	86,384	8,943	39,916	24,743	263	32,798	6,265	70,379	180,527
Shawnee	177,746	40,606	35,517	2,791	13,555	9,189	88	12,479	1,981	21,878	49,524
Sherman	5,844	1,415	1,272	97	435	299	3	413	59	768	1,029
Sumner	22,334	5,348	4,571	368	1,672	1,172	11	1,599	225	2,464	2,649
Trego	2,731	524	754	36	212	168	1	237	24	289	182
Wyandotte	165,281	44,637	22,709	3,068	12,189	7,213	82	9,380	1,966	27,891	103,974

KENTUCKY

American Lung Association in Kentucky

	HIGH OZONE DAYS 2021–2023				
County	Orange	Red	Purple	Wgt. Avg.	Grade
Bell	0	0	0	0.0	A
Boone	6	1	0	2.5	D
Boyd	0	0	0	0.0	A
Bullitt	8	0	0	2.7	D
Campbell	3	0	0	1.0	C
Carter	0	0	0	0.0	A
Christian	3	0	0	1.0	C
Daviess	7	0	0	2.3	D
Edmonson	4	0	0	1.3	C
Fayette	1	0	0	0.3	B
Greenup	0	0	0	0.0	A
Hancock	7	0	0	2.3	D
Hardin	3	0	0	1.0	C
Jefferson	23	1	0	8.2	F
Jessamine	3	0	0	1.0	C
Livingston	7	0	0	2.3	D
McCracken	8	0	0	2.7	D
Morgan	0	0	0	0.0	A
Oldham	4	0	0	1.3	C
Perry	0	0	0	0.0	A
Pike	0	0	0	0.0	A
Pulaski	0	0	0	0.0	A
Simpson	7	0	0	2.3	D
Trigg	INC	INC	INC	INC	INC
Warren	1	0	0	0.3	B
Washington	2	0	0	0.7	B

	HIGH PARTICLE POLLUTION DAYS 2021–2023							
	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Bell	4	0	0	0	1.3	C	9.1	Fail
Boone	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Boyd	2	2	0	0	1.7	C	7.5	Pass
Bullitt	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Campbell	3	2	0	0	2.0	C	7.6	Pass
Carter	1	1	0	0	0.8	B	6.3	Pass
Christian	2	0	0	0	0.7	B	8.6	Pass
Daviess	2	1	0	0	1.2	C	INC	INC
Edmonson	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Fayette	2	1	0	0	1.2	C	7.8	Pass
Greenup	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hancock	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hardin	2	0	0	0	0.7	B	7.8	Pass
Jefferson	5	1	0	0	2.2	D	9.5	Fail
Jessamine	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Livingston	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
McCracken	4	0	0	0	1.3	C	INC	INC
Morgan	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Oldham	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Perry	5	2	0	0	2.7	D	8.0	Pass
Pike	2	1	0	0	1.2	C	6.8	Pass
Pulaski	2	0	0	0	0.7	B	7.5	Pass
Simpson	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Trigg	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Warren	3	1	0	0	1.5	C	7.4	Pass
Washington	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

KENTUCKY

American Lung Association in Kentucky

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Bell	23,317	5,161	4,699	488	1,960	2,261	19	2,410	242	6,547	1,639
Boone	140,496	35,434	21,519	3,353	11,490	12,201	113	12,631	1,585	10,333	23,048
Boyd	47,826	10,134	9,896	959	4,064	4,691	39	5,016	487	8,249	3,530
Bullitt	84,863	17,812	15,254	1,686	7,292	8,122	68	8,493	948	7,130	7,131
Campbell	93,702	19,066	17,096	1,804	8,115	8,672	75	9,171	1,105	9,417	8,116
Carter	26,366	5,855	5,339	554	2,213	2,567	21	2,736	274	4,922	922
Christian	72,032	20,511	9,382	1,941	5,667	5,082	58	5,347	808	11,900	25,813
Daviess	103,458	25,134	18,874	2,378	8,491	9,323	83	9,903	1,138	16,349	14,511
Edmonson	12,448	2,235	2,689	212	1,101	1,302	10	1,385	133	1,968	680
Fayette	320,154	66,445	49,329	6,288	27,822	27,121	258	28,345	4,265	48,315	103,824
Greenup	35,221	7,370	8,002	697	2,985	3,586	28	3,876	359	5,522	1,539
Hancock	8,920	2,076	1,715	196	740	854	7	904	91	1,049	424
Hardin	112,273	27,780	17,403	2,629	9,239	9,663	90	10,049	1,278	15,567	28,006
Jefferson	772,144	170,854	137,441	16,168	65,385	69,832	620	73,828	9,191	122,737	289,234
Jessamine	55,017	12,919	9,384	1,223	4,584	4,937	44	5,182	643	5,485	7,501
Livingston	8,892	1,821	2,052	172	757	935	7	1,006	85	1,263	555
McCracken	67,428	14,581	14,120	1,380	5,692	6,543	54	7,032	735	10,425	12,350
Morgan	14,283	2,613	2,563	247	1,272	1,365	12	1,429	125	3,019	1,528
Oldham	70,183	16,986	10,604	1,607	5,826	6,304	57	6,466	724	3,801	9,188
Perry	27,133	6,351	5,025	601	2,252	2,560	22	2,698	289	7,849	1,325
Pike	55,973	11,384	11,629	1,077	4,810	5,614	45	5,978	581	12,737	2,025
Pulaski	66,191	14,387	13,415	1,361	5,591	6,500	53	6,917	699	11,056	4,617
Simpson	20,195	4,684	3,484	443	1,688	1,842	16	1,930	220	2,691	3,214
Trigg	14,369	3,089	3,381	292	1,205	1,505	12	1,627	132	1,939	1,855
Warren	142,229	33,475	19,422	3,168	11,972	11,395	114	11,780	1,872	19,312	36,297
Washington	12,267	2,847	2,366	269	1,019	1,173	10	1,243	124	1,582	1,508

LOUISIANA

American Lung Association in Louisiana

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Ascension Parish	3	2	0	2.0	C
Bossier Parish	0	0	0	0.0	A
Caddo Parish	1	0	0	0.3	B
Calcasieu Parish	4	1	0	1.8	C
East Baton Rouge Parish	10	1	0	3.8	F
Iberville Parish	21	2	0	8.0	F
Jefferson Parish	5	0	0	1.7	C
Lafayette Parish	2	0	0	0.7	B
Lafourche Parish	1	0	0	0.3	B
Livingston Parish	5	0	0	1.7	C
Orleans Parish	DNC	DNC	DNC	DNC	DNC
Ouachita Parish	0	0	0	0.0	A
Pointe Coupee Parish	4	0	0	1.3	C
Rapides Parish	DNC	DNC	DNC	DNC	DNC
St. Bernard Parish	3	0	0	1.0	C
St. James Parish	2	0	0	0.7	B
St. John the Baptist Parish	5	0	0	1.7	C
St. Martin Parish	1	0	0	0.3	B
St. Tammany Parish	1	0	0	0.3	B
Tangipahoa Parish	DNC	DNC	DNC	DNC	DNC
Terrebonne Parish	DNC	DNC	DNC	DNC	DNC
West Baton Rouge Parish	14	0	0	4.7	F

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Ascension Parish	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Bossier Parish	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Caddo Parish	0	0	0	0	0.0	A	9.6	Fail
Calcasieu Parish	1	0	0	0	0.3	B	7.6	Pass
East Baton Rouge Parish	3	0	0	0	1.0	C	8.9	Pass
Iberville Parish	0	0	0	0	0.0	A	7.9	Pass
Jefferson Parish	1	0	0	0	0.3	B	7.7	Pass
Lafayette Parish	1	0	0	0	0.3	B	7.9	Pass
Lafourche Parish	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Livingston Parish	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Orleans Parish	0	0	0	0	0.0	A	7.8	Pass
Ouachita Parish	1	0	0	0	0.3	B	7.8	Pass
Pointe Coupee Parish	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Rapides Parish	1	0	0	0	0.3	B	7.9	Pass
St. Bernard Parish	0	0	0	0	0.0	A	8.2	Pass
St. James Parish	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
St. John the Baptist Parish	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
St. Martin Parish	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
St. Tammany Parish	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Tangipahoa Parish	0	0	0	0	0.0	A	7.7	Pass
Terrebonne Parish	2	1	0	0	1.2	C	7.9	Pass
West Baton Rouge Parish	2	0	0	0	0.7	B	9.1	Fail

LOUISIANA

American Lung Association in Louisiana

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Ascension Parish	131,632	34,316	18,017	3,003	10,519	8,144	78	10,638	1,604	13,963	47,560
Bossier Parish	129,795	31,948	20,693	2,796	10,527	8,280	77	10,956	1,551	17,641	48,249
Caddo Parish	226,386	52,592	44,291	4,602	18,384	15,721	133	21,319	2,620	50,737	129,974
Calcasieu Parish	203,761	50,425	34,222	4,412	16,399	13,317	121	17,758	2,371	35,387	68,727
East Baton Rouge Parish	448,467	100,971	70,903	8,835	37,655	28,332	265	37,200	6,060	86,425	259,410
Iberville Parish	29,617	6,190	5,300	542	2,501	2,051	18	2,741	334	5,422	15,842
Jefferson Parish	421,777	93,320	82,284	8,166	34,753	29,743	250	40,269	4,795	71,376	218,348
Lafayette Parish	249,750	60,283	38,539	5,275	20,424	15,928	148	20,984	3,091	41,666	93,475
Lafourche Parish	95,056	21,505	16,421	1,882	7,846	6,477	56	8,650	1,087	17,950	23,922
Livingston Parish	150,145	38,300	21,341	3,351	12,087	9,336	89	12,222	1,855	20,924	29,102
Orleans Parish	364,136	70,990	66,128	6,212	31,411	25,159	214	33,543	4,904	80,769	251,398
Ouachita Parish	157,568	38,561	25,711	3,374	12,762	10,225	93	13,578	1,917	32,634	69,144
Pointe Coupee Parish	20,000	4,256	4,633	372	1,638	1,514	12	2,093	202	3,978	7,910
Rapides Parish	126,260	31,500	22,178	2,756	10,084	8,403	75	11,280	1,423	24,624	50,376
St. Bernard Parish	44,463	11,455	6,131	1,002	3,575	2,728	26	3,559	568	7,958	19,748
St. James Parish	19,191	4,196	3,921	367	1,578	1,386	11	1,888	209	2,879	9,635
St. John the Baptist Parish	39,592	9,458	6,479	828	3,217	2,655	23	3,535	457	6,589	27,846
St. Martin Parish	51,057	12,116	9,074	1,060	4,135	3,495	30	4,695	566	9,158	18,401
St. Tammany Parish	275,583	64,546	52,409	5,648	22,294	19,286	163	26,110	3,028	32,491	73,355
Tangipahoa Parish	138,064	33,831	21,576	2,960	11,232	8,762	82	11,561	1,715	25,447	53,651
Terrebonne Parish	103,616	25,668	17,018	2,246	8,326	6,837	62	9,109	1,157	16,450	36,406
West Baton Rouge Parish	28,266	6,893	4,331	603	2,302	1,807	17	2,381	335	3,749	13,486

MAINE

American Lung Association in Maine

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Androscoggin	0	0	0	0.0	A
Aroostook	0	0	0	0.0	A
Cumberland	5	0	0	1.7	C
Hancock	4	0	0	1.3	C
Kennebec	0	0	0	0.0	A
Knox	2	0	0	0.7	B
Oxford	0	0	0	0.0	A
Penobscot	0	0	0	0.0	A
Sagadahoc	INC	INC	INC	INC	INC
Washington	0	0	0	0.0	A
York	5	0	0	1.7	C

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Androscoggin	0	0	0	0	0.0	A	5.3	Pass
Aroostook	3	1	0	0	1.5	C	5.5	Pass
Cumberland	3	0	0	0	1.0	C	7.0	Pass
Hancock	0	0	0	0	0.0	A	3.7	Pass
Kennebec	0	0	0	0	0.0	A	5.8	Pass
Knox	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Oxford	1	0	0	0	0.3	B	5.3	Pass
Penobscot	0	0	0	0	0.0	A	4.8	Pass
Sagadahoc	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Washington	INC	INC	INC	INC	INC	INC	INC	INC
York	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

MAINE

American Lung Association in Maine

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Androscoggin	113,765	23,176	21,935	1,669	11,855	7,375	72	8,702	1,007	14,094	13,462
Aroostook	67,351	12,654	17,619	911	6,988	4,975	43	6,239	477	7,949	4,657
Cumberland	310,230	55,120	65,145	3,970	33,294	21,049	197	25,080	2,815	20,708	35,848
Hancock	56,526	8,937	15,485	644	6,089	4,301	36	5,392	431	5,586	3,619
Kennebec	127,259	23,651	27,641	1,703	13,453	8,759	81	10,558	1,075	14,132	8,674
Knox	40,977	6,829	11,729	492	4,350	3,143	26	3,982	291	3,414	2,341
Oxford	59,905	10,476	14,705	755	6,349	4,390	38	5,426	452	8,529	3,192
Penobscot	155,312	27,076	32,201	1,950	16,739	10,572	99	12,571	1,370	18,810	11,660
Sagadahoc	37,513	6,648	9,447	479	3,967	2,734	24	3,387	290	3,229	2,285
Washington	31,555	5,838	8,516	420	3,281	2,353	20	2,965	227	6,178	3,513
York	218,586	38,068	50,517	2,742	23,357	15,514	139	18,882	1,793	17,462	15,886

MARYLAND

American Lung Association in Maryland

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Anne Arundel	3	0	0	1.0	C
Baltimore	19	1	1	7.5	F
Calvert	2	0	0	0.7	B
Carroll	6	0	0	2.0	C
Cecil	7	0	0	2.3	D
Charles	3	0	0	1.0	C
Dorchester	7	0	0	2.3	D
Frederick	8	0	0	2.7	D
Garrett	0	0	0	0.0	A
Harford	17	0	0	5.7	F
Howard	DNC	DNC	DNC	DNC	DNC
Kent	6	0	0	2.0	C
Montgomery	7	0	0	2.3	D
Prince George's	14	1	0	5.2	F
Washington	3	0	0	1.0	C
Baltimore City	5	1	0	2.2	D

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Anne Arundel	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Baltimore	2	3	0	0	2.2	D	8.3	Pass
Calvert	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Carroll	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Cecil	1	4	0	0	2.3	D	7.4	Pass
Charles	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Dorchester	1	3	0	0	1.8	C	6.9	Pass
Frederick	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Garrett	0	2	0	0	1.0	C	5.6	Pass
Harford	1	3	0	0	1.8	C	7.3	Pass
Howard	1	3	0	0	1.8	C	7.4	Pass
Kent	1	3	0	0	1.8	C	6.0	Pass
Montgomery	0	3	0	0	1.5	C	7.1	Pass
Prince George's	0	3	0	0	1.5	C	6.5	Pass
Washington	3	2	0	0	2.0	C	7.0	Pass
Baltimore City	1	3	0	0	1.8	C	INC	INC

MARYLAND

American Lung Association in Maryland

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Anne Arundel	594,582	133,550	97,887	8,017	49,905	25,216	276	35,742	6,188	36,637	225,578
Baltimore	844,703	183,157	157,919	10,995	71,368	37,440	391	53,932	9,053	80,251	408,996
Calvert	94,728	21,783	16,037	1,308	7,850	4,079	44	5,861	920	4,626	24,039
Carroll	176,639	39,177	32,310	2,352	14,759	7,843	82	11,375	1,678	11,031	25,901
Cecil	105,672	23,340	18,651	1,401	8,852	4,644	49	6,700	1,038	10,384	19,344
Charles	171,973	40,744	24,347	2,446	14,193	7,003	80	9,835	1,823	13,202	117,874
Dorchester	32,879	6,783	7,760	407	2,776	1,611	15	2,418	308	5,094	12,731
Frederick	293,391	68,563	45,824	4,116	24,347	12,180	136	17,192	3,071	18,475	101,464
Garrett	28,423	4,943	7,163	297	2,487	1,472	13	2,226	242	2,993	1,256
Harford	264,644	58,594	47,686	3,517	22,169	11,657	123	16,826	2,627	19,117	73,524
Howard	336,001	79,057	53,280	4,746	27,756	14,059	156	19,966	3,517	18,652	180,155
Kent	19,303	2,910	5,519	175	1,741	1,050	9	1,597	176	2,349	4,444
Montgomery	1,058,474	238,759	187,319	14,333	88,234	46,193	491	66,553	10,861	75,263	628,434
Prince George's	947,430	206,709	148,087	12,409	80,237	39,944	439	56,260	10,190	101,680	843,359
Washington	155,813	33,592	28,617	2,017	13,160	6,919	72	9,984	1,457	16,984	42,227
Baltimore City	565,239	117,753	89,474	7,069	48,947	23,522	261	32,486	7,045	110,261	414,893

MASSACHUSETTS

American Lung Association in Massachusetts

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Barnstable	6	0	0	2.0	C
Berkshire	1	0	0	0.3	B
Bristol	7	0	0	2.3	D
Dukes	6	0	0	2.0	C
Essex	5	0	0	1.7	C
Franklin	1	0	0	0.3	B
Hampden	5	0	0	1.7	C
Hampshire	2	0	0	0.7	B
Middlesex	1	0	0	0.3	B
Norfolk	7	0	0	2.3	D
Plymouth	3	0	0	1.0	C
Suffolk	3	0	0	1.0	C
Worcester	2	0	0	0.7	B

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Barnstable	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Berkshire	5	3	0	0	3.2	D	6.6	Pass
Bristol	4	0	0	0	1.3	C	5.9	Pass
Dukes	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Essex	3	0	0	0	1.0	C	7.2	Pass
Franklin	6	1	0	0	2.5	D	7.2	Pass
Hampden	4	2	0	0	2.3	D	5.8	Pass
Hampshire	5	0	0	0	1.7	C	6.0	Pass
Middlesex	0	1	0	0	0.5	B	5.8	Pass
Norfolk	1	0	0	0	0.3	B	INC	INC
Plymouth	3	0	0	0	1.0	C	7.9	Pass
Suffolk	1	0	0	0	0.3	B	7.1	Pass
Worcester	5	0	0	0	1.7	C	8.2	Pass

MASSACHUSETTS

American Lung Association in Massachusetts

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Barnstable	231,735	31,794	78,708	1,866	23,240	14,827	109	20,227	1,457	20,388	26,633
Berkshire	126,818	20,097	33,191	1,179	12,556	7,053	60	9,306	1,013	15,266	17,347
Bristol	581,841	118,224	106,264	6,938	55,135	27,207	275	34,369	5,282	72,670	129,345
Dukes	20,819	3,633	5,836	213	2,010	1,200	10	1,603	145	1,755	2,792
Essex	810,089	167,210	154,361	9,813	76,385	38,179	382	48,541	7,241	76,541	273,889
Franklin	70,836	11,591	18,241	680	6,974	3,895	33	5,131	570	8,325	7,989
Hampden	460,291	95,008	86,320	5,576	43,484	21,290	217	27,000	4,261	78,475	185,452
Hampshire	162,502	22,556	32,314	1,324	16,755	7,709	77	9,732	1,896	17,279	29,995
Middlesex	1,623,952	313,933	273,933	18,424	156,598	72,696	766	90,577	16,035	120,838	517,572
Norfolk	727,473	147,400	133,070	8,651	69,011	33,925	343	42,856	6,787	54,608	215,816
Plymouth	535,308	109,171	109,361	6,407	50,442	26,311	253	33,776	4,463	42,087	111,833
Suffolk	768,425	121,787	106,606	7,148	78,242	31,030	362	37,206	9,552	109,289	422,523
Worcester	866,866	176,462	152,994	10,356	82,218	39,902	409	50,163	7,883	91,666	236,561

MICHIGAN

American Lung Association in Michigan

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Allegan	23	3	0	9.2	F	0	0	0	0	0.0	A	INC	INC
Bay	DNC	DNC	DNC	DNC	DNC	3	3	0	0	2.5	D	7.3	Pass
Benzie	4	2	0	2.3	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Berrien	18	1	0	6.5	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Cass	12	0	0	4.0	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Clinton	3	0	0	1.0	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Genesee	11	1	0	4.2	F	3	3	0	0	2.5	D	8.1	Pass
Huron	7	0	0	2.3	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Ingham	2	1	0	1.2	C	5	4	0	0	3.7	F	8.9	Pass
Kalamazoo	5	0	0	1.7	C	5	2	1	0	3.3	F	10.4	Fail
Kent	14	0	0	4.7	F	4	2	1	0	3.0	D	9.3	Fail
Lenawee	4	0	0	1.3	C	3	2	0	0	2.0	C	INC	INC
Macomb	13	0	0	4.3	F	2	4	0	0	2.7	D	8.7	Pass
Manistee	12	2	0	5.0	F	0	0	0	0	0.0	A	INC	INC
Mason	6	1	0	2.5	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Missaukee	6	0	0	2.0	C	0	1	1	0	1.2	C	9.4	Fail
Muskegon	24	2	0	9.0	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Oakland	10	1	0	3.8	F	1	1	0	0	0.8	B	INC	INC
Ottawa	9	2	0	4.0	F	4	2	1	0	3.0	D	INC	INC
St. Clair	15	0	0	5.0	F	5	4	0	0	3.7	F	8.4	Pass
Schoolcraft	5	0	0	1.7	C	1	0	0	0	0.3	B	INC	INC
Tuscola	7	1	0	2.8	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Washtenaw	8	1	0	3.2	D	3	1	2	0	2.8	D	9.3	Fail
Wayne	17	1	0	6.2	F	19	3	1	0	8.5	F	13.0	Fail
Wexford	8	0	0	2.7	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

MICHIGAN

American Lung Association in Michigan

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Allegan	121,939	28,000	23,125	2,035	10,382	8,208	65	9,331	1,113	11,987	15,769
Bay	102,500	19,742	22,983	1,435	9,100	7,494	54	8,653	935	12,966	11,390
Benzie	18,441	3,124	5,392	227	1,665	1,528	10	1,824	143	1,765	1,245
Berrien	152,261	32,181	33,509	2,339	13,201	10,892	81	12,586	1,376	20,324	38,590
Cass	51,642	10,336	11,910	751	4,536	3,842	27	4,466	440	6,256	7,404
Clinton	79,720	16,777	15,530	1,220	6,956	5,495	42	6,248	763	5,502	9,245
Genesee	401,522	88,219	77,829	6,413	34,608	27,275	213	31,019	3,898	70,895	115,357
Huron	30,927	5,835	8,590	424	2,732	2,484	16	2,955	230	4,377	1,779
Ingham	284,637	54,858	43,269	3,988	25,577	17,017	151	18,392	3,542	42,961	89,923
Kalamazoo	262,215	55,388	43,432	4,026	22,954	16,144	139	17,784	3,004	33,110	63,610
Kent	661,354	153,510	102,130	11,159	56,468	39,958	351	43,920	7,184	68,064	185,978
Lenawee	97,520	19,807	20,515	1,440	8,564	6,911	52	7,925	876	9,887	13,944
Macomb	875,101	179,163	164,492	13,024	77,031	59,914	464	67,734	8,599	91,776	221,044
Manistee	25,562	4,256	7,368	309	2,317	2,090	14	2,488	182	3,434	2,956
Mason	29,159	5,553	7,830	404	2,574	2,286	15	2,706	235	4,204	2,764
Missaukee	15,311	3,381	3,460	246	1,309	1,101	8	1,279	127	1,741	1,050
Muskegon	176,564	39,294	33,437	2,856	15,171	11,772	94	13,336	1,685	24,094	42,722
Oakland	1,270,426	254,657	242,408	18,511	112,385	87,516	675	99,032	12,391	103,791	381,452
Ottawa	303,372	68,744	52,010	4,997	26,005	19,012	161	21,176	3,217	26,507	51,856
St. Clair	159,874	32,050	33,468	2,330	14,098	11,575	85	13,295	1,408	18,488	15,190
Schoolcraft	8,149	1,465	2,386	106	726	684	4	820	57	1,162	1,308
Tuscola	52,826	10,517	11,856	764	4,652	3,897	28	4,513	446	7,469	3,922
Washtenaw	365,536	65,633	60,189	4,771	33,331	23,031	194	25,199	4,313	50,467	113,670
Wayne	1,751,169	411,479	299,646	29,911	148,527	111,710	929	125,092	17,911	357,796	897,563
Wexford	34,122	7,738	7,189	562	2,904	2,375	18	2,736	301	4,520	2,387

MINNESOTA

American Lung Association in Minnesota

	HIGH OZONE DAYS 2021–2023				
County	Orange	Red	Purple	Wgt. Avg.	Grade
Anoka	15	1	0	5.5	F
Becker	3	0	0	1.0	C
Beltrami	DNC	DNC	DNC	DNC	DNC
Carlton	0	0	0	0.0	A
Cass	DNC	DNC	DNC	DNC	DNC
Cook	DNC	DNC	DNC	DNC	DNC
Crow Wing	5	0	0	1.7	C
Dakota	DNC	DNC	DNC	DNC	DNC
Goodhue	5	0	0	1.7	C
Hennepin	6	1	0	2.5	D
Lake	0	0	0	0.0	A
Lyon	4	0	0	1.3	C
Mille Lacs	5	0	0	1.7	C
Olmsted	10	0	0	3.3	F
Ramsey	DNC	DNC	DNC	DNC	DNC
St. Louis	2	0	0	0.7	B
Scott	9	1	0	3.5	F
Stearns	6	1	0	2.5	D
Washington	9	0	0	3.0	D
Wright	13	1	0	4.8	F

	HIGH PARTICLE POLLUTION DAYS 2021–2023							
	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Anoka	5	3	0	0	3.2	D	7.4	Pass
Becker	10	6	1	0	7.0	F	8.6	Pass
Beltrami	9	3	2	0	5.8	F	6.9	Pass
Carlton	8	1	0	0	3.2	D	3.7	Pass
Cass	10	4	1	0	6.0	F	8.9	Pass
Cook	4	1	0	0	1.8	C	2.7	Pass
Crow Wing	5	3	1	0	3.8	F	6.7	Pass
Dakota	7	5	0	0	4.8	F	8.0	Pass
Goodhue	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hennepin	6	5	0	0	4.5	F	8.6	Pass
Lake	4	1	0	0	1.8	C	4.9	Pass
Lyon	9	7	0	0	6.5	F	7.8	Pass
Mille Lacs	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Olmsted	8	1	0	0	3.2	D	7.2	Pass
Ramsey	10	3	0	0	4.8	F	9.0	Pass
St. Louis	11	3	0	0	5.2	F	6.0	Pass
Scott	3	4	0	0	3.0	D	7.8	Pass
Stearns	6	4	1	0	4.7	F	INC	INC
Washington	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Wright	5	4	0	0	3.7	F	7.9	Pass

MINNESOTA

American Lung Association in Minnesota

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Anoka	372,441	87,993	59,551	4,696	28,154	12,310	194	22,591	3,938	23,998	93,875
Becker	35,283	8,068	8,263	431	2,627	1,348	18	2,630	317	4,094	4,774
Beltrami	46,718	11,425	8,358	610	3,459	1,524	24	2,862	501	7,612	13,377
Carlton	36,825	7,980	6,978	426	2,831	1,314	19	2,468	336	3,194	4,617
Cass	31,446	6,234	8,662	333	2,410	1,338	16	2,658	246	4,571	5,089
Cook	5,639	809	1,820	43	457	262	3	530	49	598	930
Crow Wing	68,304	13,759	17,067	734	5,253	2,745	35	5,380	605	6,191	3,909
Dakota	447,440	106,392	73,682	5,678	33,685	14,823	232	27,350	4,795	26,470	119,487
Goodhue	48,035	10,428	10,212	557	3,662	1,788	25	3,423	455	3,433	4,469
Hennepin	1,258,713	269,227	204,631	14,368	97,823	41,290	654	75,754	14,770	125,382	422,128
Lake	10,855	2,036	3,080	109	841	468	6	933	87	927	598
Lyon	25,427	6,694	4,614	357	1,834	838	13	1,581	260	2,758	4,706
Mille Lacs	27,427	6,337	5,134	338	2,070	970	14	1,823	260	2,893	3,074
Olmsted	164,784	38,963	28,679	2,079	12,372	5,443	85	10,145	1,850	12,929	39,113
Ramsey	536,075	122,184	87,785	6,521	40,831	17,183	278	31,682	6,333	62,146	221,832
St. Louis	200,514	36,720	43,779	1,960	15,937	7,502	104	14,365	2,146	25,750	19,020
Scott	155,814	39,577	20,368	2,112	11,618	4,843	81	8,640	1,701	8,230	37,037
Stearns	160,977	37,887	26,736	2,022	12,129	5,174	84	9,575	1,777	16,996	31,135
Washington	278,936	66,121	48,070	3,529	20,978	9,487	145	17,620	2,881	13,645	61,956
Wright	151,150	40,678	21,247	2,171	10,986	4,681	79	8,475	1,577	8,100	16,379

MISSISSIPPI

American Lung Association in Mississippi

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Bolivar	3	0	0	1.0	C
DeSoto	11	0	0	3.7	F
Forrest	DNC	DNC	DNC	DNC	DNC
Hancock	1	0	0	0.3	B
Harrison	1	0	0	0.3	B
Hinds	2	0	0	0.7	B
Jackson	3	0	0	1.0	C
Lauderdale	0	0	0	0.0	A
Lee	2	0	0	0.7	B
Yalobusha	1	0	0	0.3	B

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Bolivar	1	0	0	0	0.3	B	8.2	Pass
DeSoto	2	0	0	0	0.7	B	8.7	Pass
Forrest	1	0	0	0	0.3	B	9.2	Fail
Hancock	0	0	0	0	0.0	A	7.8	Pass
Harrison	0	0	0	0	0.0	A	8.0	Pass
Hinds	2	0	0	0	0.7	B	9.3	Fail
Jackson	0	0	0	0	0.0	A	7.6	Pass
Lauderdale	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lee	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Yalobusha	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

MISSISSIPPI

American Lung Association in Mississippi

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Bolivar	28,968	7,131	5,139	494	1,563	1,661	19	2,415	331	10,583	19,603
DeSoto	193,247	47,541	26,803	3,293	10,506	10,738	129	15,040	2,393	17,574	85,740
Forrest	78,208	17,784	11,055	1,232	4,262	4,138	52	5,775	1,114	13,807	34,448
Hancock	46,159	8,692	10,727	602	2,718	3,125	31	4,692	463	7,157	7,387
Harrison	210,612	49,023	36,304	3,396	11,599	12,272	141	17,716	2,429	32,963	80,941
Hinds	214,870	49,758	36,389	3,447	11,796	12,299	143	17,697	2,677	43,453	165,373
Jackson	146,389	33,114	26,026	2,294	8,166	8,764	98	12,698	1,645	19,431	49,038
Lauderdale	70,527	16,383	13,596	1,135	3,888	4,234	47	6,223	754	15,955	34,862
Lee	82,799	20,572	13,144	1,425	4,479	4,697	55	6,715	964	11,003	30,973
Yalobusha	12,386	2,605	2,794	180	705	801	8	1,203	126	2,493	5,190

MISSOURI

American Lung Association in Missouri

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Andrew	7	0	0	2.3	D
Boone	5	0	0	1.7	C
Buchanan	DNC	DNC	DNC	DNC	DNC
Callaway	5	0	0	1.7	C
Cass	5	0	0	1.7	C
Cedar	4	0	0	1.3	C
Clay	23	0	0	7.7	F
Clinton	12	0	0	4.0	F
Greene	4	0	0	1.3	C
Jackson	DNC	DNC	DNC	DNC	DNC
Jasper	4	0	0	1.3	C
Jefferson	20	2	0	7.7	F
Lincoln	16	0	0	5.3	F
Monroe	3	0	0	1.0	C
Perry	13	0	0	4.3	F
St. Charles	24	0	0	8.0	F
Ste. Genevieve	12	0	0	4.0	F
St. Louis	19	2	0	7.3	F
St. Louis City	14	2	0	5.7	F

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Andrew	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Boone	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Buchanan	5	0	0	0	1.7	C	8.6	Pass
Callaway	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Cass	1	0	0	0	0.3	B	INC	INC
Cedar	0	0	0	0	0.0	A	6.8	Pass
Clay	1	0	0	0	0.3	B	6.0	Pass
Clinton	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Greene	1	0	0	0	0.3	B	INC	INC
Jackson	5	1	0	0	2.2	D	7.6	Pass
Jasper	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Jefferson	1	1	0	0	0.8	B	8.2	Pass
Lincoln	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Monroe	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Perry	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
St. Charles	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Ste. Genevieve	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
St. Louis	0	1	0	0	0.5	B	7.2	Pass
St. Louis City	5	1	0	0	2.2	D	9.6	Fail

MISSOURI

American Lung Association in Missouri

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Andrew	18,127	4,075	3,787	326	1,390	1,285	11	1,623	174	1,504	1,247
Boone	189,463	37,878	26,784	3,035	15,456	10,752	116	13,341	2,621	25,749	44,114
Buchanan	82,956	18,451	14,958	1,478	6,450	5,442	51	6,814	851	11,962	15,646
Callaway	44,731	9,216	8,273	738	3,546	3,031	28	3,790	453	5,393	4,922
Cass	111,732	25,852	20,521	2,071	8,551	7,503	69	9,381	1,140	7,698	16,723
Cedar	14,672	3,574	3,439	286	1,089	1,073	9	1,371	122	2,163	971
Clay	259,772	60,538	40,778	4,850	20,026	16,144	160	20,005	2,918	20,019	58,322
Clinton	21,548	4,905	4,162	393	1,651	1,498	13	1,876	205	2,041	1,580
Greene	304,611	62,952	53,107	5,043	24,324	19,265	187	24,163	3,608	41,389	44,732
Jackson	718,560	165,358	117,328	13,248	55,629	44,568	441	55,534	8,284	84,520	285,225
Jasper	125,056	30,541	20,724	2,447	9,488	7,725	77	9,648	1,366	18,915	23,146
Jefferson	231,230	51,611	39,902	4,135	17,929	15,412	142	19,135	2,382	20,986	16,455
Lincoln	64,699	16,151	9,728	1,294	4,877	3,960	40	4,889	682	5,382	5,035
Monroe	8,698	1,911	2,181	153	664	672	5	859	71	1,049	706
Perry	18,950	4,185	3,907	335	1,461	1,347	12	1,697	180	1,869	1,124
St. Charles	416,659	92,794	73,375	7,434	32,367	27,474	256	34,262	4,419	22,647	66,609
Ste. Genevieve	18,642	3,994	4,052	320	1,447	1,353	11	1,713	164	1,708	1,077
St. Louis	987,059	215,244	194,144	17,244	76,830	67,372	605	84,869	10,585	94,080	360,289
St. Louis City	281,754	50,849	45,784	4,074	23,357	17,655	173	21,981	3,689	54,810	153,057

MONTANA

American Lung Association in Montana

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Beaverhead	DNC	DNC	DNC	DNC	DNC
Custer	INC	INC	INC	INC	INC
Fergus	5	0	0	1.7	C
Flathead	0	0	0	0.0	A
Gallatin	DNC	DNC	DNC	DNC	DNC
Glacier	DNC	DNC	DNC	DNC	DNC
Hill	DNC	DNC	DNC	DNC	DNC
Lewis and Clark	1	0	0	0.3	B
Lincoln	DNC	DNC	DNC	DNC	DNC
Missoula	0	0	0	0.0	A
Phillips	1	0	0	0.3	B
Powder River	2	0	0	0.7	B
Ravalli	DNC	DNC	DNC	DNC	DNC
Richland	1	0	0	0.3	B
Rosebud	INC	INC	INC	INC	INC
Silver Bow	DNC	DNC	DNC	DNC	DNC
Yellowstone	DNC	DNC	DNC	DNC	DNC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Beaverhead	INC	INC	INC	INC	INC	INC	INC	INC
Custer	INC	INC	INC	INC	INC	INC	INC	INC
Fergus	16	3	0	0	6.8	F	5.4	Pass
Flathead	16	4	0	0	7.3	F	8.6	Pass
Gallatin	6	0	0	0	2.0	C	4.1	Pass
Glacier	INC	INC	INC	INC	INC	INC	INC	INC
Hill	INC	INC	INC	INC	INC	INC	INC	INC
Lewis and Clark	19	8	0	0	10.3	F	8.7	Pass
Lincoln	17	10	0	0	10.7	F	12.8	Fail
Missoula	24	7	0	0	11.5	F	10.5	Fail
Phillips	7	7	0	0	5.8	F	INC	INC
Powder River	16	8	0	0	9.3	F	8.3	Pass
Ravalli	20	13	2	0	14.5	F	7.8	Pass
Richland	8	4	1	0	5.3	F	6.2	Pass
Rosebud	INC	INC	INC	INC	INC	INC	INC	INC
Silver Bow	25	8	0	0	12.3	F	8.3	Pass
Yellowstone	13	3	0	0	5.8	F	7.8	Pass

MONTANA

American Lung Association in Montana

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Beaverhead	9,885	1,729	2,393	117	949	604	4	724	95	1,224	1,063
Custer	11,985	2,348	2,520	159	1,136	697	5	819	113	1,571	1,163
Fergus	11,772	2,456	2,969	166	1,080	721	5	881	100	1,292	843
Flathead	113,679	24,449	24,164	1,651	10,497	6,535	51	7,737	1,064	11,138	9,976
Gallatin	126,409	23,541	17,634	1,590	12,350	6,304	57	6,747	1,519	10,694	13,377
Glacier	13,609	4,025	1,863	272	1,151	630	6	699	135	3,754	9,564
Hill	16,276	4,571	2,709	309	1,387	799	7	914	154	3,004	5,212
Lewis and Clark	75,011	15,806	15,560	1,068	6,978	4,284	34	5,041	716	6,827	7,351
Lincoln	21,895	3,885	6,690	262	2,061	1,499	10	1,892	163	3,287	1,734
Missoula	121,849	21,725	21,390	1,467	11,894	6,578	55	7,370	1,435	13,548	15,370
Phillips	4,249	1,004	1,013	68	378	252	2	308	33	700	744
Powder River	1,743	306	537	21	164	119	1	150	12	200	148
Ravalli	47,738	8,813	13,140	595	4,495	3,105	21	3,843	382	5,076	4,118
Richland	11,173	2,815	1,969	190	994	587	5	677	101	1,059	1,325
Rosebud	8,160	2,357	1,438	159	688	414	4	482	72	1,633	3,712
Silver Bow	36,360	7,295	7,097	493	3,440	2,042	16	2,364	348	5,634	3,643
Yellowstone	170,843	38,840	31,795	2,623	15,630	9,208	77	10,629	1,724	16,465	26,230

NEBRASKA

American Lung Association in Nebraska

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Douglas	23	1	0	8.2	F
Gage	DNC	DNC	DNC	DNC	DNC
Hall	DNC	DNC	DNC	DNC	DNC
Knox	18	1	0	6.5	F
Lancaster	2	0	0	0.7	B
Sarpy	DNC	DNC	DNC	DNC	DNC
Scotts Bluff	DNC	DNC	DNC	DNC	DNC
Washington	DNC	DNC	DNC	DNC	DNC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Douglas	4	1	0	0	1.8	C	8.1	Pass
Gage	3	1	0	0	1.5	C	INC	INC
Hall	2	3	0	0	2.2	D	6.8	Pass
Knox	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lancaster	0	1	0	0	0.5	B	7.2	Pass
Sarpy	3	1	0	0	1.5	C	7.8	Pass
Scotts Bluff	0	0	1	0	0.7	B	4.6	Pass
Washington	4	1	0	0	1.8	C	6.6	Pass

NEBRASKA

American Lung Association in Nebraska

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Douglas	589,540	147,751	85,827	6,067	37,699	22,671	312	30,480	7,658	66,643	196,737
Gage	21,634	4,879	4,877	200	1,393	1,030	11	1,461	220	2,198	1,520
Hall	62,197	16,992	9,935	698	3,833	2,457	33	3,356	708	6,595	24,148
Knox	8,298	2,023	2,137	83	514	410	4	595	75	1,121	1,254
Lancaster	326,716	72,610	51,559	2,982	21,606	12,927	173	17,514	4,418	33,770	69,022
Sarpy	199,886	51,804	26,484	2,127	12,698	7,481	106	9,940	2,557	9,803	44,497
Scotts Bluff	35,699	8,546	7,654	351	2,261	1,619	19	2,290	395	5,374	10,117
Washington	21,152	4,959	4,155	204	1,360	954	11	1,329	224	1,276	1,418

NEVADA

American Lung Association in Nevada

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Churchill	9	1	0	3.5	F
Clark	65	1	0	22.2	F
Douglas	DNC	DNC	DNC	DNC	DNC
Elko	7	1	0	2.8	D
Lyon	8	0	0	2.7	D
Washoe	24	2	0	9.0	F
White Pine	2	0	0	0.7	B
Carson City	9	0	0	3.0	D

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Churchill	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Clark	8	3	0	0	4.2	F	8.7	Pass
Douglas	8	25	6	0	19.2	F	8.4	Pass
Elko	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lyon	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Washoe	8	14	12	1	18.5	F	9.7	Fail
White Pine	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Carson City	13	14	8	1	17.5	F	7.5	Pass

NEVADA

American Lung Association in Nevada

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Churchill	25,803	5,886	5,062	421	1,744	1,468	11	1,570	225	2,736	7,399
Clark	2,336,573	511,912	380,462	36,621	160,644	126,738	966	134,643	23,693	297,404	1,434,103
Douglas	49,545	7,170	16,804	513	3,613	3,778	20	4,085	328	4,047	9,904
Elko	54,293	14,200	7,346	1,016	3,546	2,674	22	2,833	518	4,834	19,050
Lyon	62,583	12,885	13,823	922	4,329	3,803	26	4,074	526	5,991	18,197
Washoe	498,022	101,584	91,139	7,267	34,864	28,196	206	30,082	4,880	48,394	200,329
White Pine	8,522	1,719	1,807	123	593	513	4	549	65	959	2,382
Carson City	58,036	11,461	12,429	820	4,063	3,513	24	3,758	485	5,757	20,983

NEW HAMPSHIRE

American Lung Association in New Hampshire

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Belknap	0	0	0	0.0	A	2	0	0	0	0.7	B	4.8	Pass
Cheshire	1	0	0	0.3	B	3	0	0	0	1.0	C	7.0	Pass
Coos	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Grafton	0	0	0	0.0	A	1	0	0	0	0.3	B	5.1	Pass
Hillsborough	2	0	0	0.7	B	4	0	0	0	1.3	C	3.9	Pass
Merrimack	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Rockingham	4	0	0	1.3	C	1	0	0	0	0.3	B	5.6	Pass

NEW HAMPSHIRE

American Lung Association in New Hampshire

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Belknap	65,027	11,037	16,232	789	6,260	4,074	36	4,572	482	5,139	3,803
Cheshire	77,703	13,767	17,814	984	7,554	4,622	42	5,033	654	6,709	5,526
Coos	31,372	5,070	8,223	362	3,029	2,007	17	2,283	213	4,051	1,864
Grafton	93,146	14,179	22,235	1,013	9,341	5,670	51	6,185	821	8,045	9,778
Hillsborough	427,354	82,637	76,503	5,905	41,844	23,859	234	24,149	3,789	27,070	78,765
Merrimack	157,103	28,516	32,117	2,038	15,401	9,101	86	9,564	1,353	11,623	13,663
Rockingham	320,689	58,396	67,810	4,173	31,116	19,036	175	20,317	2,577	17,152	28,099

NEW JERSEY

American Lung Association in New Jersey

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Atlantic	0	0	0	0.0	A
Bergen	13	1	0	4.8	F
Camden	7	0	0	2.3	D
Cumberland	4	0	0	1.3	C
Essex	INC	INC	INC	INC	INC
Gloucester	11	1	0	4.2	F
Hudson	7	0	0	2.3	D
Hunterdon	5	1	0	2.2	D
Mercer	13	2	0	5.3	F
Middlesex	9	2	0	4.0	F
Monmouth	6	2	0	3.0	D
Morris	3	1	0	1.5	C
Ocean	10	0	0	3.3	F
Passaic	4	0	0	1.3	C
Union	DNC	DNC	DNC	DNC	DNC
Warren	0	0	0	0.0	A

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Atlantic	3	2	1	0	2.7	D	6.7	Pass
Bergen	2	3	0	0	2.2	D	8.5	Pass
Camden	4	2	1	0	3.0	D	9.8	Fail
Cumberland	3	1	1	0	2.2	D	INC	INC
Essex	INC	INC	INC	INC	INC	INC	INC	INC
Gloucester	0	2	0	0	1.0	C	7.4	Pass
Hudson	1	3	1	0	2.5	D	7.8	Pass
Hunterdon	1	3	1	0	2.5	D	8.1	Pass
Mercer	3	3	1	0	3.2	D	INC	INC
Middlesex	3	3	1	0	3.2	D	8.4	Pass
Monmouth	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Morris	1	1	0	0	0.8	B	6.1	Pass
Ocean	5	1	1	0	2.8	D	7.4	Pass
Passaic	INC	INC	INC	INC	INC	INC	INC	INC
Union	2	3	1	0	2.8	D	9.4	Fail
Warren	2	4	0	0	2.7	D	8.4	Pass

NEW JERSEY

American Lung Association in New Jersey

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Atlantic	275,213	56,590	56,571	3,839	18,454	10,200	129	15,859	2,806	32,219	124,335
Bergen	957,736	198,334	179,022	13,453	64,310	34,486	449	52,774	10,170	62,866	460,757
Camden	527,196	119,354	89,335	8,096	34,386	17,699	247	26,770	5,933	64,241	246,915
Cumberland	152,326	37,110	24,690	2,517	9,711	4,951	72	7,462	1,541	24,394	88,843
Essex	851,117	198,853	125,156	13,488	55,132	27,203	398	40,256	9,924	117,764	603,125
Gloucester	308,423	65,192	53,605	4,422	20,545	10,653	144	16,127	3,423	25,292	78,955
Hudson	705,472	137,155	92,495	9,303	47,582	21,539	331	31,009	9,328	106,193	502,487
Hunterdon	130,183	24,726	28,277	1,677	8,957	5,105	61	7,975	1,242	6,126	24,766
Mercer	381,671	83,627	63,220	5,673	25,195	12,904	179	19,411	4,239	38,798	217,264
Middlesex	863,623	183,504	144,285	12,447	57,417	29,297	405	44,075	9,717	72,101	536,859
Monmouth	642,799	132,784	127,345	9,007	43,246	23,818	301	36,787	6,420	42,424	171,196
Morris	514,423	105,264	96,546	7,140	34,685	18,655	241	28,549	5,288	24,591	170,039
Ocean	659,197	164,894	151,535	11,185	41,476	24,413	309	39,090	5,834	65,276	115,858
Passaic	513,395	120,459	84,482	8,171	33,151	16,972	240	25,590	5,636	70,313	315,874
Union	572,726	133,643	89,297	9,065	37,178	18,828	268	28,126	6,294	50,389	363,120
Warren	111,252	21,390	22,536	1,451	7,617	4,198	52	6,489	1,106	9,107	27,812

NEW MEXICO

American Lung Association in New Mexico

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Bernalillo	29	1	0	10.2	F
Doña Ana	38	5	0	15.2	F
Eddy	70	2	0	24.3	F
Lea	12	1	0	4.5	F
Rio Arriba	2	0	0	0.7	B
Sandoval	4	0	0	1.3	C
San Juan	14	0	0	4.7	F
Santa Fe	2	0	0	0.7	B
Taos	DNC	DNC	DNC	DNC	DNC
Valencia	2	0	0	0.7	B

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Bernalillo	10	4	0	0	5.3	F	8.0	Pass
Doña Ana	6	2	1	0	3.7	F	8.6	Pass
Eddy	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lea	2	0	0	0	0.7	B	6.6	Pass
Rio Arriba	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Sandoval	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
San Juan	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Santa Fe	1	0	0	0	0.3	B	INC	INC
Taos	1	0	0	0	0.3	B	4.9	Pass
Valencia	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

NEW MEXICO

American Lung Association in New Mexico

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Bernalillo	671,586	133,049	126,639	9,504	53,038	25,715	203	43,624	6,983	89,525	414,492
Doña Ana	225,210	50,882	39,142	3,634	17,204	7,840	68	13,532	2,420	43,762	164,360
Eddy	60,275	15,891	9,104	1,135	4,409	2,000	18	3,394	587	9,810	34,092
Lea	72,101	20,738	8,619	1,481	5,155	2,129	22	3,625	721	11,871	49,724
Rio Arriba	39,876	8,888	9,052	635	3,003	1,659	12	2,798	343	7,359	34,048
Sandoval	155,936	33,287	31,878	2,378	11,999	6,232	47	10,495	1,479	18,196	91,273
San Juan	120,675	29,703	21,005	2,122	8,972	4,337	36	7,337	1,183	23,759	76,643
Santa Fe	155,956	24,194	45,205	1,728	12,579	7,599	47	12,853	1,310	18,759	84,597
Taos	34,405	5,277	10,764	377	2,760	1,761	10	2,969	266	6,340	20,305
Valencia	79,141	18,054	15,042	1,290	6,000	3,028	24	5,099	741	13,484	54,710

NEW YORK

American Lung Association in New York

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Albany	2	0	0	0.7	B	4	3	0	0	2.8	D	6.8	Pass
Bronx	13	0	0	4.3	F	0	4	1	0	2.7	D	7.9	Pass
Chautauqua	9	0	0	3.0	D	1	0	0	0	0.3	B	6.7	Pass
Dutchess	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Erie	2	0	0	0.7	B	3	0	0	0	1.0	C	7.7	Pass
Essex	5	0	0	1.7	C	0	0	0	0	0.0	A	4.0	Pass
Hamilton	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Jefferson	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Kings	DNC	DNC	DNC	DNC	DNC	0	1	0	0	0.5	B	8.0	Pass
Monroe	2	0	0	0.7	B	2	3	0	0	2.2	D	7.2	Pass
New York	12	0	0	4.0	F	1	1	0	0	0.8	B	7.8	Pass
Niagara	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Onondaga	2	0	0	0.7	B	2	3	1	0	2.8	D	6.1	Pass
Orange	INC	INC	INC	INC	INC	1	0	0	0	0.3	B	6.6	Pass
Oswego	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Putnam	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Queens	18	0	0	6.0	F	2	4	1	0	3.3	F	8.1	Pass
Richmond	9	0	0	3.0	D	2	0	0	0	0.7	B	8.3	Pass
Rockland	4	1	0	1.8	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Saratoga	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Steuben	1	0	0	0.3	B	3	4	1	0	3.7	F	5.9	Pass
Suffolk	28	1	0	9.8	F	0	0	0	0	0.0	A	7.0	Pass
Tompkins	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Wayne	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Westchester	8	1	0	3.2	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

NEW YORK

American Lung Association in New York

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Albany	316,659	56,536	59,276	5,193	25,880	13,148	163	20,358	3,591	38,586	97,208
Bronx	1,356,476	324,773	207,403	29,833	103,208	51,037	697	77,966	14,782	367,107	1,233,915
Chautauqua	124,891	25,610	27,416	2,352	9,871	5,629	64	8,778	1,136	20,232	18,888
Dutchess	297,150	54,124	58,558	4,972	24,271	13,138	153	20,255	2,934	22,541	96,547
Erie	946,147	189,430	188,291	17,401	75,335	40,602	487	62,977	9,512	130,014	254,274
Essex	36,775	5,652	10,087	519	3,086	1,925	19	3,028	289	4,587	2,607
Hamilton	5,082	627	1,767	58	439	307	3	489	34	534	309
Jefferson	114,787	27,507	17,943	2,527	8,684	4,150	59	6,404	1,103	14,427	21,846
Kings	2,561,225	557,288	413,894	51,191	199,904	98,006	1,316	150,569	29,439	482,728	1,607,724
Monroe	748,482	150,962	144,644	13,867	59,504	31,600	385	48,947	7,729	95,055	233,144
New York	1,597,451	216,031	299,787	19,844	137,407	67,661	821	104,641	20,381	255,002	850,108
Niagara	209,457	41,366	44,893	3,800	16,741	9,462	108	14,701	1,939	28,300	34,648
Onondaga	467,873	97,236	90,044	8,932	36,918	19,684	241	30,483	4,783	61,032	117,436
Orange	407,470	104,208	61,204	9,572	30,387	15,264	210	23,260	4,023	50,244	168,428
Oswego	118,162	24,083	21,895	2,212	9,399	4,999	61	7,693	1,138	16,742	8,710
Putnam	98,060	18,967	19,472	1,742	7,914	4,403	51	6,773	885	7,076	27,811
Queens	2,252,196	430,689	422,104	39,562	181,958	96,420	1,159	148,390	23,223	307,761	1,712,219
Richmond	490,687	105,259	87,117	9,669	38,570	20,423	253	31,315	4,869	63,638	218,903
Rockland	340,807	101,965	54,364	9,366	23,844	12,441	176	19,154	3,066	50,990	132,622
Saratoga	238,711	45,085	49,297	4,141	19,327	10,775	123	16,657	2,252	17,032	26,767
Steuben	92,162	19,739	19,755	1,813	7,212	4,129	48	6,420	812	12,857	6,538
Suffolk	1,523,170	312,783	281,959	28,731	121,143	65,346	785	100,284	14,439	104,291	568,305
Tompkins	103,558	14,445	17,448	1,327	8,847	4,030	53	6,235	1,387	14,034	24,976
Wayne	90,829	18,894	19,540	1,736	7,170	4,121	47	6,398	785	9,922	10,436
Westchester	990,817	207,881	185,878	19,095	78,298	42,446	510	65,266	9,711	90,348	489,572

NORTH CAROLINA

American Lung Association in North Carolina

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Alexander	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Avery	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Buncombe	0	0	0	0.0	A	0	0	0	0	0.0	A	6.3	Pass
Caldwell	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Carteret	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Caswell	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Catawba	DNC	DNC	DNC	DNC	DNC	3	0	0	0	1.0	C	8.5	Pass
Cumberland	1	0	0	0.3	B	2	0	0	0	0.7	B	8.4	Pass
Davidson	DNC	DNC	DNC	DNC	DNC	3	0	0	0	1.0	C	9.2	Fail
Durham	0	0	0	0.0	A	3	0	0	0	1.0	C	7.6	Pass
Edgecombe	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Forsyth	3	0	0	1.0	C	8	1	0	0	3.2	D	8.0	Pass
Graham	7	0	0	2.3	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Granville	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Guilford	1	0	0	0.3	B	3	0	0	0	1.0	C	8.6	Pass
Haywood	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Jackson	DNC	DNC	DNC	DNC	DNC	INC	INC	INC	INC	INC	INC	INC	INC
Johnston	1	0	0	0.3	B	1	0	0	0	0.3	B	7.7	Pass
Lenoir	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lincoln	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Macon	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Martin	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Mecklenburg	8	0	0	2.7	D	4	0	0	0	1.3	C	9.2	Fail
Mitchell	DNC	DNC	DNC	DNC	DNC	1	0	0	0	0.3	B	6.3	Pass
Montgomery	0	0	0	0.0	A	4	0	0	0	1.3	C	8.2	Pass
New Hanover	0	0	0	0.0	A	1	0	0	0	0.3	B	5.4	Pass
Northampton	DNC	DNC	DNC	DNC	DNC	1	0	0	0	0.3	B	7.2	Pass
Person	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Pitt	0	0	0	0.0	A	2	0	0	0	0.7	B	6.8	Pass
Rockingham	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Rowan	1	0	0	0.3	B	3	0	0	0	1.0	C	8.2	Pass
Swain	1	0	0	0.3	B	2	0	0	0	0.7	B	6.4	Pass
Union	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Wake	1	0	0	0.3	B	5	0	0	0	1.7	C	8.3	Pass
Yancey	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

NORTH CAROLINA

American Lung Association in North Carolina

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Alexander	36,473	7,132	7,554	820	2,943	2,183	21	3,180	330	4,350	5,350
Avery	17,561	2,550	4,248	293	1,512	1,152	10	1,674	152	2,469	2,195
Buncombe	275,901	48,293	60,275	5,550	22,827	16,780	161	23,990	3,043	34,611	50,204
Caldwell	80,574	15,754	17,365	1,810	6,516	4,922	47	7,216	757	10,843	11,885
Carteret	69,615	11,545	19,399	1,327	5,912	4,865	41	7,239	577	7,295	9,467
Caswell	22,807	4,238	5,356	487	1,873	1,445	13	2,114	189	3,564	8,862
Catawba	164,645	35,247	31,389	4,050	12,937	9,366	96	13,540	1,651	19,276	44,768
Cumberland	337,890	85,264	44,854	9,798	24,853	15,441	197	20,542	3,931	49,047	202,831
Davidson	174,804	37,458	33,888	4,305	13,745	10,038	102	14,573	1,734	24,163	41,498
Durham	336,892	65,434	50,717	7,519	26,769	17,039	196	23,009	4,422	33,994	192,197
Edgecombe	48,832	11,179	10,519	1,285	3,789	2,860	28	4,133	493	10,936	31,811
Forsyth	392,921	87,995	68,335	10,112	30,343	21,047	228	29,748	4,460	56,249	180,591
Graham	8,052	1,535	2,046	176	660	524	5	769	71	1,344	1,228
Granville	62,192	12,611	11,428	1,449	4,948	3,543	37	5,140	593	6,722	27,644
Guilford	549,866	119,813	89,625	13,768	42,648	28,732	319	40,161	6,629	77,550	294,931
Haywood	62,969	10,864	16,420	1,248	5,281	4,204	37	6,168	578	6,869	5,865
Jackson	44,574	7,292	9,174	838	3,720	2,607	26	3,620	528	6,787	9,261
Johnston	241,955	59,373	33,935	6,823	18,052	11,981	141	17,000	2,652	25,952	93,021
Lenoir	54,895	12,496	11,901	1,436	4,268	3,233	32	4,684	533	12,425	28,743
Lincoln	95,675	19,527	18,924	2,244	7,629	5,640	56	8,274	909	10,126	16,534
Macon	38,412	7,018	11,200	806	3,207	2,677	22	3,950	319	5,155	5,540
Martin	21,447	4,322	5,624	497	1,740	1,407	12	2,067	194	4,173	10,245
Mecklenburg	1,163,701	262,068	143,690	30,116	88,527	54,727	678	74,511	14,912	116,447	652,485
Mitchell	14,999	2,716	3,835	312	1,245	993	9	1,466	131	2,203	1,347
Montgomery	26,085	5,380	5,934	618	2,088	1,606	15	2,348	246	3,955	9,494
New Hanover	238,852	41,794	46,870	4,803	19,652	13,817	139	19,465	2,838	28,150	56,594
Northampton	16,715	2,957	5,096	340	1,409	1,200	10	1,782	131	3,395	10,064
Person	39,737	8,196	8,542	942	3,172	2,401	23	3,515	375	5,646	14,115
Pitt	175,119	37,244	26,398	4,280	13,606	8,709	102	11,754	2,326	32,930	84,429
Rockingham	92,518	18,702	20,123	2,149	7,426	5,637	54	8,262	883	12,424	27,058
Rowan	151,661	33,377	27,394	3,836	11,796	8,363	89	11,989	1,550	21,559	48,260
Swain	13,916	3,010	2,795	346	1,093	802	8	1,156	140	2,125	5,694
Union	256,452	64,733	35,466	7,439	18,970	12,757	150	18,383	2,730	21,166	84,702
Wake	1,190,275	270,737	159,366	31,112	90,615	58,185	694	81,028	14,339	85,051	510,380
Yancey	18,938	3,356	5,034	386	1,582	1,275	11	1,879	167	2,984	1,636

NORTH DAKOTA

American Lung Association in North Dakota

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Billings	4	0	0	1.3	C
Burke	5	0	0	1.7	C
Burleigh	7	0	0	2.3	D
Cass	3	0	0	1.0	C
Dunn	4	0	0	1.3	C
McKenzie	3	0	0	1.0	C
Mercer	4	0	0	1.3	C
Oliver	6	0	0	2.0	C
Ward	6	0	0	2.0	C

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Billings	7	3	1	0	4.5	F	6.1	Pass
Burke	13	10	1	0	10.0	F	7.6	Pass
Burleigh	15	12	1	0	11.7	F	8.8	Pass
Cass	15	10	1	0	10.7	F	9.2	Fail
Dunn	14	8	0	1	9.5	F	7.1	Pass
McKenzie	13	6	1	0	8.0	F	INC	INC
Mercer	12	9	0	1	9.3	F	6.6	Pass
Oliver	14	12	0	1	11.5	F	8.0	Pass
Ward	16	9	1	0	10.5	F	7.2	Pass

NORTH DAKOTA

American Lung Association in North Dakota

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Billings	1,034	222	261	14	80	48	1	79	10	108	84
Burke	2,134	535	494	35	157	95	1	156	19	192	188
Burleigh	100,012	23,179	18,506	1,508	7,755	4,073	53	6,436	1,184	7,402	13,278
Cass	196,362	43,407	25,873	2,824	15,929	6,943	104	10,384	2,846	18,222	35,045
Dunn	4,019	1,044	786	68	297	165	2	264	39	440	785
McKenzie	14,252	4,547	1,496	296	1,008	445	8	660	167	1,141	3,711
Mercer	8,309	1,938	1,933	126	626	379	4	620	80	663	707
Oliver	1,879	445	492	29	139	89	1	148	16	202	128
Ward	68,332	16,387	10,204	1,066	5,354	2,494	36	3,815	860	4,874	13,023

OHIO

American Lung Association in Ohio

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Allen	4	0	0	1.3	C	3	3	0	0	2.5	D	7.5	Pass
Ashtabula	9	0	0	3.0	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Athens	DNC	DNC	DNC	DNC	DNC	0	1	0	0	0.5	B	6.1	Pass
Belmont	DNC	DNC	DNC	DNC	DNC	0	1	0	0	0.5	B	7.8	Pass
Butler	11	0	0	3.7	F	8	4	0	0	4.7	F	11.2	Fail
Clark	3	0	0	1.0	C	4	3	0	0	2.8	D	8.8	Pass
Clermont	3	0	0	1.0	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Clinton	5	0	0	1.7	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Cuyahoga	13	2	0	5.3	F	6	3	1	0	4.2	F	12.2	Fail
Delaware	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Fayette	INC	INC	INC	INC	INC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Franklin	3	0	0	1.0	C	6	3	1	0	4.2	F	9.3	Fail
Geauga	3	0	0	1.0	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Greene	5	0	0	1.7	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hamilton	17	2	0	6.7	F	6	2	0	0	3.0	D	10.1	Fail
Harrison	DNC	DNC	DNC	DNC	DNC	INC	INC	INC	INC	INC	INC	INC	INC
Jefferson	2	0	0	0.7	B	2	1	2	0	2.5	D	10.0	Fail
Knox	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lake	16	0	0	5.3	F	1	2	0	0	1.3	C	7.2	Pass
Lawrence	0	0	0	0.0	A	2	2	0	0	1.7	C	7.9	Pass
Licking	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lorain	1	0	0	0.3	B	INC	INC	INC	INC	INC	INC	INC	INC
Lucas	21	0	0	7.0	F	1	1	0	0	0.8	B	9.4	Fail
Madison	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Mahoning	3	0	0	1.0	C	3	2	1	0	2.7	D	INC	INC
Medina	6	0	0	2.0	C	4	2	1	0	3.0	D	7.4	Pass
Miami	5	0	0	1.7	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Montgomery	8	0	0	2.7	D	4	3	0	0	2.8	D	9.0	Pass
Noble	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Portage	6	2	0	3.0	D	INC	INC	INC	INC	INC	INC	INC	INC
Preble	4	0	0	1.3	C	5	2	1	0	3.3	F	8.0	Pass
Scioto	DNC	DNC	DNC	DNC	DNC	4	2	0	0	2.3	D	7.7	Pass
Stark	8	0	0	2.7	D	6	1	2	0	3.8	F	9.4	Fail
Summit	8	0	0	2.7	D	3	2	1	0	2.7	D	8.6	Pass
Trumbull	3	1	0	1.5	C	7	2	1	0	4.0	F	8.7	Pass
Warren	10	0	0	3.3	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Washington	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Wood	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

OHIO

American Lung Association in Ohio

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Allen	100,838	23,604	19,555	1,599	8,523	6,190	62	7,697	1,009	13,724	20,230
Ashtabula	96,845	21,061	19,969	1,426	8,378	6,329	60	7,899	884	16,603	11,620
Athens	62,706	9,037	9,631	612	5,936	3,507	39	4,184	900	13,648	6,701
Belmont	64,918	12,060	14,655	817	5,818	4,439	40	5,580	575	9,327	5,536
Butler	393,043	90,755	64,335	6,147	33,566	22,658	241	27,572	4,412	45,064	96,444
Clark	134,610	30,242	27,727	2,048	11,514	8,638	83	10,799	1,343	19,949	23,908
Clermont	211,972	46,229	40,271	3,131	18,365	13,311	130	16,452	2,162	18,649	17,160
Clinton	41,938	9,432	8,122	639	3,595	2,623	26	3,255	425	5,080	3,269
Cuyahoga	1,233,088	250,704	247,380	16,980	108,355	78,178	755	97,180	13,571	193,220	524,954
Delaware	231,636	56,566	35,858	3,831	19,572	13,520	142	16,353	2,483	11,360	46,454
Fayette	28,817	6,766	5,314	458	2,447	1,780	18	2,197	294	4,064	2,524
Franklin	1,326,063	306,699	179,213	20,773	113,480	69,674	814	82,862	16,622	195,004	548,099
Geauga	95,407	20,964	21,927	1,420	8,198	6,551	59	8,287	824	5,953	5,001
Greene	169,691	34,620	32,428	2,345	14,904	10,433	104	12,898	1,873	15,986	29,039
Hamilton	827,058	188,768	140,997	12,785	70,638	47,714	507	58,368	9,456	109,421	303,975
Harrison	14,159	2,913	3,277	197	1,239	983	9	1,242	130	2,011	819
Jefferson	64,026	12,462	14,672	844	5,666	4,360	39	5,501	639	9,884	6,854
Knox	63,320	14,395	12,635	975	5,394	3,949	39	4,924	647	6,835	3,478
Lake	231,640	44,026	51,878	2,982	20,673	15,836	142	19,895	2,281	23,146	33,500
Lawrence	56,118	11,982	11,163	812	4,890	3,640	34	4,519	569	9,382	3,297
Licking	183,201	41,512	32,774	2,812	15,732	11,192	112	13,748	1,926	17,281	26,211
Lorain	317,910	68,131	65,110	4,615	27,602	20,637	195	25,731	3,162	34,018	74,796
Lucas	425,484	96,339	77,039	6,525	36,432	25,587	261	31,506	4,661	75,810	140,928
Madison	44,602	8,762	7,548	593	3,996	2,755	28	3,345	406	3,714	5,990
Mahoning	225,596	45,617	51,997	3,090	19,749	15,243	138	19,275	2,191	42,602	56,560
Medina	184,042	38,831	37,648	2,630	16,088	12,172	113	15,152	1,775	13,795	13,857
Miami	110,876	25,246	22,034	1,710	9,463	7,016	68	8,735	1,097	10,565	10,496
Montgomery	533,796	117,960	101,018	7,990	45,907	32,498	327	40,221	5,822	79,116	169,376
Noble	14,311	2,747	4,346	186	1,257	1,135	9	1,480	98	1,733	929
Portage	162,665	29,230	30,494	1,980	14,767	10,199	100	12,525	1,910	20,077	20,349
Preble	40,556	8,961	8,429	607	3,494	2,664	25	3,329	386	4,192	1,824
Scioto	71,969	15,499	13,847	1,050	6,248	4,516	44	5,590	728	12,775	5,309
Stark	372,716	79,977	78,127	5,417	32,266	24,141	229	30,210	3,768	45,043	57,178
Summit	535,733	109,966	107,060	7,448	47,054	34,339	328	42,646	5,664	68,166	136,577
Trumbull	200,373	41,176	45,598	2,789	17,497	13,546	123	17,101	1,916	33,696	28,423
Warren	252,148	59,494	41,173	4,030	21,500	15,052	155	18,301	2,573	14,544	43,166
Washington	58,577	11,400	13,486	772	5,185	4,007	36	5,058	572	7,334	3,287
Wood	132,650	26,558	22,544	1,799	11,732	7,686	81	9,362	1,600	12,420	18,011

OKLAHOMA

American Lung Association in Oklahoma

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Adair	2	0	0	0.7	B
Canadian	12	0	0	4.0	F
Carter	INC	INC	INC	INC	INC
Cleveland	7	0	0	2.3	D
Comanche	6	0	0	2.0	C
Creek	6	0	0	2.0	C
Dewey	3	0	0	1.0	C
Jefferson	INC	INC	INC	INC	INC
Johnston	INC	INC	INC	INC	INC
Kay	DNC	DNC	DNC	DNC	DNC
Kiowa	INC	INC	INC	INC	INC
Love	INC	INC	INC	INC	INC
McClain	15	0	0	5.0	F
Mayes	3	0	0	1.0	C
Nowata	INC	INC	INC	INC	INC
Oklahoma	13	0	0	4.3	F
Osage	11	2	0	4.7	F
Ottawa	10	0	0	3.3	F
Pittsburg	10	0	0	3.3	F
Pontotoc	INC	INC	INC	INC	INC
Sequoyah	1	0	0	0.3	B
Tulsa	25	5	0	10.8	F
Washington	INC	INC	INC	INC	INC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Adair	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Canadian	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Carter	1	1	0	0	0.8	B	7.4	Pass
Cleveland	3	0	0	0	1.0	C	9.3	Fail
Comanche	1	0	0	0	0.3	B	7.1	Pass
Creek	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Dewey	1	0	0	0	0.3	B	6.9	Pass
Jefferson	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Johnston	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Kay	6	1	0	0	2.5	D	9.0	Pass
Kiowa	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Love	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
McClain	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Mayes	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Nowata	INC	INC	INC	INC	INC	INC	INC	INC
Oklahoma	2	0	0	0	0.7	B	9.1	Fail
Osage	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Ottawa	14	4	0	0	6.7	F	INC	INC
Pittsburg	6	0	0	0	2.0	C	8.2	Pass
Pontotoc	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Sequoyah	1	0	0	0	0.3	B	8.1	Pass
Tulsa	5	1	0	0	2.2	D	8.8	Pass
Washington	INC	INC	INC	INC	INC	INC	INC	INC

OKLAHOMA

American Lung Association in Oklahoma

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Adair	19,627	5,270	3,135	516	1,627	1,150	12	1,511	208	4,480	11,842
Canadian	175,829	44,698	24,208	4,380	14,861	9,572	108	12,336	2,165	13,705	52,302
Carter	48,596	12,073	8,324	1,183	4,131	2,914	30	3,860	543	8,208	15,792
Cleveland	301,193	60,379	46,474	5,916	27,236	17,302	185	22,511	3,986	37,151	96,990
Comanche	121,574	28,859	17,249	2,828	10,491	6,577	75	8,513	1,419	21,799	55,117
Creek	73,332	16,997	13,781	1,665	6,369	4,657	45	6,223	780	11,405	19,202
Dewey	4,286	1,141	826	112	355	265	3	358	42	581	847
Jefferson	5,347	1,317	1,151	129	454	352	3	481	51	1,277	1,270
Johnston	10,216	2,365	1,945	232	886	639	6	858	112	1,953	3,397
Kay	43,641	10,799	8,557	1,058	3,703	2,702	27	3,658	459	8,006	12,336
Kiowa	8,398	2,032	1,785	199	718	553	5	754	82	1,795	2,369
Love	10,296	2,447	1,961	240	886	646	6	867	110	1,468	3,334
McClain	47,072	11,636	7,458	1,140	4,016	2,787	29	3,645	534	4,458	11,341
Mayes	39,889	9,330	7,608	914	3,453	2,537	25	3,400	424	6,652	14,808
Nowata	9,438	2,203	1,862	216	818	615	6	826	96	1,628	3,322
Oklahoma	808,866	203,852	119,648	19,974	68,477	44,759	497	58,298	10,001	127,113	382,919
Osage	46,130	9,589	10,132	940	4,121	3,159	28	4,300	457	6,328	17,112
Ottawa	30,287	7,750	5,457	759	2,545	1,814	19	2,428	327	6,322	11,391
Pittsburg	43,479	9,923	8,792	972	3,786	2,799	27	3,787	431	7,603	14,022
Pontotoc	38,396	9,676	6,641	948	3,244	2,258	24	3,005	442	5,238	14,373
Sequoyah	40,291	9,652	7,582	946	3,464	2,559	25	3,423	425	8,866	15,797
Tulsa	682,868	169,744	105,691	16,632	58,065	38,746	420	50,717	8,233	101,475	288,317
Washington	53,706	12,945	10,884	1,268	4,593	3,382	33	4,597	570	7,954	15,802

OREGON

American Lung Association in Oregon

	HIGH OZONE DAYS 2021–2023				
County	Orange	Red	Purple	Wgt. Avg.	Grade
Clackamas	4	1	0	1.8	C
Columbia	1	0	0	0.3	B
Crook	DNC	DNC	DNC	DNC	DNC
Deschutes	DNC	DNC	DNC	DNC	DNC
Harney	DNC	DNC	DNC	DNC	DNC
Jackson	3	0	0	1.0	C
Josephine	DNC	DNC	DNC	DNC	DNC
Klamath	DNC	DNC	DNC	DNC	DNC
Lake	DNC	DNC	DNC	DNC	DNC
Lane	1	0	0	0.3	B
Marion	4	0	0	1.3	C
Multnomah	2	0	0	0.7	B
Umatilla	1	0	0	0.3	B
Washington	0	0	0	0.0	A

	HIGH PARTICLE POLLUTION DAYS 2021–2023							
	24-Hour						Annual	
	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Clackamas	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Columbia	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Crook	8	6	0	0	5.7	F	7.5	Pass
Deschutes	INC	INC	INC	INC	INC	INC	INC	INC
Harney	8	4	0	0	4.7	F	10.0	Fail
Jackson	5	14	5	0	12.0	F	10.5	Fail
Josephine	9	7	4	0	9.2	F	10.2	Fail
Klamath	21	25	2	0	20.8	F	12.0	Fail
Lake	9	2	0	0	4.0	F	9.1	Fail
Lane	21	29	10	10	36.5	F	14.4	Fail
Marion	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Multnomah	2	1	0	0	1.2	C	6.7	Pass
Umatilla	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Washington	2	1	0	0	1.2	C	6.6	Pass

OREGON

American Lung Association in Oregon

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Clackamas	423,173	86,933	86,560	6,042	39,990	23,179	177	29,252	3,562	29,176	91,582
Columbia	53,880	10,849	11,260	754	5,122	3,014	23	3,803	429	5,248	7,608
Crook	26,952	5,254	6,951	365	2,566	1,628	11	2,130	199	3,416	3,469
Deschutes	208,513	38,766	45,403	2,694	20,144	11,736	87	14,949	1,776	17,944	30,889
Harney	7,440	1,465	2,027	102	704	455	3	603	51	1,111	1,084
Jackson	220,768	44,562	52,660	3,097	20,824	12,588	92	16,378	1,792	27,404	48,532
Josephine	87,821	16,852	24,339	1,171	8,368	5,446	37	7,219	625	13,041	13,616
Klamath	70,003	15,165	15,989	1,054	6,487	3,887	29	5,034	546	13,321	16,689
Lake	8,293	1,667	2,129	116	784	502	3	656	53	1,317	1,557
Lane	381,181	65,661	81,956	4,563	37,332	20,889	159	26,719	3,537	54,725	78,370
Marion	346,741	80,631	59,193	5,604	31,645	16,914	145	21,011	3,059	47,544	131,988
Multnomah	789,698	136,429	120,183	9,482	77,908	38,833	330	46,890	8,424	99,712	264,489
Umatilla	80,053	19,425	13,339	1,350	7,212	3,840	34	4,762	642	12,500	29,847
Washington	598,865	126,504	91,767	8,792	56,355	28,925	250	35,114	5,746	48,317	233,724

PENNSYLVANIA

American Lung Association in Pennsylvania

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Adams	4	0	0	1.3	C	6	3	1	0	4.2	F	8.7	Pass
Allegheny	6	1	0	2.5	D	26	3	1	0	10.8	F	11.6	Fail
Armstrong	6	0	0	2.0	C	2	2	1	0	2.3	D	8.3	Pass
Beaver	3	0	0	1.0	C	5	0	2	0	3.0	D	8.8	Pass
Berks	13	0	0	4.3	F	2	3	2	0	3.5	F	8.3	Pass
Blair	2	0	0	0.7	B	2	4	1	0	3.3	F	7.9	Pass
Bradford	1	0	0	0.3	B	1	0	0	0	0.3	B	INC	INC
Bucks	16	1	0	5.8	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Cambria	1	0	0	0.3	B	1	3	0	0	1.8	C	8.8	Pass
Centre	2	0	0	0.7	B	2	5	0	0	3.2	D	7.6	Pass
Chester	3	0	0	1.0	C	3	2	2	0	3.3	F	8.1	Pass
Clearfield	INC	INC	INC	INC	INC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Cumberland	DNC	DNC	DNC	DNC	DNC	5	2	2	0	4.0	F	7.8	Pass
Dauphin	8	0	0	2.7	D	5	3	2	0	4.5	F	9.8	Fail
Delaware	7	0	0	2.3	D	3	2	2	0	3.3	F	8.5	Pass
Elk	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Erie	3	0	0	1.0	C	1	3	0	0	1.8	C	INC	INC
Fayette	2	0	0	0.7	B	1	0	0	0	0.3	B	INC	INC
Franklin	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Greene	2	0	0	0.7	B	1	0	0	0	0.3	B	INC	INC
Indiana	4	0	0	1.3	C	4	2	1	0	3.0	D	7.3	Pass
Lackawanna	3	0	0	1.0	C	2	4	1	0	3.3	F	7.5	Pass
Lancaster	3	0	0	1.0	C	15	4	1	1	8.5	F	9.5	Fail
Lawrence	3	0	0	1.0	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lebanon	4	0	0	1.3	C	4	3	2	0	4.2	F	8.4	Pass
Lehigh	1	0	0	0.3	B	0	5	0	1	3.3	F	INC	INC
Luzerne	INC	INC	INC	INC	INC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Lycoming	3	0	0	1.0	C	1	0	0	0	0.3	B	INC	INC
Mercer	5	0	0	1.7	C	3	2	0	0	2.0	C	INC	INC
Monroe	3	0	0	1.0	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Montgomery	6	0	0	2.0	C	2	3	2	0	3.5	F	8.1	Pass
Northampton	4	1	0	1.8	C	3	4	0	1	3.8	F	8.3	Pass
Philadelphia	16	2	0	6.3	F	7	4	1	1	5.8	F	10.0	Fail
Somerset	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Susquehanna	DNC	DNC	DNC	DNC	DNC	1	0	0	0	0.3	B	INC	INC
Tioga	0	0	0	0.0	A	1	0	0	0	0.3	B	INC	INC
Washington	3	0	0	1.0	C	6	1	2	0	3.8	F	9.0	Pass
Westmoreland	1	0	0	0.3	B	1	0	0	0	0.3	B	INC	INC
Wyoming	DNC	DNC	DNC	DNC	DNC	1	0	0	0	0.3	B	INC	INC
York	2	0	0	0.7	B	4	3	1	0	3.5	F	9.3	Fail

PENNSYLVANIA

American Lung Association in Pennsylvania

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Adams	106,748	20,487	23,904	2,032	8,760	6,751	57	9,899	947	9,485	12,911
Allegheny	1,224,825	226,158	254,947	22,429	102,122	74,462	652	106,710	12,505	137,660	284,276
Armstrong	64,074	12,053	15,796	1,195	5,249	4,237	34	6,366	525	7,512	2,339
Beaver	165,631	31,791	38,555	3,153	13,564	10,601	88	15,704	1,451	17,014	20,018
Berks	432,821	94,177	79,873	9,340	34,671	25,150	231	35,348	4,199	50,100	142,390
Blair	120,273	24,008	26,630	2,381	9,782	7,497	64	10,985	1,086	16,835	7,684
Bradford	59,695	13,194	13,704	1,309	4,706	3,719	32	5,543	493	8,189	2,809
Bucks	645,984	127,508	137,710	12,646	52,686	40,506	344	58,766	5,751	42,929	120,302
Cambria	130,668	24,985	32,112	2,478	10,683	8,497	70	12,765	1,112	16,576	11,855
Centre	157,795	22,922	25,891	2,273	13,997	9,032	85	11,965	1,807	23,648	24,506
Chester	549,784	119,592	101,244	11,861	44,009	32,157	293	45,198	5,291	33,085	127,918
Clearfield	77,090	14,170	17,430	1,405	6,381	4,974	41	7,296	616	11,254	4,742
Cumberland	270,738	55,072	52,515	5,462	22,084	15,956	144	22,590	2,700	21,063	52,086
Dauphin	289,234	64,271	53,618	6,374	23,040	16,650	154	23,453	2,870	36,562	112,333
Delaware	576,720	126,232	103,693	12,519	46,206	33,012	307	46,081	5,905	60,085	213,940
Elk	30,198	5,762	7,416	571	2,464	2,004	16	3,010	232	2,988	968
Erie	267,571	54,886	54,370	5,443	21,722	16,017	143	22,975	2,568	36,783	45,838
Fayette	123,915	23,360	28,839	2,317	10,187	7,991	66	11,825	1,055	22,787	11,147
Franklin	157,854	34,496	32,571	3,421	12,557	9,513	84	13,773	1,441	12,729	23,004
Greene	34,357	6,417	7,390	636	2,844	2,154	18	3,119	291	4,880	2,436
Indiana	83,094	14,854	17,482	1,473	6,981	5,067	44	7,267	850	12,709	5,967
Lackawanna	216,123	44,107	45,269	4,374	17,530	13,150	115	19,014	2,041	33,535	41,988
Lancaster	558,589	127,940	112,749	12,689	43,953	32,546	298	46,971	5,306	46,567	111,949
Lawrence	84,472	16,745	20,172	1,661	6,853	5,415	45	8,092	729	11,209	8,024
Lebanon	144,252	32,290	29,944	3,202	11,399	8,612	77	12,506	1,316	12,219	30,659
Lehigh	377,754	83,731	68,317	8,304	30,139	21,645	201	30,293	3,765	44,748	153,783
Luzerne	327,388	66,543	66,598	6,599	26,606	19,850	175	28,483	3,013	51,977	85,350
Lycoming	112,724	22,853	23,837	2,266	9,160	6,859	60	9,936	1,063	13,762	12,088
Mercer	108,503	20,454	25,728	2,029	8,919	6,994	58	10,399	939	12,920	11,215
Monroe	166,053	31,246	33,856	3,099	13,728	10,401	89	14,878	1,510	15,684	63,434
Montgomery	868,742	183,193	168,332	18,168	70,048	51,589	463	73,278	8,412	58,209	238,410
Northampton	319,091	60,437	66,409	5,994	26,394	19,606	170	28,164	3,064	29,639	87,359
Philadelphia	1,550,542	324,477	235,398	32,180	127,049	83,258	824	110,525	18,640	304,389	1,023,238
Somerset	72,197	12,995	17,700	1,289	5,982	4,779	39	7,149	548	8,149	4,095
Susquehanna	38,109	7,103	9,914	704	3,120	2,565	20	3,906	292	4,509	1,969
Tioga	40,840	7,958	9,791	789	3,327	2,630	22	3,930	350	5,091	1,821
Washington	210,232	41,042	47,424	4,070	17,167	13,310	112	19,576	1,869	19,620	18,860
Westmoreland	351,163	63,299	87,503	6,278	29,070	23,319	187	35,039	2,941	37,249	25,921
Wyoming	25,902	4,943	6,013	490	2,124	1,660	14	2,456	226	3,417	1,459
York	464,640	100,940	89,418	10,011	37,141	27,491	248	39,073	4,334	38,942	93,615

PUERTO RICO

American Lung Association in Puerto Rico

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Adjuntas	DNC	DNC	DNC	DNC	DNC
Bayamón	0	0	0	0.0	A
Caguas	DNC	DNC	DNC	DNC	DNC
Cataño	INC	INC	INC	INC	INC
Fajardo	DNC	DNC	DNC	DNC	DNC
Guayama	DNC	DNC	DNC	DNC	DNC
Guaynabo	DNC	DNC	DNC	DNC	DNC
Mayagüez	0	0	0	0.0	A
Ponce	DNC	DNC	DNC	DNC	DNC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Adjuntas	INC	INC	INC	INC	INC	INC	INC	INC
Bayamón	0	0	0	0	0.0	A	6.7	Pass
Caguas	0	0	0	0	0.0	A	INC	INC
Cataño	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Fajardo	0	0	0	0	0.0	A	INC	INC
Guayama	INC	INC	INC	INC	INC	INC	INC	INC
Guaynabo	0	0	0	0	0.0	A	INC	INC
Mayagüez	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Ponce	0	0	0	0	0.0	A	INC	INC

PUERTO RICO

American Lung Association in Puerto Rico

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Adjuntas	17,900	2,945	4,204	472	1,801	786	3	1,584	107	11,107	56
Bayamón	180,835	27,017	45,194	4,333	18,414	8,017	27	16,077	950	61,516	1,641
Caguas	124,608	19,031	28,789	3,052	12,538	5,441	18	10,848	727	46,022	1,407
Cataño	22,108	3,553	5,593	570	2,209	966	3	1,954	119	10,066	218
Fajardo	31,166	5,042	7,555	809	3,130	1,367	5	2,762	178	13,114	188
Guayama	34,765	5,603	7,415	899	3,497	1,491	5	2,858	193	16,414	174
Guaynabo	89,039	11,901	23,596	1,909	9,335	4,096	13	8,353	485	21,393	889
Mayagüez	69,798	10,611	18,873	1,702	7,394	3,193	10	6,274	401	37,469	534
Ponce	130,251	21,642	33,887	3,471	13,194	5,776	19	11,716	689	66,952	699

RHODE ISLAND

American Lung Association in Rhode Island

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Kent	4	0	0	1.3	C
Providence	7	0	0	2.3	D
Washington	12	1	0	4.5	F

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Kent	3	0	0	0	1.0	C	4.9	Pass
Providence	3	0	0	0	1.0	C	7.7	Pass
Washington	4	0	0	0	1.3	C	5.1	Pass

RHODE ISLAND

American Lung Association in Rhode Island

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Kent	171,278	30,557	35,957	2,608	17,359	9,758	96	12,730	1,423	15,274	26,476
Providence	660,615	131,950	111,084	11,260	65,594	33,297	369	42,422	6,178	80,793	279,234
Washington	129,982	19,503	31,550	1,664	13,506	7,879	73	10,505	1,080	11,250	13,150

SOUTH CAROLINA

American Lung Association in South Carolina

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Aiken	0	0	0	0.0	A
Anderson	0	0	0	0.0	A
Berkeley	2	0	0	0.7	B
Charleston	0	0	0	0.0	A
Chesterfield	0	0	0	0.0	A
Darlington	0	0	0	0.0	A
Edgefield	0	0	0	0.0	A
Florence	DNC	DNC	DNC	DNC	DNC
Greenville	1	0	0	0.3	B
Horry	0	0	0	0.0	A
Lexington	DNC	DNC	DNC	DNC	DNC
Richland	4	0	0	1.3	C
Spartanburg	3	0	0	1.0	C
York	3	0	0	1.0	C

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Aiken	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Anderson	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Berkeley	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Charleston	0	0	0	0	0.0	A	INC	INC
Chesterfield	1	0	0	0	0.3	B	6.8	Pass
Darlington	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Edgefield	0	0	0	0	0.0	A	8.1	Pass
Florence	1	0	0	0	0.3	B	7.7	Pass
Greenville	2	0	0	0	0.7	B	8.4	Pass
Horry	INC	INC	INC	INC	INC	INC	INC	INC
Lexington	1	0	0	0	0.3	B	INC	INC
Richland	2	0	0	0	0.7	B	7.4	Pass
Spartanburg	2	0	0	0	0.7	B	8.4	Pass
York	1	0	0	0	0.3	B	7.5	Pass

SOUTH CAROLINA

American Lung Association in South Carolina

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Aiken	177,130	38,104	37,638	2,569	12,298	10,927	93	14,842	1,780	24,516	63,330
Anderson	213,076	47,938	39,704	3,232	14,627	12,520	112	16,816	2,229	28,239	51,554
Berkeley	255,217	59,484	38,856	4,010	17,188	13,676	135	17,952	2,852	24,616	98,568
Charleston	424,367	81,669	78,368	5,506	30,062	24,913	224	33,140	4,914	45,722	143,272
Chesterfield	44,031	9,792	8,639	660	3,046	2,668	23	3,607	430	8,818	18,301
Darlington	62,416	13,895	12,541	937	4,300	3,771	33	5,103	657	13,658	29,049
Edgefield	27,607	4,567	5,677	308	2,038	1,755	15	2,361	245	4,264	11,485
Florence	137,214	32,289	25,047	2,177	9,271	7,886	72	10,573	1,499	25,245	69,316
Greenville	558,036	127,137	95,536	8,571	37,960	31,389	295	41,718	6,179	61,870	188,663
Horry	397,478	66,411	107,430	4,477	29,517	28,340	210	39,315	3,589	50,083	91,047
Lexington	309,528	70,740	54,364	4,769	21,142	17,778	163	23,748	3,285	34,255	90,124
Richland	425,138	91,073	61,710	6,140	29,096	22,332	224	28,964	5,400	63,343	256,494
Spartanburg	356,698	83,262	58,315	5,613	24,100	19,712	188	26,106	3,923	48,674	121,794
York	298,320	69,973	47,392	4,717	20,231	16,570	158	21,949	3,303	28,093	98,193

SOUTH DAKOTA

American Lung Association in South Dakota

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Brookings	6	0	0	2.0	C
Brown	DNC	DNC	DNC	DNC	DNC
Clay	INC	INC	INC	INC	INC
Codington	11	0	0	3.7	F
Custer	1	1	0	0.8	B
Hughes	DNC	DNC	DNC	DNC	DNC
Jackson	1	0	0	0.3	B
Meade	8	0	0	2.7	D
Minnehaha	23	1	0	8.2	F
Pennington	DNC	DNC	DNC	DNC	DNC
Union	INC	INC	INC	INC	INC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Brookings	5	3	1	0	3.8	F	5.6	Pass
Brown	7	3	1	0	4.5	F	6.0	Pass
Clay	INC	INC	INC	INC	INC	INC	INC	INC
Codington	6	3	1	0	4.2	F	8.5	Pass
Custer	6	2	1	0	3.7	F	4.6	Pass
Hughes	3	4	2	0	4.3	F	3.6	Pass
Jackson	2	5	2	0	4.5	F	5.6	Pass
Meade	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Minnehaha	4	5	0	0	3.8	F	INC	INC
Pennington	6	4	1	0	4.7	F	7.8	Pass
Union	INC	INC	INC	INC	INC	INC	INC	INC

SOUTH DAKOTA

American Lung Association in South Dakota

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Brookings	35,980	7,467	5,048	519	2,544	1,447	19	2,066	553	3,659	4,554
Brown	37,733	8,849	7,082	615	2,849	1,805	20	2,611	472	3,680	5,663
Clay	15,431	2,668	1,988	185	1,107	603	8	857	286	2,266	2,113
Codington	28,971	6,533	5,890	454	2,248	1,462	15	2,118	335	3,243	2,678
Custer	9,117	1,267	3,161	88	843	663	5	967	76	763	956
Hughes	17,624	4,288	3,329	298	1,338	849	9	1,231	217	1,455	3,458
Jackson	2,776	977	379	68	176	105	1	151	30	814	1,737
Meade	30,954	6,408	5,434	445	2,370	1,445	16	2,085	392	2,363	4,295
Minnehaha	206,930	52,235	29,185	3,628	15,011	8,541	107	12,320	2,704	19,711	43,173
Pennington	115,903	25,374	23,722	1,762	9,071	5,893	60	8,539	1,330	13,052	24,087
Union	17,183	4,082	3,394	283	1,326	854	9	1,238	198	970	1,822

TENNESSEE

American Lung Association in Tennessee

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Anderson	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Blount	6	0	0	2.0	C	5	0	0	0	1.7	C	7.4	Pass
Claiborne	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Davidson	6	0	0	2.0	C	3	0	0	0	1.0	C	9.6	Fail
DeKalb	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Dyer	DNC	DNC	DNC	DNC	DNC	2	0	0	0	0.7	B	7.7	Pass
Hamilton	3	0	0	1.0	C	2	0	0	0	0.7	B	8.4	Pass
Jefferson	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Knox	0	0	0	0.0	A	6	0	0	0	2.0	C	9.1	Fail
Lawrence	DNC	DNC	DNC	DNC	DNC	0	0	0	0	0.0	A	6.8	Pass
Loudon	0	0	0	0.0	A	1	0	0	0	0.3	B	6.9	Pass
McMinn	DNC	DNC	DNC	DNC	DNC	2	0	0	0	0.7	B	7.8	Pass
Madison	DNC	DNC	DNC	DNC	DNC	2	0	0	0	0.7	B	8.1	Pass
Maury	DNC	DNC	DNC	DNC	DNC	1	0	0	0	0.3	B	7.3	Pass
Montgomery	DNC	DNC	DNC	DNC	DNC	2	0	0	0	0.7	B	7.2	Pass
Putnam	DNC	DNC	DNC	DNC	DNC	1	0	0	0	0.3	B	7.2	Pass
Roane	DNC	DNC	DNC	DNC	DNC	2	1	0	0	1.2	C	7.3	Pass
Sevier	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Shelby	21	2	0	8.0	F	0	0	0	0	0.0	A	8.9	Pass
Sullivan	0	0	0	0.0	A	2	0	0	0	0.7	B	6.7	Pass
Sumner	9	0	0	3.0	D	1	0	0	0	0.3	B	7.6	Pass
Williamson	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Wilson	5	0	0	1.7	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

TENNESSEE

American Lung Association in Tennessee

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Anderson	80,234	16,840	16,165	1,640	6,951	6,721	50	7,951	845	11,386	10,042
Blount	141,456	27,869	30,401	2,714	12,452	12,332	88	14,716	1,454	13,528	15,096
Claiborne	32,654	6,230	6,721	607	2,898	2,807	20	3,321	351	5,818	1,861
Davidson	712,334	145,337	95,020	14,155	62,304	50,749	442	55,736	10,109	85,007	323,504
DeKalb	21,225	4,568	4,034	445	1,829	1,773	13	2,086	218	3,408	2,703
Dyer	36,498	8,805	6,521	858	3,040	2,870	23	3,354	402	6,368	8,196
Hamilton	379,864	80,074	71,134	7,799	32,876	30,583	236	35,690	4,414	47,922	115,769
Jefferson	57,838	11,090	12,105	1,080	5,130	5,080	36	6,040	591	7,279	5,388
Knox	500,669	104,121	82,873	10,141	43,533	38,648	311	44,146	6,205	67,213	99,972
Lawrence	46,114	11,562	8,170	1,126	3,794	3,608	29	4,223	478	6,770	3,453
Loudon	60,591	11,318	17,024	1,102	5,378	5,802	38	7,210	517	6,316	8,756
McMinn	55,678	11,849	11,441	1,154	4,806	4,713	35	5,601	581	8,141	6,573
Madison	99,193	22,186	18,285	2,161	8,447	7,895	61	9,220	1,137	17,629	46,064
Maury	110,760	25,217	19,670	2,456	9,387	8,691	69	10,101	1,257	11,685	25,548
Montgomery	239,872	63,729	24,720	6,207	19,384	15,175	149	16,249	3,160	29,603	97,042
Putnam	83,844	17,394	14,021	1,694	7,291	6,432	52	7,346	995	13,884	12,043
Roane	56,096	10,539	13,363	1,026	4,989	5,119	35	6,201	543	7,448	4,684
Sevier	99,415	20,634	20,860	2,010	8,639	8,554	62	10,195	1,005	12,045	14,174
Shelby	910,042	231,052	139,302	22,503	74,584	66,442	563	75,799	10,988	163,297	609,321
Sullivan	162,135	30,752	36,430	2,995	14,394	14,395	101	17,271	1,656	21,649	12,932
Sumner	207,994	47,358	35,517	4,612	17,649	16,416	129	19,013	2,336	18,409	41,623
Williamson	264,460	67,157	40,744	6,541	21,724	20,417	164	23,528	2,877	12,845	46,754
Wilson	163,674	37,990	26,449	3,700	13,817	12,694	102	14,598	1,855	10,673	32,304

TEXAS

American Lung Association in Texas

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Atascosa	DNC	DNC	DNC	DNC	DNC	2	0	0	0	0.7	B	9.0	Pass
Bell	12	0	0	4.0	F	0	0	0	0	0.0	A	7.3	Pass
Bexar	32	0	0	10.7	F	2	0	0	0	0.7	B	8.9	Pass
Bowie	DNC	DNC	DNC	DNC	DNC	2	0	0	0	0.7	B	10.3	Fail
Brazoria	35	2	0	12.7	F	INC	INC	INC	INC	INC	INC	INC	INC
Brazos	DNC	DNC	DNC	DNC	DNC	0	0	0	0	0.0	A	7.9	Pass
Brewster	1	0	0	0.3	B	1	0	0	0	0.3	B	INC	INC
Cameron	1	0	0	0.3	B	7	0	0	0	2.3	D	10.9	Fail
Collin	33	3	0	12.5	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Culberson	INC	INC	INC	INC	INC	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Dallas	45	2	0	16.0	F	1	0	0	0	0.3	B	9.9	Fail
Denton	63	9	0	25.5	F	1	0	0	0	0.3	B	7.7	Pass
Ector	DNC	DNC	DNC	DNC	DNC	0	0	0	0	0.0	A	7.3	Pass
Ellis	3	0	0	1.0	C	INC	INC	INC	INC	INC	INC	INC	INC
El Paso	42	0	0	14.0	F	1	0	0	0	0.3	B	9.0	Pass
Galveston	27	3	0	10.5	F	1	0	0	0	0.3	B	8.3	Pass
Gregg	2	1	0	1.2	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Harris	71	21	1	34.8	F	4	0	0	0	1.3	C	12.5	Fail
Harrison	2	0	0	0.7	B	3	2	0	0	2.0	C	9.5	Fail
Hidalgo	1	0	0	0.3	B	4	0	0	0	1.3	C	9.6	Fail
Hood	23	0	0	7.7	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hunt	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Jefferson	14	0	0	4.7	F	2	1	0	0	1.2	C	8.8	Pass
Johnson	27	1	0	9.5	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Kaufman	11	0	0	3.7	F	INC	INC	INC	INC	INC	INC	INC	INC
Kleberg	DNC	DNC	DNC	DNC	DNC	5	0	0	0	1.7	C	9.9	Fail
Lubbock	DNC	DNC	DNC	DNC	DNC	2	1	0	0	1.2	C	5.7	Pass
McLennan	7	0	0	2.3	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Maverick	DNC	DNC	DNC	DNC	DNC	2	0	0	0	0.7	B	7.9	Pass
Montgomery	16	1	0	5.8	F	1	0	0	0	0.3	B	INC	INC
Navarro	1	0	0	0.3	B	INC	INC	INC	INC	INC	INC	INC	INC
Nueces	4	0	0	1.3	C	1	0	0	0	0.3	B	8.4	Pass
Orange	2	0	0	0.7	B	1	0	0	0	0.3	B	8.3	Pass
Parker	22	0	0	7.3	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Polk	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Potter	DNC	DNC	DNC	DNC	DNC	3	0	0	0	1.0	C	6.0	Pass
Randall	8	0	0	2.7	D	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Rockwall	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Smith	10	0	0	3.3	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Tarrant	52	7	1	21.5	F	3	0	0	0	1.0	C	9.6	Fail
Travis	17	0	0	5.7	F	2	0	0	0	0.7	B	9.6	Fail
Victoria	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Webb	3	0	0	1.0	C	3	0	0	0	1.0	C	9.7	Fail

TEXAS

American Lung Association in Texas

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Atascosa	51,784	13,776	7,812	1,037	3,253	2,010	22	3,092	602	9,468	35,721
Bell	393,193	107,999	47,818	8,131	23,963	13,510	168	20,266	5,052	44,369	224,642
Bexar	2,087,679	510,639	273,263	38,446	133,156	76,581	891	115,628	27,102	301,255	1,531,649
Bowie	91,687	21,746	16,221	1,637	6,025	3,887	39	6,033	1,014	12,857	35,400
Brazoria	398,938	101,544	52,042	7,645	25,285	14,841	170	22,584	4,909	36,476	233,478
Brazos	244,703	49,477	26,002	3,725	16,018	8,043	105	11,601	3,849	52,926	112,090
Brewster	9,513	1,607	2,292	121	688	481	4	758	107	1,233	4,699
Cameron	426,710	120,413	61,905	9,066	26,095	15,878	182	24,302	4,992	99,161	388,270
Collin	1,195,359	291,387	142,320	21,939	76,750	43,964	510	66,627	15,442	75,716	598,755
Culberson	2,196	521	433	39	145	98	1	153	21	448	1,662
Dallas	2,606,358	645,638	317,636	48,610	165,385	93,581	1,112	140,880	34,226	354,670	1,913,958
Denton	1,007,703	231,932	120,688	17,462	65,705	37,306	430	56,368	13,452	60,723	474,566
Ector	164,494	50,301	16,473	3,787	9,547	5,152	70	7,649	1,992	18,966	118,317
Ellis	222,829	58,582	29,218	4,411	13,983	8,263	95	12,597	2,753	16,224	107,228
El Paso	869,880	223,607	117,006	16,835	54,651	31,851	371	48,230	10,763	157,986	773,227
Galveston	361,744	84,684	58,751	6,376	23,830	14,998	154	23,194	4,295	41,008	163,516
Gregg	126,243	32,477	20,557	2,445	8,030	5,041	54	7,771	1,489	19,723	56,407
Harris	4,835,125	1,239,210	586,125	93,301	303,648	172,540	2,063	260,118	62,795	764,979	3,529,941
Harrison	70,895	17,004	12,705	1,280	4,649	3,021	30	4,696	821	11,735	27,372
Hidalgo	898,471	274,020	106,589	20,631	52,661	30,095	383	45,359	11,031	239,489	843,534
Hood	67,774	13,788	17,530	1,038	4,772	3,547	29	5,658	657	5,455	12,522
Hunt	113,347	27,979	17,498	2,107	7,305	4,506	48	6,929	1,360	13,951	39,448
Jefferson	251,496	61,829	40,050	4,655	16,239	10,102	108	15,553	2,763	47,706	159,577
Johnson	202,906	52,074	28,653	3,921	12,866	7,747	87	11,852	2,406	19,799	72,333
Kaufman	185,690	53,451	19,347	4,024	11,107	6,091	79	9,099	2,441	17,588	99,079
Kleberg	30,069	7,202	4,149	542	1,910	1,077	13	1,607	409	6,341	23,761
Lubbock	320,940	74,957	43,685	5,644	20,628	11,708	137	17,552	4,432	52,974	154,171
McLennan	268,583	64,148	41,797	4,830	17,352	10,487	114	15,995	3,458	43,162	121,464
Maverick	57,762	17,819	6,891	1,342	3,371	1,934	25	2,918	681	13,047	56,091
Montgomery	711,354	183,341	99,841	13,804	45,120	27,259	303	41,777	8,565	71,419	292,967
Navarro	55,635	14,873	9,263	1,120	3,511	2,252	24	3,493	619	8,526	27,181
Nueces	352,289	83,141	57,765	6,260	23,031	14,359	150	22,105	4,251	59,695	247,875
Orange	85,722	21,966	14,023	1,654	5,482	3,477	37	5,381	978	12,295	19,106
Parker	173,494	42,478	28,026	3,198	11,303	7,179	74	11,134	1,952	14,141	35,352
Polk	54,186	11,127	10,265	838	3,757	2,509	23	3,938	489	9,090	15,518
Potter	114,647	30,535	16,643	2,299	7,160	4,328	49	6,615	1,306	19,265	65,549
Randall	148,255	35,123	23,864	2,644	9,651	5,950	63	9,129	1,836	12,644	49,325
Rockwall	131,307	34,701	16,728	2,613	8,237	4,861	56	7,417	1,591	6,600	49,741
Smith	245,209	58,935	43,372	4,437	16,008	10,279	104	15,919	2,942	31,655	102,942
Tarrant	2,182,947	547,594	276,400	41,229	138,502	79,901	930	120,970	28,337	236,391	1,262,658
Travis	1,334,961	263,112	152,219	19,810	89,634	48,279	572	71,667	19,125	133,858	695,488
Victoria	91,664	22,941	16,078	1,727	5,901	3,787	39	5,862	1,070	12,747	52,154
Webb	269,148	83,126	28,470	6,259	15,642	8,679	115	12,998	3,282	59,745	258,642

UTAH

American Lung Association in Utah

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Box Elder	4	0	0	1.3	C
Cache	2	1	0	1.2	C
Carbon	4	0	0	1.3	C
Davis	37	2	0	13.3	F
Duchesne	28	10	1	15.0	F
Garfield	INC	INC	INC	INC	INC
Grand	INC	INC	INC	INC	INC
Iron	2	0	0	0.7	B
Salt Lake	65	8	0	25.7	F
San Juan	2	0	0	0.7	B
Tooele	12	0	0	4.0	F
Uintah	39	19	3	24.5	F
Utah	18	0	0	6.0	F
Washington	1	1	0	0.8	B
Weber	17	0	0	5.7	F

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Box Elder	INC	INC	INC	INC	INC	INC	INC	INC
Cache	18	5	0	0	8.5	F	7.9	Pass
Carbon	0	0	0	0	0.0	A	INC	INC
Davis	13	0	0	0	4.3	F	7.3	Pass
Duchesne	14	1	0	0	5.2	F	7.0	Pass
Garfield	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Grand	INC	INC	INC	INC	INC	INC	INC	INC
Iron	2	1	0	0	1.2	C	5.7	Pass
Salt Lake	19	4	0	0	8.3	F	9.3	Fail
San Juan	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Tooele	10	2	0	0	4.3	F	6.4	Pass
Uintah	4	1	0	0	1.8	C	6.3	Pass
Utah	11	0	0	0	3.7	F	7.0	Pass
Washington	1	1	0	0	0.8	B	5.1	Pass
Weber	10	0	0	0	3.3	F	6.7	Pass

UTAH

American Lung Association in Utah

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Box Elder	62,684	18,839	8,255	1,161	4,839	1,687	15	2,884	738	5,272	8,739
Cache	142,393	41,019	14,682	2,528	11,263	3,522	35	5,662	2,039	14,667	25,297
Carbon	20,609	5,180	4,021	319	1,688	647	5	1,197	237	2,853	3,600
Davis	373,207	109,915	42,481	6,774	29,155	9,778	92	16,136	4,736	22,191	72,172
Duchesne	20,477	6,472	2,818	399	1,543	549	5	954	232	2,513	3,020
Garfield	5,314	1,177	1,262	73	450	182	1	350	53	521	703
Grand	9,706	1,984	2,027	122	845	324	2	601	118	1,018	2,150
Iron	64,211	17,084	9,040	1,053	5,204	1,773	16	3,045	851	7,283	10,506
Salt Lake	1,185,813	292,797	146,590	18,045	98,862	33,184	291	54,967	15,875	110,632	382,865
San Juan	14,358	3,991	2,268	246	1,139	420	4	743	162	2,651	7,703
Tooele	82,051	25,121	7,727	1,548	6,322	2,059	20	3,276	1,056	5,573	17,782
Uintah	37,747	11,500	4,783	709	2,899	1,002	9	1,700	456	4,165	6,947
Utah	719,174	223,925	58,010	13,801	55,200	16,620	177	25,543	10,168	63,310	154,280
Washington	202,452	48,734	45,347	3,003	16,757	6,603	50	12,628	2,233	21,205	36,606
Weber	271,926	70,898	34,556	4,369	22,232	7,566	67	12,664	3,499	22,794	69,128

VERMONT

American Lung Association in Vermont

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Bennington	1	0	0	0.3	B
Chittenden	1	0	0	0.3	B
Rutland	0	0	0	0.0	A

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Bennington	6	1	0	0	2.5	D	5.4	Pass
Chittenden	5	1	0	0	2.2	D	6.4	Pass
Rutland	3	0	0	0	1.0	C	6.7	Pass

VERMONT

American Lung Association in Vermont

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Bennington	37,183	6,821	9,402	522	3,434	2,094	20	2,570	254	4,272	2,823
Chittenden	169,481	28,587	29,744	2,190	15,811	7,991	89	9,285	1,607	12,459	22,670
Rutland	60,271	10,337	15,271	792	5,643	3,410	32	4,179	408	6,900	3,365

VIRGINIA

American Lung Association in Virginia

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Albemarle	0	0	0	0.0	A	4	2	0	0	2.3	D	7.1	Pass
Arlington	7	0	0	2.3	D	0	2	0	0	1.0	C	7.9	Pass
Caroline	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Charles City	0	0	0	0.0	A	3	0	0	0	1.0	C	6.7	Pass
Chesterfield	1	0	0	0.3	B	1	0	0	0	0.3	B	6.9	Pass
Fairfax	7	0	0	2.3	D	5	2	1	0	3.3	F	8.5	Pass
Fauquier	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Frederick	2	0	0	0.7	B	4	3	0	0	2.8	D	7.8	Pass
Giles	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hanover	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Henrico	1	0	0	0.3	B	4	1	0	0	1.8	C	7.6	Pass
Loudoun	5	0	0	1.7	C	1	2	0	0	1.3	C	7.3	Pass
Madison	1	0	0	0.3	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Prince Edward	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Prince William	4	0	0	1.3	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Roanoke	0	0	0	0.0	A	4	1	0	0	1.8	C	7.1	Pass
Rockbridge	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Rockingham	1	0	0	0.3	B	2	1	0	0	1.2	C	7.4	Pass
Stafford	2	1	0	1.2	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Wythe	0	0	0	0.0	A	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Bristol City	DNC	DNC	DNC	DNC	DNC	2	0	0	0	0.7	B	7.3	Pass
Hampton City	0	0	0	0.0	A	1	1	0	0	0.8	B	6.9	Pass
Lynchburg City	DNC	DNC	DNC	DNC	DNC	2	0	0	0	0.7	B	6.7	Pass
Norfolk City	DNC	DNC	DNC	DNC	DNC	0	0	0	0	0.0	A	7.1	Pass
Richmond City	DNC	DNC	DNC	DNC	DNC	3	2	0	0	2.0	C	8.1	Pass
Salem City	DNC	DNC	DNC	DNC	DNC	1	0	0	0	0.3	B	7.2	Pass
Suffolk City	2	0	0	0.7	B	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Virginia Beach City	DNC	DNC	DNC	DNC	DNC	0	1	0	0	0.5	B	7.3	Pass

VIRGINIA

American Lung Association in Virginia

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Albemarle	115,676	22,094	24,602	1,737	9,599	6,737	56	9,550	1,250	8,610	29,423
Arlington	234,162	42,055	29,077	3,306	19,160	11,534	114	14,865	3,110	16,535	95,152
Caroline	32,640	7,436	5,673	585	2,583	1,764	16	2,452	320	2,993	12,649
Charles City	6,610	953	1,809	75	597	461	3	681	51	748	3,589
Chesterfield	383,876	90,352	63,434	7,103	30,001	20,224	186	27,907	4,077	26,042	166,304
Fairfax	1,141,878	257,792	177,855	20,266	90,143	59,773	556	81,609	12,135	69,309	597,071
Fauquier	75,165	17,416	13,440	1,369	5,953	4,144	37	5,811	703	4,570	18,891
Frederick	95,994	21,439	18,557	1,685	7,686	5,406	47	7,642	908	7,040	21,587
Giles	16,457	3,226	3,654	254	1,377	1,008	8	1,453	146	1,835	967
Hanover	114,148	24,439	22,514	1,921	9,272	6,570	56	9,315	1,074	5,891	21,006
Henrico	334,760	72,241	58,689	5,679	26,828	18,172	162	25,172	3,636	30,898	166,980
Loudoun	436,347	113,954	49,711	8,958	32,684	20,636	213	27,217	4,772	17,860	212,530
Madison	14,128	2,777	3,356	218	1,185	883	7	1,286	126	1,409	2,301
Prince Edward	22,049	3,517	3,788	276	1,858	1,183	11	1,590	260	4,430	8,696
Prince William	489,640	128,216	57,805	10,079	36,545	23,008	239	30,361	5,293	32,529	302,454
Roanoke	97,026	18,712	21,875	1,471	8,122	5,906	47	8,505	936	6,804	16,521
Rockbridge	22,358	3,670	6,320	289	1,965	1,525	11	2,269	185	2,480	2,032
Rockingham	86,568	19,113	17,765	1,503	6,956	4,944	42	7,040	840	8,476	13,306
Stafford	165,428	43,026	19,491	3,382	12,368	7,769	81	10,240	1,756	8,608	77,799
Wythe	28,104	5,454	6,375	429	2,360	1,736	14	2,510	251	3,757	1,937
Bristol City	16,807	3,356	3,797	264	1,394	1,015	8	1,463	159	3,601	2,238
Hampton City	137,098	29,512	23,421	2,320	10,916	7,235	66	9,922	1,541	17,827	88,616
Lynchburg City	79,535	15,519	11,538	1,220	6,359	3,872	38	5,066	1,102	13,198	30,319
Norfolk City	230,930	46,629	31,305	3,666	18,370	11,201	113	14,613	2,750	38,185	134,075
Richmond City	229,247	39,809	33,293	3,129	18,916	11,646	111	15,291	3,147	38,475	130,899
Salem City	25,600	4,999	5,170	393	2,112	1,470	12	2,071	274	2,459	4,634
Suffolk City	100,659	23,582	15,699	1,854	7,856	5,213	49	7,124	1,058	11,033	53,990
Virginia Beach City	453,649	98,433	74,911	7,738	36,116	23,941	220	32,775	4,919	38,630	183,519

WASHINGTON

American Lung Association in Washington

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Benton	3	0	0	1.0	C
Clallam	0	0	0	0.0	A
Clark	0	1	0	0.5	B
Columbia	0	0	0	0.0	A
King	12	2	0	5.0	F
Kitsap	DNC	DNC	DNC	DNC	DNC
Kittitas	DNC	DNC	DNC	DNC	DNC
Okanogan	DNC	DNC	DNC	DNC	DNC
Pierce	0	0	0	0.0	A
Skagit	0	0	0	0.0	A
Snohomish	DNC	DNC	DNC	DNC	DNC
Spokane	3	0	0	1.0	C
Stevens	DNC	DNC	DNC	DNC	DNC
Thurston	INC	INC	INC	INC	INC
Whatcom	0	0	0	0.0	A
Yakima	DNC	DNC	DNC	DNC	DNC

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
County	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Benton	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Clallam	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Clark	4	1	0	0	1.8	C	6.6	Pass
Columbia	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
King	10	2	0	0	4.3	F	8.3	Pass
Kitsap	5	0	0	0	1.7	C	5.5	Pass
Kittitas	5	3	2	0	4.5	F	6.6	Pass
Okanogan	18	8	5	0	13.3	F	12.3	Fail
Pierce	8	5	0	0	5.2	F	7.3	Pass
Skagit	2	1	0	0	1.2	C	INC	INC
Snohomish	18	7	3	1	12.3	F	8.2	Pass
Spokane	6	9	1	1	8.0	F	8.1	Pass
Stevens	14	12	2	0	12.0	F	10.1	Fail
Thurston	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Whatcom	4	2	0	0	2.3	D	INC	INC
Yakima	13	15	3	0	13.8	F	10.2	Fail

WASHINGTON

American Lung Association in Washington

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Benton	215,219	55,701	34,934	4,072	17,116	7,065	101	11,003	2,091	23,890	74,506
Clallam	77,616	12,334	25,603	902	6,937	3,743	37	6,495	574	9,120	14,312
Clark	521,150	115,802	89,049	8,465	43,527	18,304	245	28,462	5,257	38,572	138,400
Columbia	4,053	728	1,180	53	354	183	2	312	32	546	688
King	2,271,380	434,851	329,254	31,787	197,458	75,587	1,069	113,475	25,763	197,703	1,050,595
Kitsap	277,658	53,588	56,397	3,917	23,996	10,462	131	16,727	2,569	23,273	72,442
Kittitas	45,508	7,903	8,642	578	4,030	1,670	21	2,630	491	6,869	8,038
Okanogan	43,712	9,507	10,420	695	3,655	1,754	21	2,901	354	7,229	15,621
Pierce	928,696	211,883	141,379	15,488	77,015	30,669	437	46,828	9,687	89,696	351,945
Skagit	131,417	27,014	30,591	1,975	11,159	5,237	62	8,605	1,172	12,671	36,010
Snohomish	844,761	184,346	129,207	13,475	71,002	28,539	398	43,455	8,751	73,606	315,377
Spokane	551,455	117,592	98,180	8,596	46,534	19,468	259	30,504	5,601	67,235	99,581
Stevens	48,837	10,151	12,667	742	4,131	2,080	23	3,477	380	5,791	6,818
Thurston	299,003	61,434	57,785	4,491	25,459	10,982	141	17,438	3,040	29,265	86,531
Whatcom	231,919	42,135	44,643	3,080	20,328	8,491	109	13,433	2,542	29,187	54,112
Yakima	256,643	73,483	37,805	5,371	19,664	7,921	121	12,204	2,502	40,910	154,962

WEST VIRGINIA

American Lung Association in West Virginia

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Berkeley	4	0	0	1.3	C
Brooke	DNC	DNC	DNC	DNC	DNC
Cabell	0	0	0	0.0	A
Gilmer	INC	INC	INC	INC	INC
Greenbrier	0	0	0	0.0	A
Hancock	4	0	0	1.3	C
Harrison	DNC	DNC	DNC	DNC	DNC
Kanawha	0	0	0	0.0	A
Marion	DNC	DNC	DNC	DNC	DNC
Marshall	DNC	DNC	DNC	DNC	DNC
Monongalia	1	0	0	0.3	B
Ohio	3	0	0	1.0	C
Tucker	0	0	0	0.0	A
Wood	3	0	0	1.0	C

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Berkeley	1	1	0	0	0.8	B	9.1	Fail
Brooke	1	1	0	0	0.8	B	8.7	Pass
Cabell	1	0	0	0	0.3	B	7.6	Pass
Gilmer	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Greenbrier	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Hancock	1	1	0	0	0.8	B	8.3	Pass
Harrison	0	1	0	0	0.5	B	7.5	Pass
Kanawha	0	1	0	0	0.5	B	8.1	Pass
Marion	0	1	0	0	0.5	B	INC	INC
Marshall	2	1	1	0	1.8	C	8.9	Pass
Monongalia	0	1	0	0	0.5	B	7.7	Pass
Ohio	1	1	0	0	0.8	B	8.3	Pass
Tucker	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Wood	0	1	0	0	0.5	B	8.1	Pass

WEST VIRGINIA

American Lung Association in West Virginia

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Berkeley	132,440	30,454	20,592	2,867	14,378	11,883	99	12,634	1,348	14,758	26,061
Brooke	21,373	3,633	5,495	342	2,468	2,354	16	2,681	181	2,910	1,195
Cabell	92,082	18,223	18,487	1,716	10,230	8,725	69	9,651	979	17,413	9,852
Gilmer	7,254	1,107	1,348	104	856	702	6	760	51	1,477	1,486
Greenbrier	32,149	6,188	8,112	583	3,616	3,472	24	3,957	274	5,769	2,415
Hancock	28,145	5,162	7,010	486	3,210	3,069	21	3,480	238	3,933	2,046
Harrison	64,639	13,638	13,527	1,284	7,139	6,440	48	7,146	594	9,135	4,501
Kanawha	174,805	34,395	39,460	3,238	19,578	17,936	131	20,113	1,635	26,860	22,699
Marion	55,807	11,048	11,428	1,040	6,227	5,428	42	6,008	553	7,962	4,309
Marshall	29,405	5,494	7,187	517	3,340	3,171	22	3,588	240	4,309	1,286
Monongalia	107,718	17,291	15,092	1,628	12,512	9,059	81	9,437	1,365	18,255	14,025
Ohio	41,194	8,038	9,555	757	4,599	4,203	31	4,744	386	5,689	3,644
Tucker	6,604	942	1,888	89	790	787	5	905	53	1,137	209
Wood	83,052	17,296	18,279	1,628	9,201	8,469	62	9,464	744	11,200	4,643

WISCONSIN

American Lung Association in Wisconsin

	HIGH OZONE DAYS 2021–2023					HIGH PARTICLE POLLUTION DAYS 2021–2023							
						24-Hour						Annual	
County	Orange	Red	Purple	Wgt. Avg.	Grade	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Ashland	1	0	0	0.3	B	6	1	0	0	2.5	D	5.4	Pass
Brown	8	0	0	2.7	D	7	5	0	0	4.8	F	7.7	Pass
Columbia	16	2	0	6.3	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Dane	18	1	0	6.5	F	6	1	3	0	4.5	F	8.7	Pass
Dodge	15	0	0	5.0	F	4	2	2	0	3.7	F	7.7	Pass
Door	14	1	0	5.2	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Eau Claire	8	0	0	2.7	D	10	5	0	0	5.8	F	7.9	Pass
Fond du Lac	5	0	0	1.7	C	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Forest	4	0	0	1.3	C	8	4	0	0	4.7	F	5.9	Pass
Grant	DNC	DNC	DNC	DNC	DNC	4	2	1	0	3.0	D	8.6	Pass
Jackson	DNC	DNC	DNC	DNC	DNC	5	2	0	0	2.7	D	INC	INC
Jefferson	16	0	0	5.3	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Kenosha	33	4	0	13.0	F	1	2	1	0	2.0	C	7.6	Pass
Kewaunee	11	3	0	5.2	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
La Crosse	6	1	0	2.5	D	2	5	0	0	3.2	D	7.8	Pass
Manitowoc	9	3	0	4.5	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Marathon	8	1	0	3.2	D	INC	INC	INC	INC	INC	INC	INC	INC
Milwaukee	23	2	0	8.7	F	6	1	2	0	3.8	F	9.2	Fail
Monroe	DNC	DNC	DNC	DNC	DNC	4	2	0	0	2.3	D	INC	INC
Outagamie	8	0	0	2.7	D	7	5	0	0	4.8	F	8.1	Pass
Ozaukee	23	2	1	9.3	F	3	2	1	0	2.7	D	INC	INC
Racine	24	3	0	9.5	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Rock	20	2	0	7.7	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Sauk	13	2	0	5.3	F	5	2	1	0	3.3	F	7.5	Pass
Sheboygan	24	2	1	9.7	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Taylor	5	0	0	1.7	C	5	7	0	0	5.2	F	6.8	Pass
Vilas	6	0	0	2.0	C	7	2	0	0	3.3	F	5.5	Pass
Walworth	21	0	0	7.0	F	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Waukesha	21	0	0	7.0	F	5	1	2	0	3.5	F	9.1	Fail

WISCONSIN

American Lung Association in Wisconsin

		AT-RISK GROUPS									
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Ashland	16,079	3,325	3,624	205	1,380	809	8	1,286	145	2,185	2,863
Brown	271,417	61,506	45,825	3,788	22,889	12,031	142	18,355	2,822	25,827	59,214
Columbia	58,091	11,715	11,792	722	5,040	2,873	30	4,495	528	4,496	5,128
Dane	575,347	111,383	89,584	6,861	50,669	24,438	300	36,410	6,992	56,180	132,826
Dodge	88,231	16,855	17,213	1,038	7,769	4,337	46	6,730	777	7,118	10,548
Door	30,562	4,714	10,207	290	2,759	1,888	16	3,160	221	2,654	2,290
Eau Claire	107,903	21,116	18,868	1,301	9,448	4,729	56	7,177	1,271	11,136	12,203
Fond du Lac	103,948	21,702	21,168	1,337	8,928	5,033	54	7,881	1,008	9,301	13,593
Forest	9,325	1,822	2,422	112	809	514	5	834	72	1,452	1,846
Grant	51,409	10,873	9,749	670	4,403	2,333	27	3,605	494	6,609	3,192
Jackson	20,855	4,417	4,467	272	1,782	1,034	11	1,633	165	2,479	2,923
Jefferson	85,743	16,578	16,543	1,021	7,527	4,145	45	6,420	867	7,607	10,571
Kenosha	167,488	35,829	27,739	2,207	14,379	7,600	87	11,553	1,753	18,389	45,518
Kewaunee	20,690	4,280	4,739	264	1,776	1,064	11	1,696	176	1,785	1,492
La Crosse	120,486	23,093	22,316	1,422	10,591	5,460	63	8,365	1,397	14,068	14,339
Manitowoc	81,331	16,250	18,868	1,001	7,041	4,226	42	6,745	702	7,436	9,771
Marathon	138,612	30,980	27,302	1,908	11,692	6,586	72	10,291	1,292	13,122	18,268
Milwaukee	916,205	215,270	139,123	13,259	76,546	37,953	477	56,910	10,635	153,720	472,541
Monroe	46,151	11,665	8,516	718	3,750	2,096	24	3,262	415	5,848	5,099
Outagamie	193,234	43,816	33,166	2,699	16,290	8,670	101	13,269	1,937	11,991	28,111
Ozaukee	93,460	19,366	20,870	1,193	8,021	4,714	49	7,486	845	4,403	9,540
Racine	196,613	44,050	36,578	2,713	16,602	9,171	103	14,211	1,901	20,528	60,331
Rock	164,278	36,388	30,234	2,241	13,922	7,632	86	11,799	1,624	18,138	31,667
Sauk	65,920	14,542	13,589	896	5,573	3,182	34	5,004	609	6,097	7,313
Sheboygan	117,752	25,055	23,936	1,543	10,063	5,698	61	8,928	1,088	10,197	21,989
Taylor	20,058	4,594	4,412	283	1,675	1,009	10	1,608	163	2,254	1,087
Vilas	23,885	3,825	7,756	236	2,146	1,490	12	2,486	150	2,941	3,269
Walworth	105,822	20,174	21,892	1,243	9,298	5,199	55	8,129	1,038	10,790	16,604
Waukesha	412,591	85,573	86,963	5,271	35,480	20,508	215	32,295	3,836	22,694	57,432

WYOMING

American Lung Association in Wyoming

HIGH OZONE DAYS 2021–2023

County	Orange	Red	Purple	Wgt. Avg.	Grade
Albany	9	1	0	3.5	F
Big Horn	1	0	0	0.3	B
Campbell	10	0	0	3.3	F
Converse	3	0	0	1.0	C
Fremont	7	0	0	2.3	D
Johnson	7	0	0	2.3	D
Laramie	10	0	0	3.3	F
Lincoln	3	0	0	1.0	C
Natrona	4	0	0	1.3	C
Park	DNC	DNC	DNC	DNC	DNC
Sheridan	DNC	DNC	DNC	DNC	DNC
Sublette	11	0	0	3.7	F
Sweetwater	12	0	0	4.0	F
Teton	1	0	0	0.3	B
Weston	0	0	0	0.0	A

HIGH PARTICLE POLLUTION DAYS 2021–2023

	24-Hour						Annual	
	Orange	Red	Purple	Maroon	Wgt. Avg.	Grade	Design Value	Pass/ Fail
Albany	2	0	0	0	0.7	B	INC	INC
Big Horn	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Campbell	12	1	0	0	4.5	F	INC	INC
Converse	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Fremont	3	0	0	0	1.0	C	2.1	Pass
Johnson	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC
Laramie	4	1	0	0	1.8	C	5.2	Pass
Lincoln	2	0	0	0	0.7	B	INC	INC
Natrona	3	0	0	0	1.0	C	3.7	Pass
Park	1	0	0	0	0.3	B	4.5	Pass
Sheridan	2	1	0	0	1.2	C	7.0	Pass
Sublette	3	0	0	0	1.0	C	3.7	Pass
Sweetwater	1	0	0	0	0.3	B	INC	INC
Teton	10	0	0	0	3.3	F	4.0	Pass
Weston	DNC	DNC	DNC	DNC	DNC	DNC	DNC	DNC

WYOMING

American Lung Association in Wyoming

				AT-RISK GROUPS							
				Lung Diseases							
County	Total Population	Under 18	65 & Over	Pediatric Asthma	Adult Asthma	COPD	Lung Cancer	CV Disease	Pregnancies	Poverty	People of Color
Albany	38,257	5,761	5,287	387	3,297	2,008	13	2,145	545	5,922	7,104
Big Horn	12,018	2,838	2,657	191	918	719	4	887	107	1,479	1,621
Campbell	47,498	12,477	6,560	838	3,557	2,406	17	2,716	505	3,987	6,748
Converse	13,809	3,306	2,625	222	1,058	791	5	948	133	1,422	1,674
Fremont	39,815	9,665	8,164	649	3,024	2,300	14	2,793	370	5,248	11,888
Johnson	8,759	1,737	2,437	117	697	589	3	754	73	730	768
Laramie	100,984	22,278	17,994	1,496	7,941	5,666	35	6,634	1,048	9,587	22,718
Lincoln	20,880	5,171	4,257	347	1,578	1,219	7	1,487	188	1,450	1,891
Natrona	79,941	18,562	14,209	1,247	6,191	4,443	28	5,218	849	8,266	11,587
Park	30,735	6,241	7,882	419	2,438	1,984	11	2,498	277	2,930	2,968
Sheridan	32,519	6,710	7,575	451	2,581	2,033	11	2,512	306	2,993	2,973
Sublette	8,969	1,909	2,196	128	704	570	3	713	80	681	1,066
Sweetwater	41,249	10,087	6,463	678	3,155	2,197	14	2,527	440	4,056	8,814
Teton	23,232	3,892	4,304	261	1,954	1,393	8	1,627	256	1,429	4,690
Weston	6,808	1,265	1,585	85	555	434	2	535	54	710	794

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 50, 53, and 58

[EPA–HQ–OAR–2015–0072; FRL–8635–02–OAR]

RIN 2060–AV52

Reconsideration of the National Ambient Air Quality Standards for Particulate Matter

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Based on the Environmental Protection Agency's (EPA's) reconsideration of the air quality criteria and the national ambient air quality standards (NAAQS) for particulate matter (PM), the EPA is revising the primary annual $PM_{2.5}$ standard by lowering the level from 12.0 μg/m^3 to 9.0 μg/m^3. The Agency is retaining the current primary 24-hour $PM_{2.5}$ standard and the primary 24-hour PM_{10} standard. The Agency also is not changing the secondary 24-hour $PM_{2.5}$ standard, secondary annual $PM_{2.5}$ standard, and secondary 24-hour PM_{10} standard at this time. The EPA is also finalizing revisions to other key aspects related to the PM NAAQS, including revisions to the Air Quality Index (AQI) and monitoring requirements for the PM NAAQS.

DATES: This final rule is effective May 6, 2024.

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA–HQ–OAR–2015–0072. All documents in the docket are listed on the *https://www.regulations.gov* website. Although listed in the index, some information is not publicly available, *e.g.,* CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only in hard copy form. Publicly available docket materials are available electronically through *https://www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Dr. Lars Perlmutt, Health and Environmental Impacts Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Mail Code C539–04, Research Triangle Park, NC 27711; telephone: (919) 541–3037; fax: (919) 541–5315; email: *perlmutt.lars@epa.gov.*

SUPPLEMENTARY INFORMATION:

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The following topics are discussed in this preamble:

Executive Summary

This document presents the Administrator's final decisions for the reconsideration of the 2020 final decision on the primary (health-based) and secondary (welfare-based) National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM). More specifically, this document summarizes the background and rationale for the Administrator's final decisions to revise the primary annual $PM_{2.5}$ standard by lowering the level from 12.0 μg/m^3 to 9.0 μg/m^3; to retain the current primary 24-hour $PM_{2.5}$ standard (at a level of 35 μg/m^3); to retain the primary 24-hour PM_{10} standard; and, not to change the secondary PM standards at this time. In reaching his final decisions, the Administrator considered the currently available scientific evidence in the 2019 Integrated Science Assessment (2019 ISA) and the Supplement to the 2019 ISA (ISA Supplement), quantitative and policy analyses presented in the 2022 Policy Assessment (2022 PA), advice from the Clean Air Scientific Advisory Committee (CASAC), and public comments on the proposal. The EPA has established primary and secondary standards for $PM_{2.5}$, which includes particles with diameters generally less than or equal to 2.5 μm, and PM_{10}, which includes particles with diameters generally less than or equal to 10 μm. The standards include two primary $PM_{2.5}$ standards: an annual average standard, averaged over three years, with a level of 12.0 μg/m^3, and a 24-hour standard with a 98th percentile form, averaged over three years, and a level of 35 μg/m^3. It also includes a primary PM_{10} standard with a 24-hour averaging time, and a level of 150 μg/m^3, not to be exceeded more than once per year on average over three years. Secondary PM standards are set equal to the primary standards, except that the level of the secondary annual $PM_{2.5}$ standard is 15.0 μg/m^3.

The most recent of the PM NAAQS was completed in December 2020. In that review, the EPA retained the primary and secondary NAAQS, without revision (85 FR 82684, December 18, 2020). Following publication of the 2020 final action, several parties filed petitions for review and petitions for reconsideration of the EPA's final decision.

In June 2021, the Agency announced its decision to reconsider the 2020 PM NAAQS final action.[1] The EPA decided to reconsider the December 2020 decision because the available scientific evidence and technical information indicated that the current standards may not be adequate to protect public health and welfare, as required by the Clean Air Act. The EPA noted that the 2020 PA concluded that the scientific evidence and information called into question the adequacy of the primary $PM_{2.5}$ standards and supported consideration of revising the level of the primary annual $PM_{2.5}$ standard to below the current level of 12.0 μg/m^3 while retaining the primary 24-hour $PM_{2.5}$ standard (U.S. EPA, 2020b). The EPA also noted that the 2020 PA concluded that the available scientific evidence and information did not call into question the adequacy of the primary PM_{10} or secondary PM standards and supported consideration of retaining the primary PM_{10} standard and secondary PM standards without revision (U.S. EPA, 2020b).

The final decisions presented in this document on the primary $PM_{2.5}$ standards have been informed by key aspects of the available health effects evidence and conclusions contained in the 2019 ISA and ISA Supplement, quantitative exposure/risk analyses and policy evaluations presented in the 2022 PA, advice from the CASAC[2] and public comment received as part of this reconsideration.[3] The health effects evidence newly available in this reconsideration, in conjunction with the full body of evidence critically evaluated in the 2019 ISA, supports a causal relationship between long- and short-term exposures and mortality and cardiovascular effects, and the evidence supports a likely to be a causal relationship between long-term exposures and respiratory effects, nervous system effects, and cancer. The longstanding evidence base, including animal toxicological studies, controlled human exposure studies, and epidemiologic studies, reaffirms, and in some cases strengthens, the conclusions from past reviews regarding the health effects of $PM_{2.5}$ exposures. Epidemiologic studies available in this reconsideration demonstrate generally positive, and often statistically significant, $PM_{2.5}$ health effect associations. Such studies report associations between estimated $PM_{2.5}$ exposures and non-accidental, cardiovascular, or respiratory mortality; cardiovascular or respiratory hospitalizations or emergency room visits; and other mortality/morbidity outcomes (*e.g.,* lung cancer mortality or incidence, asthma development). The scientific evidence available in this reconsideration, as evaluated in the 2019 ISA and ISA Supplement, includes

[1] The press release for this announcement is available at: *https://www.epa.gov/newsreleases/epa-reexamine-health-standards-harmful-soot-previous-administration-left-unchanged.*

[2] In 2021, the Administrator announced his decision to reestablish the membership of the CASAC. The Administrator selected seven members to serve on the chartered CASAC, and appointed a PM CASAC panel to support the chartered CASAC's review of the draft ISA Supplement and the draft PA as a part of this reconsideration (see section I.C.6.b below for more information).

[3] More information regarding the CASAC review of the draft ISA Supplement and the draft PA, including opportunities for public comment, can be found in the following **Federal Register** notices: 86 FR 54186, September 30, 2021; 86 FR 52673, September 22, 2021; 86 FR 56263, October 8, 2021; 87 FR 958, January 7, 2022.

a number of epidemiologic studies that use various methods to characterize exposure to $PM_{2.5}$ (*e.g.,* ground-based monitors and hybrid modeling approaches) and to evaluate associations between health effects and lower ambient $PM_{2.5}$ concentrations. There are a number of recent epidemiologic studies that use varying study designs that reduce uncertainties related to confounding and exposure measurement error. The results of these analyses provide further support for the robustness of associations between $PM_{2.5}$ exposures and mortality and morbidity. Moreover, the Administrator notes that recent epidemiologic studies strengthen support for health effect associations at lower $PM_{2.5}$ concentrations, with these new studies finding positive and significant associations when assessing exposure in locations and time periods with lower annual mean and 25th percentile concentrations than those evaluated in epidemiologic studies available at the time of previous reviews. Additionally, the experimental evidence (*i.e.,* animal toxicological and controlled human exposure studies) strengthens the coherence of effects across scientific disciplines and provides additional support for potential biological pathways through which $PM_{2.5}$ exposures could lead to the overt population-level outcomes reported in epidemiologic studies for the health effect categories for which a causal relationship (*i.e.,* short- and long-term $PM_{2.5}$ exposure and mortality and cardiovascular effects) or likely to be causal relationship (*i.e.,* short- and long-term $PM_{2.5}$ exposure and respiratory effects; and long-term $PM_{2.5}$ exposure and nervous system effects and cancer) was concluded.

The available evidence in the 2019 ISA continues to provide support for factors that may contribute to increased risk of $PM_{2.5}$-related health effects including lifestage (children and older adults), pre-existing diseases (cardiovascular disease and respiratory disease), race/ethnicity, and socioeconomic status. For example, the 2019 ISA and ISA Supplement conclude that there is strong evidence that Black and Hispanic populations, on average, experience higher $PM_{2.5}$ exposures and $PM_{2.5}$-related health risks than non-Hispanic White populations. In addition, studies evaluated in the 2019 ISA and ISA Supplement also provide evidence indicating that communities with lower socioeconomic status (SES), as assessed in epidemiologic studies using indicators of SES including income and educational attainment are, on average, exposed to higher concentrations of $PM_{2.5}$ compared to higher SES communities.

The quantitative risk assessment, as well as policy considerations in the 2022 PA, also inform the final decisions on the primary $PM_{2.5}$ standards. The risk assessment in this reconsideration focuses on all-cause or nonaccidental mortality associated with long- and short-term $PM_{2.5}$ exposures. The primary analyses focus on exposure and risk associated with air quality that might occur in an area under air quality conditions that just meet the current and potential alternative standards. The risk assessment estimates that the current primary $PM_{2.5}$ standards could allow a substantial number of $PM_{2.5}$-associated premature deaths in the United States, and that public health improvements would be associated with just meeting all of the alternative (more stringent) annual and 24-hour standard levels modeled. Additionally, the results of the risk assessment suggest that for most of the U.S., the annual standard is the controlling standard and that revision to that standard has the most potential to reduce $PM_{2.5}$ exposure-related risk. The analyses are summarized in this document and in the proposal and are described in detail in the 2022 PA.

In its advice to the Administrator, in its review of the 2021 draft PA, the CASAC concurred that the currently available health effects evidence calls into question the adequacy of the primary annual $PM_{2.5}$ standard. With regard to the primary annual $PM_{2.5}$ standard, the majority of the CASAC concluded that the level of the standard should be revised within the range of 8.0 to 10.0 $\mu g/m^3$, while the minority of the CASAC concluded that the primary annual $PM_{2.5}$ standard should be revised to a level of 10.0 to 11.0 $\mu g/m^3$. With regard to the primary 24-hour $PM_{2.5}$ standard, the CASAC did not reach consensus on the adequacy of the current standard. The majority of the CASAC concluded that the primary 24-hour $PM_{2.5}$ was not adequate and that the level of the standard should be revised to within the range of 25 to 30 $\mu g/m^3$, while the minority of the CASAC concluded that the standard was adequate and should be retained, without revision. Additionally, in their review of the 2019 draft PA, the CASAC did not reach consensus on the adequacy of the primary annual $PM_{2.5}$ standard, with the minority recommending revision and the majority recommending the standard be retained. In their review of the 2019 draft PA, the CASAC reached consensus regarding the adequacy of the primary 24-hour $PM_{2.5}$ standard, concluding that the standard should be retained.

In considering how to revise the suite of primary $PM_{2.5}$ standards to provide the requisite degree of protection, the Administrator recognizes that the current annual standard and 24-hour standard, together, are intended to provide public health protection against the full distribution of short- and long-term $PM_{2.5}$ exposures. Further, he recognizes that changes in $PM_{2.5}$ air quality designed to meet either the annual or the 24-hour standard would likely result in changes to both long-term average and short-term peak $PM_{2.5}$ concentrations.

As in 2012, the Administrator concludes that the most effective way to reduce total population risk associated with both long- and short-term $PM_{2.5}$ exposures is to set a generally controlling annual standard, and to provide supplemental protection against the occurrence of peak 24-hour $PM_{2.5}$ concentrations by means of a 24-hour standard set at the appropriate level. Based on the current evidence and quantitative information, as well as consideration of CASAC advice and public comments, the Administrator concludes that the current primary annual $PM_{2.5}$ standard is not adequate to protect public health with an adequate margin of safety. The Administrator notes that the CASAC was unanimous in its advice on the 2021 draft PA regarding the need to revise the annual standard. In considering the appropriate level for a revised annual standard, the Administrator concludes that a standard set at a level of 9.0 $\mu g/m^3$ reflects his judgment about placing the most weight on the strongest available evidence while appropriately weighing the uncertainties.

With regard to the primary 24-hour $PM_{2.5}$ standard, the Administrator finds the available scientific evidence and quantitative information to be insufficient to call into question the adequacy of the public health protection afforded by the current 24-hour standard. He further notes that a more stringent annual standard set at a level of 9.0 $\mu g/m^3$ is expected to reduce both average (annual) concentrations and peak (daily) concentrations. The Administrator also notes that, in their review of the 2021 draft PA, the CASAC did not reach consensus on whether revisions to the primary 24-hour $PM_{2.5}$ standard are warranted at this time. He also notes that, in their review of the 2019 draft PA, the CASAC did reach consensus that the primary 24-hour $PM_{2.5}$ standard should be retained. The Administrator concludes that the 24-hour standard should be retained to

continue to provide requisite protection against short-term peak $PM_{2.5}$ concentrations, particularly when considered in conjunction with the protection provided by the suite of standards and the decision to revise the annual standard to a level of 9.0 μg/m³.

The primary PM_{10} standard is intended to provide public health protection against health effects related to exposures to $PM_{10–2.5}$, which are particles with a diameter between 10 μm and 2.5 μm. The final decision to retain the current 24-hour PM_{10} standard has been informed by key aspects of the available health effects evidence and conclusions contained in the 2019 ISA, the policy evaluations presented in the 2022 PA, advice from the CASAC and public comments. Specifically, the health effects evidence for $PM_{10–2.5}$ exposures is somewhat strengthened since past reviews, although the strongest evidence still only provides support for a suggestive of, but not sufficient to infer, causal relationship with long- and short-term exposures and mortality and cardiovascular effects, short-term exposures and respiratory effects, and long-term exposures and cancer, nervous system effects, and metabolic effects. In reaching his final decision on the primary PM_{10} standard, the Administrator recognizes that, while the available health effects evidence has expanded, recent studies are subject to the same types of uncertainties that were judged to be important in previous reviews. He also recognizes that, in their review of the 2019 draft PA and the 2021 draft PA, the CASAC generally agreed that it was reasonable to retain the primary 24-hour PM_{10} standard given the available scientific evidence, including retaining PM_{10} as the indicator. He concludes that the newly available evidence does not call into question the adequacy of the current primary PM_{10} standard, and retains that standard, without revision.

With respect to the secondary PM standards, this reconsideration focuses on visibility, climate, and materials effects.[4] The Administrator's final decision to not change the current secondary standards at this time has been informed by key aspects of the currently available welfare effects evidence as well as the conclusions contained in the 2019 ISA and ISA Supplement; quantitative analyses of visibility impairment; policy evaluations presented in the 2022 PA; advice from the CASAC; and public comments. Specifically, the welfare effects evidence available in this reconsideration is consistent with the evidence available in previous reviews and supports a causal relationship between PM and visibility, climate, and materials effects. With regard to visibility effects, the Administrator notes that he judges that the evidence supports a target level of protection of 27 dv. He further notes that the results of quantitative analyses of visibility impairment suggest that in areas that meet the current secondary 24-hour $PM_{2.5}$ standard that estimated light extinction in terms of a 3-year visibility metric would be at or well below the target level of protection. With regard to climate and materials effects, while the evidence has expanded since previous reviews, significant limitations and uncertainties remain in the evidence. While the evidence has expanded since previous reviews, the available scientific evidence remains insufficient to allow the Administrator to make a reasoned judgment about what specific standard(s) would be requisite to protect against known or anticipated adverse effects to public welfare from PM's effects on materials damage or climate.- In their review of the 2019 draft PA and the 2021 draft PA, the CASAC did not recommend revising the secondary PM standards. In considering the available evidence and quantitative information, with its inherent uncertainties and limitations, the Administrator judges that it is appropriate not to change the secondary PM standards at this time.

The final revisions to the primary annual $PM_{2.5}$ NAAQS trigger a process under which States (and Tribes, if they choose) make recommendations to the Administrator regarding designations, identifying areas of the country that either meet or do not meet the new or revised PM NAAQS. Those areas that do not meet the revised PM NAAQS will need to develop plans that demonstrate how they will meet the standards. As part of these plans, states have the opportunity to advance environmental justice, in this case for overburdened communities in areas with high PM concentrations above the NAAQS, by using the tools described in the current PM NAAQS implementation guidance (80 FR 58010, 58136, August 25, 2016). The EPA is not making changes to any of the current PM NAAQS implementation programs in this final rulemaking.

On other topics, the EPA is finalizing two sets of changes to the $PM_{2.5}$ sub-index of the Air Quality Index (AQI). First, the EPA is continuing to use the approach used in the revisions to the AQI in 2012 (77 FR 38890, June 29, 2012) of setting the lower breakpoints (50, 100 and 150) based on the levels of the primary annual and 24-hour $PM_{2.5}$ standards. In so doing, the EPA is revising the AQI value of 50 to 9.0 μg/m³ and is retaining the AQI values of 100 and 150 at 35.4 μg/m³ and 55.4 μg/m³, respectively. Second, the EPA is revising the upper AQI breakpoints (200 and above), and replacing the linear-relationship approach used in 1999 (64 FR 42530, August 4, 1999) to set these breakpoints, with an approach that more fully considers the $PM_{2.5}$ health effects evidence from controlled human exposure and epidemiologic studies that has become available in the last 20 years. The EPA is also revising the AQI values of 200, 300 and 500 to 125.4 μg/m³, 225.4 μg/m³, and 325.4 μg/m³, respectively. In addition, this final rule revises the daily reporting requirement from 5 days per week to 7 days per week, while also reformatting appendix G and providing clarifications.

With regard to monitoring-related activities, the EPA finalizes revisions to data calculations and ambient air monitoring requirements for PM to improve the usefulness and appropriateness of data used in regulatory decision making and to better characterize air quality in communities that are at increased risk of $PM_{2.5}$ exposure and health risk. These changes are found in 40 CFR part 50 (appendices K, L, and N), part 53, and part 58 with associated appendices (A, B, C, D, and E). These changes include addressing updates in data calculations, approval of reference and equivalent methods, updates in quality assurance statistical calculations to account for lower concentration measurements, updates to support improvements in PM methods, a revision to the $PM_{2.5}$ network design to account for at-risk populations, and updates to the Probe and Monitoring Path Siting Criteria for NAAQS pollutants.

In setting the NAAQS, the EPA may not consider the costs of implementing the standards. This was confirmed by the Supreme Court in *Whitman* v. *American Trucking Associations,* 531 U.S. 457, 465–472, 475–76 (2001), as discussed in section II.A of this document. As has traditionally been

[4] Consistent with the 2016 Integrated Review Plan (U.S. EPA, 2016), other welfare effects of PM, such as ecological effects, are being considered in the separate, on-going review of the secondary NAAQS for oxides of nitrogen, oxides of sulfur and PM. Accordingly, the public welfare protection provided by the secondary PM standards against ecological effects such as those related to deposition of nitrogen- and sulfur-containing compounds in vulnerable ecosystems is being considered in that separate review. Thus, the Administrator's conclusion in this reconsideration of the 2020 final decision is focused only and specifically on the adequacy of public welfare protection provided by the secondary PM standards from effects related to visibility, climate, and materials and hereafter ''welfare effects'' refers to those welfare effects.

done in NAAQS rulemaking, the EPA prepared a Regulatory Impact Analysis (RIA) to provide the public with information on the potential costs and benefits of attaining several alternative $PM_{2.5}$ standard levels. In NAAQS rulemaking, the RIA is done for informational purposes only, and the final decisions on the NAAQS in this rulemaking are not based on consideration of the information or analyses in the RIA. The RIA fulfills the requirements of Executive Orders 14094, 13563, and 12866. The RIA estimates the costs and monetized human health benefits of attaining the revised and two alternative annual $PM_{2.5}$ standard levels and one alternative 24-hour $PM_{2.5}$ standard level. Specifically, the RIA examines the revised annual standard level of 9.0 μg/m^3 in combination with the current 24-hour standard of 35 μg/m^3 (*i.e.,* 9.0/35 μg/m^3), as well as the following less and more stringent alternative standard levels: (1) An alternative annual standard level of 10.0 μg/m^3 in combination with the current 24-hour standard (*i.e.,* 10.0/35 μg/m^3), (2) an alternative annual standard level of 8.0 μg/m^3 in combination with the current 24-hour standard (*i.e.,* 8.0/35 μg/m^3), and (3) an alternative 24-hour standard level of 30 μg/m^3 in combination with an alternative annual standard level of 10 μg/m^3 (*i.e.,* 10.0/30 μg/m^3). The RIA presents estimates of the costs and benefits of applying illustrative national control strategies in 2032 after implementing existing and expected regulations and assessing emissions reductions to meet the current annual and 24-hour particulate matter NAAQS (12.0/35 μg/m^3).

I. Background

A. Legislative Requirements

Two sections of the Clean Air Act (CAA) govern the establishment and revision of the NAAQS. Section 108 (42 U.S.C. 7408) directs the Administrator to identify and list certain air pollutants and then to issue air quality criteria for those pollutants. The Administrator is to list those pollutants ''emissions of which, in his judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare''; ''the presence of which in the ambient air results from numerous or diverse mobile or stationary sources''; and for which he ''plans to issue air quality criteria. . . .'' (42 U.S.C. 7408(a)(1)). Air quality criteria are intended to ''accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of [a] pollutant in the ambient air. . . .'' (42 U.S.C. 7408(a)(2)).

Section 109 [42 U.S.C. 7409] directs the Administrator to propose and promulgate ''primary'' and ''secondary'' NAAQS for pollutants for which air quality criteria are issued [42 U.S.C. 7409(a)]. Section 109(b)(1) defines primary standards as ones ''the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health.'' [5] Under section 109(b)(2), a secondary standard must ''specify a level of air quality the attainment and maintenance of which, in the judgment of the Administrator, based on such criteria, is requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of [the] pollutant in the ambient air.'' [6]

In setting primary and secondary standards that are ''requisite'' to protect public health and welfare, respectively, as provided in section 109(b), the EPA's task is to establish standards that are neither more nor less stringent than necessary. In so doing, the EPA may not consider the costs of implementing the standards. See generally *Whitman* v. *American Trucking Associations,* 531 U.S. 457, 465–472, 475–76 (2001). Likewise, ''[a]ttainability and technological feasibility are not relevant considerations in the promulgation of national ambient air quality standards.'' *American Petroleum Institute* v. *Costle,* 665 F.2d 1176, 1185 (D.C. Cir. 1981); *accord Murray Energy Corporation* v. *EPA,* 936 F.3d 597, 623–24 (D.C. Cir. 2019).

The requirement that primary standards provide an adequate margin of safety was intended to address uncertainties associated with inconclusive scientific and technical information available at the time of standard setting. It was also intended to provide a reasonable degree of protection against hazards that research has not yet identified. See *Lead Industries Association* v. *EPA,* 647 F.2d 1130, 1154 (D.C. Cir. 1980); *American Petroleum Institute* v. *Costle,* 665 F.2d at 1186; *Coalition of Battery Recyclers Ass'n* v. *EPA,* 604 F.3d 613, 617–18 (D.C. Cir. 2010); *Mississippi* v. *EPA,* 744 F.3d 1334, 1353 (D.C. Cir. 2013). Both kinds of uncertainties are components of the risk associated with pollution at levels below those at which human health effects can be said to occur with reasonable scientific certainty. Thus, in selecting primary standards that include an adequate margin of safety, the Administrator is seeking not only to prevent pollution levels that have been demonstrated to be harmful but also to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. The CAA does not require the Administrator to establish a primary NAAQS at a zero-risk level or at background concentration levels, see *Lead Industries Ass'n* v. *EPA,* 647 F.2d at 1156 n.51, *Mississippi* v. *EPA,* 744 F.3d at 1351, but rather at a level that reduces risk sufficiently so as to protect public health with an adequate margin of safety.

In addressing the requirement for an adequate margin of safety, the EPA considers such factors as the nature and severity of the health effects involved, the size of the sensitive population(s), and the kind and degree of uncertainties. The selection of any particular approach to providing an adequate margin of safety is a policy choice left specifically to the Administrator's judgment. See *Lead Industries Ass'n* v. *EPA,* 647 F.2d at 1161–62; *Mississippi* v. *EPA,* 744 F.3d at 1353.

Section 109(d)(1) of the Act requires the review every five years of existing air quality criteria and, if appropriate, the revision of those criteria to reflect advances in scientific knowledge on the effects of the pollutant on public health and welfare. Under the same provision, the EPA is also to review every five years and, if appropriate, revise the NAAQS, based on the revised air quality criteria. Section 109(d)(1) also provides that the Administrator may review and revise criteria or promulgate new standards earlier or more frequently.

Section 109(d)(2) addresses the appointment and advisory functions of an independent scientific review committee. Section 109(d)(2)(A) requires the Administrator to appoint this committee, which is to be composed of ''seven members including at least one member of the National Academy of Sciences, one physician, and one person representing State air

[5] The legislative history of section 109 indicates that a primary standard is to be set at ''the maximum permissible ambient air level . . . which will protect the health of any [sensitive] group of the population,'' and that for this purpose ''reference should be made to a representative sample of persons comprising the sensitive group rather than to a single person in such a group.'' S. Rep. No. 91–1196, 91st Cong., 2d Sess. 10 (1970).

[6] Under CAA section 302(h) (42 U.S.C. 7602(h)), effects on welfare include, but are not limited to, ''effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being.''

pollution control agencies.'' Section 109(d)(2)(B) provides that the independent scientific review committee ''shall complete a review of the criteria . . . and the national primary and secondary ambient air quality standards . . . and shall recommend to the Administrator any new . . . standards and revisions of existing criteria and standards as may be appropriate. . . .'' Since the early 1980s, this independent review function has been performed by the Clean Air Scientific Advisory Committee (CASAC) of the EPA's Science Advisory Board.

As previously noted, the Supreme Court has held that section 109(b) ''unambiguously bars cost considerations from the NAAQS-setting process.'' *Whitman* v. *Am. Trucking Associations,* 531 U.S. 457, 471 (2001). Accordingly, while some of these issues regarding which Congress has directed the CASAC to advise the Administrator are ones that are relevant to the standard setting process, others are not. Issues that are not relevant to standard setting may be relevant to implementation of the NAAQS once they are established.

B. Related PM Control Programs

States are primarily responsible for ensuring attainment and maintenance of ambient air quality standards once the EPA has established them. Under section 110, Part C, and Part D, Subparts 1 and 4 of the CAA, and related provisions and regulations, States are to submit, for the EPA's approval, State implementation plans (SIPs) that provide for the attainment and maintenance of the NAAQS for PM through control programs directed to sources of the pollutants involved. The States, in conjunction with the EPA, also administer the prevention of significant deterioration of air quality program that covers these pollutants (see 42 U.S.C. 7470–7479). In addition, Federal programs provide for or result in nationwide reductions in emissions of PM and its precursors under Title II of the Act, 42 U.S.C. 7521–7574, which involves controls for motor vehicles and nonroad engines and equipment; the new source performance standards under section 111 of the Act, 42 U.S.C. 7411; and the national emissions standards for hazardous pollutants under section 112 of the Act, 42 U.S.C. 7412.

C. Review of the Air Quality Criteria and Standards for Particulate Matter

1. Reviews Completed in 1971 and 1987

The EPA first established NAAQS for PM in 1971 (36 FR 8186, April 30, 1971), based on the original Air Quality Criteria Document (AQCD) (DHEW, 1969).[7] The Federal reference method (FRM) specified for determining attainment of the original standards was the high-volume sampler, which collects PM up to a nominal size of 25 to 45 μm (referred to as total suspended particulates or TSP). The primary standards were set at 260 μg/m^3, 24-hour average, not to be exceeded more than once per year, and 75 μg/m^3, annual geometric mean. The secondary standards were set at 150 μg/m^3, 24-hour average, not to be exceeded more than once per year, and 60 μg/m^3, annual geometric mean.

In October 1979 (44 FR 56730, October 2, 1979), the EPA announced the first periodic review of the air quality criteria and NAAQS for PM. Revised primary and secondary standards were promulgated in 1987 (52 FR 24634, July 1, 1987). In the 1987 decision, the EPA changed the indicator for particles from TSP to PM_{10}, in order to focus on the subset of inhalable particles small enough to penetrate to the thoracic region of the respiratory tract (including the tracheobronchial and alveolar regions), referred to as thoracic particles.[8] The level of the 24-hour standards (primary and secondary) was set at 150 μg/m^3, and the form was one expected exceedance per year, on average over three years. The level of the annual standards (primary and secondary) was set at 50 μg/m^3, and the form was the annual arithmetic mean, averaged over three years.

2. Review Completed in 1997

In April 1994, the EPA announced its plans for the second periodic review of the air quality criteria and NAAQS for PM, and in 1997 the EPA promulgated revisions to the NAAQS (62 FR 38652, July 18, 1997). In the 1997 decision, the EPA determined that the fine and coarse fractions of PM_{10} should be considered separately. This determination was based on evidence that serious health effects were associated with short- and long-term exposures to fine particles in areas that met the existing PM_{10} standards. The EPA added new standards, using $PM_{2.5}$ as the indicator for fine particles (with $PM_{2.5}$ referring to particles with a nominal mean aerodynamic diameter less than or equal to 2.5 μm). The new primary standards were as follows: (1) An annual standard with a level of 15.0 μg/m^3, based on the 3-year average of annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors;[9] and (2) a 24-hour standard with a level of 65 μg/m^3, based on the 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations at each monitor within an area. Also, the EPA established a new reference method for the measurement of $PM_{2.5}$ in the ambient air and adopted rules for determining attainment of the new standards. To continue to address the health effects of the coarse fraction of PM_{10} (referred to as thoracic coarse particles or $PM_{10–2.5}$, generally including particles with a nominal mean aerodynamic diameter greater than 2.5 μm and less than or equal to 10 μm), the EPA retained the primary annual PM_{10} standard and revised the form of the primary 24-hour PM_{10} standard to be based on the 99th percentile of 24-hour PM_{10} concentrations at each monitor in an area. The EPA revised the secondary standards by setting them equal in all respects to the primary standards.

Following promulgation of the 1997 PM NAAQS, petitions for review were filed by several parties, addressing a broad range of issues. In May 1999, the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit) upheld the EPA's decision to establish fine particle standards and to regulate coarse particle pollution, but vacated the 1997 PM_{10} standards, concluding that the EPA had not provided a reasonable explanation justifying use of PM_{10} as an indicator for coarse particles. *American Trucking Associations, Inc.* v. *EPA,* 175 F. 3d 1027 (D.C. Cir. 1999). Pursuant to the D.C. Circuit's decision, the EPA removed the vacated 1997 PM_{10} standards, and the pre-existing 1987 PM_{10} standards remained in place (65 FR 80776, December 22, 2000). The D.C. Circuit also upheld the EPA's determination not to establish more stringent secondary standards for fine particles to address effects on visibility. *American Trucking Associations* v. *EPA,* 175 F. 3d at 1027.

[7] Prior to the review initiated in 2007 (see below), the AQCD provided the scientific foundation (*i.e.,* the air quality criteria) for the NAAQS. Beginning in that review, the Integrated Science Assessment (ISA) has replaced the AQCD.

[8] PM_{10} refers to particles with a nominal mean aerodynamic diameter less than or equal to 10 μm. More specifically, 10 μm is the aerodynamic diameter for which the efficiency of particle collection is 50 percent.

[9] The 1997 annual $PM_{2.5}$ standard was compared with measurements made at the community-oriented monitoring site recording the highest concentration or, if specific constraints were met, measurements from multiple community-oriented monitoring sites could be averaged (*i.e.,* ''spatial averaging''). In the last review (completed in 2012) the EPA replaced the term ''community-oriented'' monitor with the term ''area-wide'' monitor. Area-wide monitors are those sited at the neighborhood scale or larger, as well as those monitors sited at micro- or middle-scales that are representative of many such locations in the same core-based statistical area (CBSA) (78 FR 3236, January 15, 2013).

The D.C. Circuit also addressed more general issues related to the NAAQS, including issues related to the consideration of costs in setting NAAQS and the EPA's approach to establishing the levels of NAAQS. Regarding the cost issue, the court reaffirmed prior rulings holding that in setting NAAQS the EPA is ''not permitted to consider the cost of implementing those standards.'' *American Trucking Associations* v. *EPA,* 175 F. 3d at 1040–41. Regarding the levels of NAAQS, the court held that the EPA's approach to establishing the level of the standards in 1997 (*i.e.,* both for PM and for the ozone NAAQS promulgated on the same day) effected ''an unconstitutional delegation of legislative authority.'' *American Trucking Associations* v. *EPA,* 175 F. 3d at 1034–40. Although the court stated that ''the factors EPA uses in determining the degree of public health concern associated with different levels of ozone and PM are reasonable,'' it remanded the rule to the EPA, stating that when the EPA considers these factors for potential non-threshold pollutants ''what EPA lacks is any determinate criterion for drawing lines'' to determine where the standards should be set.

The D.C. Circuit's holding on the cost and constitutional issues were appealed to the United States Supreme Court. In February 2001, the Supreme Court issued a unanimous decision upholding the EPA's position on both the cost and constitutional issues. *Whitman* v. *American Trucking Associations,* 531 U.S. 457, 464, 475–76. On the constitutional issue, the Court held that the statutory requirement that NAAQS be ''requisite'' to protect public health with an adequate margin of safety sufficiently guided the EPA's discretion, affirming the EPA's approach of setting standards that are neither more nor less stringent than necessary.

The Supreme Court remanded the case to the D.C. Circuit for resolution of any remaining issues that had not been addressed in that court's earlier rulings. Id. at 475–76. In a March 2002 decision, the D.C. Circuit rejected all remaining challenges to the standards, holding that the EPA's $PM_{2.5}$ standards were reasonably supported by the administrative record and were not ''arbitrary and capricious.'' *American Trucking Associations* v. *EPA,* 283 F. 3d 355, 369–72 (D.C. Cir. 2002).

3. Review Completed in 2006

In October 1997, the EPA published its plans for the third periodic review of the air quality criteria and NAAQS for PM (62 FR 55201, October 23, 1997). After the CASAC and public review of several drafts, the EPA's National Center for Environmental Assessment (NCEA) finalized the AQCD in October 2004 (U.S. EPA, 2004a). The EPA's Office of Air Quality Planning and Standards (OAQPS) finalized a Risk Assessment and Staff Paper in December 2005 (Abt Associates, 2005; U.S. EPA, 2005).[10] On December 20, 2005, the EPA announced its proposed decision to revise the NAAQS for PM and solicited public comment on a broad range of options (71 FR 2620, January 17, 2006). On September 21, 2006, the EPA announced its final decisions to revise the primary and secondary NAAQS for PM to provide increased protection of public health and welfare, respectively (71 FR 61144, October 17, 2006). With regard to the primary and secondary standards for fine particles, the EPA revised the level of the 24-hour $PM_{2.5}$ standards to 35 $\mu g/m^3$, retained the level of the annual $PM_{2.5}$ standards at 15.0 $\mu g/m^3$, and revised the form of the annual $PM_{2.5}$ standards by narrowing the constraints on the optional use of spatial averaging. With regard to the primary and secondary standards for PM_{10}, the EPA retained the 24-hour standards, with levels at 150 $\mu g/m^3$, and revoked the annual standards. The then-Administrator judged that the available evidence generally did not suggest a link between long-term exposure to existing ambient levels of coarse particles and health or welfare effects. In addition, a new reference method was added for the measurement of $PM_{10-2.5}$ in the ambient air in order to provide a basis for approving Federal Equivalent Methods (FEMs) and to promote the gathering of scientific data to support future reviews of the PM NAAQS.

Several parties filed petitions for review following promulgation of the revised PM NAAQS in 2006. On February 24, 2009, the D.C. Circuit issued its opinion in the case *American Farm Bureau Federation* v. *EPA,* 559 F. 3d 512 (D.C. Cir. 2009). The court remanded the primary annual $PM_{2.5}$ NAAQS to the EPA because the Agency had failed to adequately explain why the standards provided the requisite protection from both short- and long-term exposures to fine particles, including protection for at-risk populations. *Id. at* 520–27. With regard to the standards for $PM_{10,}$ the court upheld the EPA's decisions to retain the 24-hour PM_{10} standard to provide protection from thoracic coarse particle exposures and to revoke the annual PM_{10} standard. *Id.* at 533–38. With regard to the secondary $PM_{2.5}$ standards, the court remanded the standards to the EPA because the Agency failed to adequately explain why setting the secondary PM standards identical to the primary standards provided the required protection for public welfare, including protection from visibility impairment. *Id.* at 528–32. The EPA responded to the court's remands as part of the next review of the PM NAAQS, which was initiated in 2007 (discussed below).

4. Review Completed in 2012

In June 2007, the EPA initiated the fourth periodic review of the air quality criteria and the PM NAAQS by issuing a call for information (72 FR 35462, June 28, 2007). Based on the NAAQS review process, as revised in 2008 and again in 2009,[11] the EPA held science/policy issue workshops on the primary and secondary PM NAAQS (72 FR 34003, June 20, 2007; 72 FR 34005, June 20, 2007), and prepared and released the planning and assessment documents that comprise the review process (*i.e.,* Integrated Review Plan, (IRP; U.S. EPA, 2008), Integrated Science Assessment (ISA; U.S. EPA, 2009a), Risk and Exposure Assessment (REA) planning documents for health and welfare (U.S. EPA, 2009b, U.S. EPA, 2009c), a quantitative health risk assessment (U.S. EPA, 2010a) and an urban-focused visibility assessment (U.S. EPA, 2010b), and a Policy Assessment (PA; U.S. EPA, 2011). In June 2012, the EPA announced its proposed decision to revise the NAAQS for PM (77 FR 38890, June 29, 2012).

In December 2012, the EPA announced its final decisions to revise the primary NAAQS for PM to provide increased protection of public health (78 FR 3086, January 15, 2013). With regard to primary standards for $PM_{2.5}$, the EPA revised the level of the annual $PM_{2.5}$ standard [12] to 12.0 $\mu g/m^3$ and retained the 24-hour $PM_{2.5}$ standard, with its level of 35 $\mu g/m^3$. For the primary PM_{10} standard, the EPA retained the 24-hour standard to continue to provide protection against effects associated with short-term exposure to thoracic coarse particles (*i.e.,* $PM_{10-2.5}$). With regard to the secondary PM standards, the EPA generally retained the 24-hour

[10] Prior to the review initiated in 2007, the Staff Paper presented the EPA staff's considerations and conclusions regarding the adequacy of existing NAAQS and, when appropriate, the potential alternative standards that could be supported by the evidence and information. More recent reviews present this information in the Policy Assessment.

[11] The history of the NAAQS review process, including revisions to the process, is discussed at *https://www.epa.gov/naaqs/historical-information-naaqs-review-process.*

[12] The EPA also eliminated the option for spatial averaging.

and annual $PM_{2.5}$ standards [13] and the 24-hour PM_{10} standard to address visibility and non-visibility welfare effects.

As with previous reviews, petitioners challenged the EPA's final rule. Petitioners argued that the EPA acted unreasonably in revising the level and form of the annual standard and in amending the monitoring network provisions. On judicial review, the revised standards and monitoring requirements were upheld in all respects. *NAM* v. *EPA,* 750 F.3d 921 (D.C. Cir. 2014).

5. Review Initiated in 2014

In December 2014, the EPA announced the initiation of the current periodic review of the air quality criteria for PM and of the $PM_{2.5}$ and PM_{10} NAAQS and issued a call for information (79 FR 71764, December 3, 2014). On February 9 to 11, 2015, the EPA's NCEA and OAQPS held a public workshop to inform the planning for the review of the PM NAAQS (announced in 79 FR 71764, December 3, 2014). Workshop participants, including a wide range of external experts as well as the EPA staff representing a variety of areas of expertise (*e.g.,* epidemiology, human and animal toxicology, risk/exposure analysis, atmospheric science, visibility impairment, climate effects), were asked to highlight significant new and emerging PM research, and to make recommendations to the Agency regarding the design and scope of the review. This workshop provided for a public discussion of the key science and policy-relevant issues around which the EPA structured the review of the PM NAAQS and of the most meaningful new scientific information that would be available in the review to inform understanding of these issues.

The input received at the workshop guided the EPA staff in developing a draft IRP, which was reviewed by the CASAC Particulate Matter Panel and discussed on public teleconferences held in May 2016 (81 FR 13362, March 14, 2016) and August 2016 (81 FR 39043, June 15, 2016). Advice from the CASAC, supplemented by the Particulate Matter Panel, and input from the public were considered in developing the final IRP (U.S. EPA, 2016). The final IRP discusses the approaches to be taken in developing key scientific, technical, and policy documents in the review and the key policy-relevant issues that frame the EPA's consideration of whether the primary and/or secondary NAAQS for PM should be retained or revised.

In May 2018, the then-Administrator issued a memorandum announcing the Agency's intention to conduct the review of the PM NAAQS in such a manner as to ensure that any necessary revisions were finalized by December 2020 (Pruitt, 2018). Following this memo, on October 10, 2018, the then-Administrator additionally announced that the role of reviewing the key assessments developed as part of the ongoing review of the PM NAAQS (*i.e.,* drafts of the ISA and PA) would be performed by the seven-member chartered CASAC (*i.e.,* rather than the CASAC Particulate Matter Panel that reviewed the draft IRP).[14]

The EPA released the draft ISA in October 2018 (83 FR 53471, October 23, 2018). The draft ISA was reviewed by the chartered CASAC at a public meeting held in Arlington, VA in December 2018 (83 FR 55529, November 6, 2018) and was discussed on a public teleconference in March 2019 (84 FR 8523, March 8, 2019). The CASAC provided its advice on the draft ISA in a letter to the then-Administrator dated April 11, 2019 (Cox, 2019a). The EPA addressed these comments in the final ISA, which was released in December 2019 (U.S. EPA, 2019a).

The EPA released the draft PA in September 2019 (84 FR 47944, September 11, 2019). The draft PA was reviewed by the chartered CASAC and discussed in October 2019 at a public meeting held in Cary, NC. Public comments were received via a separate public teleconference (84 FR 51555, September 30, 2019). A public meeting to discuss the chartered CASAC letter and response to charge questions on the draft PA was held in Cary, NC, in October 2019 (84 FR 51555, September 30, 2019), and the CASAC provided its advice on the draft PA, including its advice on the current primary and secondary PM standards, in a letter to the then-Administrator dated December 16, 2019 (Cox, 2019b). With regard to the primary standards, the CASAC recommended retaining the current 24-hour $PM_{2.5}$ and PM_{10} standards but did not reach consensus on the adequacy of the current annual $PM_{2.5}$ standard. Some CASAC members expressed support for retaining the current primary annual $PM_{2.5}$ standard while other members expressed support for revising that standard in order to increase public health protection (Cox, 2019b, p. 1 of letter). These views are described in greater detail in the letter to the then-Administrator (Cox, 2019b) and in the notice of final rulemaking (85 FR 82706–82707, December 18, 2020), as well as below. With regard to the secondary standards, the CASAC recommended retaining the current standards. In response to the CASAC's comments, the 2020 final PA incorporated a number of changes (Cox, 2019b, U.S. EPA, 2020b), as described in detail in section I.C.5 of the 2020 proposal document (85 FR 24100, April 30, 2020).

a. 2020 Proposed and Final Actions

On April 14, 2020, the EPA proposed to retain all of the primary and secondary PM standards, without revision. These proposed decisions were published in the **Federal Register** on April 30, 2020 (85 FR 24094, April 30, 2020). The EPA's final decision on the PM NAAQS was published in the **Federal Register** on December 18, 2020 (85 FR 82684, December 18, 2020). In the 2020 rulemaking, the EPA retained the primary and secondary $PM_{2.5}$ and PM_{10} standards, without revision. The then-Administrator's rationale for his decisions is described in more detail in section II, III, and V below, and is briefly summarized here.

In reaching his final decision to retain the primary annual and 24-hour $PM_{2.5}$ standards, the then-Administrator considered the available scientific evidence, quantitative information, CASAC advice, and public comments in his supporting rationale in the 2020 final action (85 FR 82714, December 18, 2020). In so doing, he concluded that the available controlled human exposure studies did not provide support for additional public health protection against exposures to peak $PM_{2.5}$ concentrations, beyond the protection provided by the combination of the current primary annual and 24-hour $PM_{2.5}$ standards. He also noted that the available epidemiologic studies did not indicate that associations in those studies are strongly influenced by exposures to peak concentrations in the air quality distribution and thus did not indicate the need for additional protection against short-term exposures to peak $PM_{2.5}$ concentrations. Accordingly, and taking into account consensus CASAC advice to retain the current primary 24-hour $PM_{2.5}$ standard, the then-Administrator concluded the primary 24-hour $PM_{2.5}$ standard should be retained.

With respect to the annual $PM_{2.5}$ standard, the then-Administrator recognized that important uncertainties and limitations that were present in epidemiologic studies in previous

[13] Consistent with the primary standard, the EPA eliminated the option for spatial averaging with the annual standard.

[14] Announcement available at: *https://www.regulations.gov/document/EPA-HQ-OAR-2015-0072-0223.*

reviews remained in the evidence assessed in the 2019 ISA. In considering the epidemiologic evidence, the then-Administrator noted that: (1) The reported mean concentration in the majority of the key U.S. epidemiologic studies using ground-based monitoring data are above the level of the current annual standard; (2) the mean of the reported study means (or medians) (*i.e.,* 13.5 $\mu g/m^3$) is above the level of the current primary annual $PM_{2.5}$ standard of 12 $\mu g/m^3$; (3) air quality analyses show the study means to be lower than their corresponding design by 10–20%; and (4) that these analyses must be considered in light of uncertainties inherent in the epidemiologic evidence. The then-Administrator further considered other available information, including the risk assessment, accountability studies, and controlled human exposure studies, and found that, in considering all of the evidence together along with advice from the CASAC, the suite of primary $PM_{2.5}$ standards were requisite to protect public health with an adequate margin of safety, and should be retained, without revision.

With regard to the primary PM_{10} standard, the then-Administrator noted that the expanded body of evidence has broadened the range of effects that have been linked with $PM_{10–2.5}$ exposures. In light of that information, as well as continued uncertainties in the evidence and advice from the CASAC to retain the standard, the then-Administrator judged it appropriate to retain the primary PM_{10} standard to provide the requisite degree of public health protection against $PM_{10–2.5}$ exposures, regardless of location, source of origin, or particle composition (85 FR 82725, December 18, 2020).

With regard to the secondary PM standards, the then-Administrator concluded that there was insufficient information available to establish any distinct secondary PM standards to address climate and materials effects of PM. For visibility effects, he found that in the absence of a monitoring network for direct measurement of light extinction, a calculated light extinction indicator that utilizes the IMPROVE algorithms continued to provide a reasonable basis for defining a target level of protection against PM-related visibility impairment. He further found that a visibility index with a 24-hour averaging time was reasonable based on its stability and suitability for representing subdaily periods, and a form based on the 3-year average of annual 90th percentile values was reasonable based on its stability and that it represents the median of the 20 percent worst visibility days which are targeted under the Regional Haze program. With regard to the level of a visibility index, the then-Administrator judged it appropriate to establish a target level of protection of 30 dv, reflecting the upper end of the range of visibility impairment judged to be acceptable by at least 50% of study participants in the available public preference studies, taking into consideration the variability, limitations and uncertainties of the public preference studies. The then-Administrator judged that the secondary 24-hour $PM_{2.5}$ standard with its level of 35 $\mu g/m^3$ would provide at least the target level of protection for visual air quality of 30 dv which he judged appropriate. Accordingly, taking into consideration the advice of the CASAC to retain the current secondary PM standards, the then-Administrator found the current secondary standards provide the requisite degree of protection and that they should be retained (85 FR 82742, December 18, 2020).

Following publication of the 2020 final action, several parties filed petitions for review and petitions for reconsideration of the EPA's final decision. The petitions for review were filed in the D.C. Circuit and the Court consolidated the cases.[15] Following EPA's decision to reconsider the 2020 final decision, the Court ordered the consolidated cases to be held in abeyance.

b. Reconsideration of the 2020 PM NAAQS Final Action

Executive Order 13990 directed review of certain agency actions (86 FR 7037, January 25, 2021).[16] An accompanying fact sheet provided a non-exclusive list of agency actions that agency heads should review in accordance with that order, including the 2020 Particulate Matter NAAQS Decision.[17]

On June 10, 2021, the Agency announced its decision to reconsider the 2020 PM NAAQS final action because the available scientific evidence and technical information indicate that the current standards may not be adequate to protect public health and welfare, as required by the Clean Air Act.[18] The Administrator reached this decision in part based on the fact that the EPA noted that the 2020 PA concluded that the scientific evidence and information called into question the adequacy of the primary annual $PM_{2.5}$ standard and supported revising the level to below the current level of 12.0 $\mu g/m^3$ while retaining the primary 24-hour $PM_{2.5}$ standard (U.S. EPA, 2020b). The EPA also noted that the 2020 PA concluded that the available scientific evidence and information supported retaining the primary PM_{10} standard and secondary PM standards without revision (U.S. EPA, 2020b).

The EPA staff conclusions detailed in the 2020 PA in combination with the CASAC advice that informed the Administrator's decisions regarding the 2020 final action, studies highlighted by public comments on the 2020 proposal, and the numerous studies published since the literature cutoff date of the 2019 ISA all informed the scope of the reconsideration.

In its review of the 2019 draft PA, some members of the CASAC had recommended that greater attention should be given to accountability studies and epidemiologic studies that employ alternative methods for confounder control (also referred to as causal inference or causal modeling studies) in order to ''more fully account for effects of confounding, measurement and estimation errors, model uncertainty, and heterogeneity'' in epidemiologic studies (Cox, 2019b, p. 8 of consensus responses). In addition, public commenters submitted a number of recent studies published after the literature cutoff date for the 2019 ISA that would have been considered within the scope of the 2019 ISA. While the EPA provisionally considered these studies in responding to public comments,[19] it was determined that, at the time of the 2020 final action, these studies were generally consistent with the evidence assessed in the 2019 ISA (85 FR 82690, December 18, 2020; U.S. EPA, 2020a). As such, and consistent with previous NAAQS reviews, the EPA concluded that the new studies did not materially change any of the broad scientific conclusions regarding the health and welfare effects of PM in ambient air made in the air quality criteria, and therefore, reopening of the air quality criteria was not warranted (85 FR 82691, December 18, 2020). However, at that time, the EPA

[15] See *California* v. *EPA,* (D.C. Cir., No. 21–2014 consolidated with Nos. 21–1027, 21–1054).

[16] See *https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-protecting-public-health-and-environment-and-restoring-science-to-tackle-climate-crisis/.*

[17] See *https://www.whitehouse.gov/briefing-room/statements-releases/2021/01/20/fact-sheet-list-of-agency-actions-for-review/.*

[18] The press release for this announcement is available at: *https://www.epa.gov/newsreleases/epa-reexamine-health-standards-harmful-soot-previous-administration-left-unchanged.*

[19] The list of provisionally considered studies is included in Appendix A to the 2020 Response to Comments document (U.S. EPA, 2020a).

recognized that its ''provisional consideration of these studies did not and could not provide the kind of in-depth critical review'' (85 FR 82690, December 18, 2020) that studies undergo in the development of an ISA.

In preparing to reconsider the 2020 final decision for the PM NAAQS, the Agency revisited the need to reopen the air quality criteria, given the amount of time that had passed since the literature cutoff date of the 2019 ISA (*i.e.,* approximately January 2018) and the volume of literature that had become available, including those studies provisionally considered in responding to comments in 2020. In so doing, the EPA preliminarily concluded that at least some of these studies were likely to be relevant to its reconsideration of the air quality criteria and the PM NAAQS and that, in considering public comments on any proposed decisions for the reconsideration, these studies were likely to be raised by public commenters and would potentially warrant a reopening of the air quality criteria. For example, on February 16, 2021, the EPA received two petitions to reconsider the PM NAAQS. One petition objected to the EPA's provisional consideration of studies submitted in public comments on the 2020 proposal and suggested that the provisional consideration was inadequate because the studies could be important in determining whether the existing standards are adequately protective. See, Petition for Reconsideration of National Ambient Air Quality Standards for Particulate Matter, submitted by American Lung Association, et al, dated Feb. 16, 2020. The other petition identified a number of new studies, including one epidemiologic study that was published after the provisional consideration was completed that could further inform the concern expressed by the CASAC that associations reported in epidemiologic studies do not adequately account for ''uncontrolled confounding and other potential sources of error and bias.'' See Petition for Reconsideration of ''Review of the National Ambient Air Quality Standards for Particulate Matter,'' submitted by the State of California, dated Feb. 16, 2020. This was also an uncertainty noted by the then-Administrator in the 2020 decision, who also recognized ''that methodological study designs to address confounding, such as causal inference methods, are an emerging field of study.'' Thus, the Agency concluded it was appropriate to reconsider not only the standards but also the air quality criteria, in light of public comments during the 2020 PM NAAQS proposal and recent studies published since the cutoff date of the 2019 ISA, as reflected in petitions. In deciding to reopen the air quality criteria, the Agency concluded it was reasonable to focus on studies that were most likely to inform decisions on the appropriate standard, but not to reassess areas which, based on the assessment of available science published since the cutoff date of the 2019 ISA and through 2021, were judged unlikely to have new information that would be useful for the Administrator's decision making. The Agency accordingly announced that, in support of the reconsideration, it would develop a supplement to the 2019 ISA and a revised PA.

The EPA also explained that the draft ISA Supplement and draft PA would be reviewed at a public meeting by the CASAC, and the public would have opportunities to comment on these documents during the CASAC review process, as well as to provide input during the rulemaking through the public comment process and public hearings on the proposed rulemaking.

On March 31, 2021, the Administrator announced his decision to reestablish the membership of the CASAC to ''ensure the agency received the best possible scientific insight to support our work to protect human health and the environment.'' [20] Consistent with this memorandum, a call for nominations of candidates to the EPA's chartered CASAC was published in the **Federal Register** (86 FR 17146, April 1, 2021). On June 17, 2021, the Administrator announced his selection of the seven members to serve on the chartered CASAC.[21] [22] Additionally, a call for nominations of candidates to a PM-specific panel was published in the **Federal Register** (86 FR 33703, June 25, 2021). The members of the PM CASAC panel were announced on August 30, 2021.[23]

The draft ISA Supplement was released in September 2021 (U.S. EPA, 2021a; 86 FR 54186, September 30, 2021), and included a discussion of the rationale and scope of the Supplement. As explained therein, the ISA Supplement focuses on a thorough evaluation of some studies that became available after the literature cutoff date of the 2019 ISA that could either further inform the adequacy of the current PM NAAQS or address key scientific topics that have evolved since the literature cutoff date for the 2019 ISA. In selecting the health effects to evaluate within the ISA Supplement, the EPA focused on health effects for which the evidence supported a ''causal relationship'' because those were the health effects that were most useful in informing conclusions in the 2020 PA (U.S. EPA, 2022a, section 1.2.1).[24] Consistent with the rationale for the focus on certain health effects, in selecting the non-ecological welfare effects to evaluate within the ISA Supplement, the EPA focused on the non-ecological welfare effects for which the evidence supported a ''causal relationship'' and for which quantitative analyses could be supported by the evidence because those were the welfare effects that were most useful in informing conclusions in the 2020 PA.[25] Specifically, for non-ecological welfare effects, the focus within the ISA Supplement is on visibility effects. The ISA Supplement also considers recent health effects evidence that addresses key scientific topics where the literature has evolved since the 2020 review was completed,

[20] The press release for this announcement is available at: *https://www.epa.gov/newsreleases/administrator-regan-directs-epa-reset-critical-science-focused-federal-advisory.*

[21] The press release for this announcement is available at: *https://www.epa.gov/newsreleases/epa-announces-selections-charter-members-clean-air-scientific-advisory-committee.*

[22] The list of members of the chartered CASAC and their biosketches are available at: *https://casac.epa.gov/ords/sab/r/sab_apex/casac/mems?p14_committeeon=2021%20CASAC%20PM%20Panel&session=17433386035954.*

[23] The list of members of the PM CASAC panel and their biosketches are available at: *https://casac.epa.gov/ords/sab/f?p=105:14:9979229564047:::14:P14_COMMITTEEON:2021%20CASAC%20PM%20Panel.*

[24] As described in section 1.2.1 of the ISA Supplement: ''In considering the public health protection provided by the current primary $PM_{2.5}$ standards, and the protection that could be provided by alternatives, [the U.S. EPA, within the 2020 PM PA] emphasized health outcomes for which the ISA determined that the evidence supports either a '*causal*' or a '*likely to be causal*' relationship with $PM_{2.5}$ exposures'' (U.S. EPA, 2020b). Although the 2020 PA initially focused on this broader set of evidence, the basis of the discussion on potential alternative standards primarily focused on health effect categories where the 2019 PM ISA concluded a '*causal relationship*' (*i.e.,* short- and long-term $PM_{2.5}$ exposure and cardiovascular effects and mortality) as reflected in Figures 3–7 and 3–8 of the 2020 PA (U.S. EPA, 2020b).''

[25] As described in section 1.2.1 of the ISA Supplement: ''The 2019 PM ISA concluded a '*causal relationship*' for each of the welfare effects categories evaluated (*i.e.,* visibility, climate effects and materials effects). While the 2020 PA considered the broader set of evidence for these effects, for climate effects and material effects, it concluded that there remained 'substantial uncertainties with regard to the quantitative relationships with PM concentrations and concentration patterns that limit[ed] [the] ability to quantitatively assess the public welfare protection provided by the standards from these effects' (U.S. EPA, 2020b).''

specifically since the literature cutoff date for the 2019 ISA.[26]

Building on the rationale presented in section 1.2.1, the ISA Supplement considers peer-reviewed studies published from approximately January 2018 through March 2021 that meet the following criteria:

- Health Effects
  - U.S. and Canadian epidemiologic studies for health effect categories where the 2019 ISA concluded a ''*causal relationship*'' (*i.e.,* short- and long-term $PM_{2.5}$ exposure and cardiovascular effects and mortality).
  - U.S. and Canadian epidemiologic studies that employed alternative methods for confounder control or conducted accountability analyses (*i.e.,* examined the effect of a policy on reducing $PM_{2.5}$ concentrations).
- Welfare Effects
  - U.S. and Canadian studies that provide new information on public preferences for visibility impairment and/or developed methodologies or conducted quantitative analyses of light extinction.
- Key Scientific Topics
  - Experimental studies (*i.e.,* controlled human exposure and animal toxicological) conducted at near-ambient $PM_{2.5}$ concentrations experienced in the U.S.
  - U.S.- and Canadian-based epidemiologic studies that examined the relationship between $PM_{2.5}$ exposures and severe acute respiratory syndrome coronavirus 2 (SARS–CoV–2) infection and coronavirus disease 2019 (COVID–19) death.
  - At-Risk Populations.
  - U.S.- and Canadian-based epidemiologic or exposure studies examining potential disparities in either $PM_{2.5}$ exposures or the risk of health effects by race/ethnicity or socioeconomic status (SES).

Given the narrow scope of the ISA Supplement, it is important to recognize that the evaluation does not encompass the full multidisciplinary evaluation presented within the 2019 ISA that would result in weight-of-evidence conclusions on causality (*i.e.,* causality determinations). The ISA Supplement critically evaluates and provides key study-specific information for those recent studies deemed to be of greatest significance for informing preliminary conclusions on the PM NAAQS in the context of the body of evidence and scientific conclusions presented in the 2019 ISA.

In developing a revised PA to support the reconsideration, the EPA considered the available scientific evidence, including the evidence presented in the 2019 ISA and ISA Supplement. The 2022 PA considered the quantitative and technical information presented in the 2020 PA, in addition to new and updated analyses conducted since the 2020 final decision. For those health and welfare effects for which the ISA Supplement evaluated recently available studies (*i.e.,* $PM_{2.5}$-related health effects and visibility effects), new updated quantitative analyses were conducted as a part of the development of the 2022 PA. The newly available scientific and technical information presented in the 2022 PA were considered in reaching conclusions regarding the adequacy of the current standards and any potential alternative standards. For those health and welfare effects for which newly available scientific and technical information were not evaluated (*i.e.,* $PM_{10–2.5}$-related health effects and non-visibility welfare effects), the conclusions presented in the 2022 PA rely heavily on the information that supported the conclusions in the 2020 PA.

The CASAC PM panel met at a virtual public meeting in November 2021 to review the draft ISA Supplement (86 FR 52673, September 22, 2021). A virtual public meeting was then held in February 2022, and during this meeting the chartered CASAC considered the CASAC PM panel's draft letter to the Administrator on the draft ISA Supplement (87 FR 958, January 7, 2022).

The chartered CASAC provided its advice on the draft ISA Supplement in a letter to the EPA Administrator dated March 18, 2022 (Sheppard, 2022b). In its review of the draft ISA Supplement, the CASAC noted that they found ''the Draft ISA Supplement to be a well-written, comprehensive evaluation of the new scientific information published since the 2019 PM ISA'' (Sheppard, 2022b, p. 2 of letter). Furthermore, the CASAC stated that ''the final Integrated Science Assessment (ISA) Supplement . . . deserve[s] the Administrator's full consideration and [is] adequate for rulemaking'' (Sheppard, 2022b, p. 2 of letter). The CASAC generally endorsed EPA's decisions regarding the limited scope of the draft ISA Supplement, stating that ''this limitation [on scope] is appropriate for the targeted purpose of the Draft ISA Supplement'' although the CASAC noted it would not be appropriate for ISAs generally, and recommended that the EPA provide additional acknowledgment and explanation for the limited scope (Sheppard, 2022b, p. 2 of letter; see also pp. 2–3 of consensus responses). The EPA specifically noted in the final ISA Supplement, which was released in May 2022 (U.S. EPA, 2022a; hereafter referred to as the ISA Supplement throughout this document) that the ''targeted approach to developing the Supplement to the 2019 PM ISA for the purpose of reconsidering the 2020 PM NAAQS decision does not reflect a change to EPA's approach for developing ISAs for NAAQS reviews.'' Thus, the evidence presented within the 2019 ISA, along with the targeted identification and evaluation of new scientific information in the ISA Supplement, provides the scientific basis for the reconsideration of the 2020 PM NAAQS final decision.

The draft PA was released in October 2021 (86 FR 56263, October 8, 2021). The CASAC PM panel met at a virtual public meeting in December 2021 to review the draft PA (86 FR 52673, September 22, 2021). A virtual public meeting was then held in February 2022 and March 2022, and during this meeting the chartered CASAC considered the CASAC PM panel's draft letter to the Administrator on the draft PA (87 FR 958, January 7, 2022). The chartered CASAC provided its advice on the draft PA in a letter to the EPA Administrator dated March 18, 2022 (Sheppard, 2022a). The EPA took steps to address these comments in revising and finalizing the PA. The 2022 PA considers the scientific evidence presented in the 2019 ISA and ISA Supplement and considers the quantitative and technical information presented in the 2020 PA, along with updated and newly available analyses since the completion of the 2020 review. For those health and welfare effects for which the ISA Supplement evaluated recently available evidence and for which updated quantitative analyses were supported (*i.e.,* $PM_{2.5}$-related health effects and visibility effects), the 2022 PA includes consideration of this newly available scientific and technical information in reaching preliminary conclusions. For those health and welfare effects for which newly available scientific and technical

[26] These key scientific topics include experimental studies conducted at near-ambient concentrations, epidemiologic studies that employed alternative methods for confounder control or conducted accountability analyses, studies that assess the relationship between $PM_{2.5}$ exposure and severe acute respiratory syndrome coronavirus 2 (SARS–CoV–2) infection and coronavirus disease 2019 (COVID–19) death; and in accordance with recent EPA goals on addressing environmental justice, studies that examine disparities in $PM_{2.5}$ exposure and the risk of health effects by race/ethnicity or socioeconomic status (SES) (U.S. EPA, 2022a, section 1.2.1).

information were not evaluated (*i.e.,* $PM_{10–2.5}$-related health effects and non-visibility effects), the conclusions presented in the 2022 PA rely heavily on the information that supported the conclusions in the 2020 PA. The final PA was released in May 2022 (U.S. EPA, 2022b; hereafter referred to as the 2022 PA throughout this document).

Drawing from his consideration of the scientific evidence assessed in the 2019 ISA and ISA Supplement and the analyses in the 2022 PA, including the uncertainties in the evidence and analyses, and from his consideration of advice from the CASAC, on January 5, 2023, the Administrator proposed to revise the level of the primary annual $PM_{2.5}$ standard and to retain the primary 24-hour $PM_{2.5}$ standard, the primary 24-hour PM_{10} standard, and the secondary PM standards. These proposed decisions were published in the **Federal Register** on January 27, 2023 (88 FR 5558, January 27, 2023). The EPA held a multi-day virtual public hearing on February 21–23, 2023 (88 FR 6215, January 31, 2023). In total, the EPA received nearly 700,000 comments on the proposal from members of the public by the close of the public comment period on March 28, 2023. Major issues raised in the public comments are discussed throughout the preamble of this final action. A more detailed summary of all significant comments, along with the EPA's responses (henceforth ''Response to Comments'' document), can be found in the docket for this rulemaking (Docket No. EPA–HQ–OAR–2015–0072).

As in prior reviews, the EPA is basing its decision in this reconsideration on studies and related information in the air quality criteria, which have undergone CASAC and public review. These studies assessed in the 2019 ISA [27] and ISA Supplement [28] and the 2022 PA, and the integration of the scientific evidence presented in them, have undergone extensive critical review by the EPA, the CASAC, and the public. Decisions on the NAAQS should be based on studies that have been rigorously assessed in an integrative manner not only by the EPA but also by the statutorily mandated independent scientific advisory committee, as well as the public review that accompanies this process. It is for this reason that the EPA preliminarily concluded that the scientific evidence available since the completion of the 2019 ISA, including those raised in public comments on the proposal in 2020, warranted a partial reopening of the air quality criteria and prepared an ISA Supplement to enable the EPA, the CASAC, and the public to consider them further. Some commenters have referred to and discussed additional individual scientific studies on the health effects of PM that were not included in the 2019 ISA or ISA Supplement (''new studies'') and that have not gone through this comprehensive review process. In considering and responding to comments for which such ''new'' studies were cited in support, the EPA has provisionally considered the cited studies in the context of the findings of the 2019 ISA and ISA Supplement. The EPA's provisional consideration of these studies did not and could not provide the kind of in-depth critical review described above, but rather was focused on determining whether they warranted further reopening the review of the air quality criteria to enable the EPA, the CASAC, and the public to consider them further.

This approach, and the decision to rely on the studies and related information in the air quality criteria, which have undergone CASAC and public review, is consistent with the EPA's practice in prior NAAQS reviews and its interpretation of the requirements of the CAA. Since the 1970 amendments, the EPA has taken the view that NAAQS decisions are to be based on scientific studies and related information that have been assessed as a part of the pertinent air quality criteria, and the EPA has consistently followed this approach. This longstanding interpretation was strengthened by new legislative requirements enacted in 1977, which added section 109(d)(2) of the Act concerning CASAC review of air quality criteria. See 71 FR 6114, 61148 (October 17, 2006, final decision on review of NAAQS for particulate matter) for a detailed discussion of this issue and the EPA's past practice.

As discussed in the EPA's 1993 decision not to review the O_3 NAAQS, ''new'' studies may sometimes be of such significance that it is appropriate to delay a decision in a NAAQS review and to supplement the pertinent air quality criteria so the studies can be taken into account (58 FR 13013–13014, March 9, 1993). In the present case, the EPA decided to partially reopen the air quality criteria and prepared an ISA Supplement as a part of the reconsideration to facilitate evaluation of these studies by the EPA, the CASAC, and the public. The narrow scope of the ISA Supplement is supported by EPA's provisional consideration of ''new'' studies submitted in response to public comments on the 2020 proposal which concluded that, taken in context, the ''new'' information and findings do not materially change any of the broad scientific conclusions regarding the health and welfare effects of PM in ambient air made in the air quality criteria. Therefore, a full reopening of the air quality criteria was not warranted to assess the health and welfare effects of PM for purposes of the review.

Accordingly, the EPA is basing the final decisions in this reconsideration on the studies and related information included in the PM air quality criteria (including the 2019 PM ISA and ISA Supplement) that have undergone rigorous review by the EPA, the CASAC, and the public. The EPA will consider these ''new'' studies for inclusion in the air quality criteria for the next PM NAAQS review, which the EPA expects to begin soon after the conclusion of this reconsideration and which will provide the opportunity to fully assess these studies through a more rigorous review process involving the EPA, the CASAC, and the public.

D. Air Quality Information

This section provides a summary of basic information related to PM ambient air quality. It summarizes information on the distribution of particle size in ambient air (section I.D.1), sources and emissions contributing to PM in the ambient air (section I.D.2), monitoring ambient PM in the U.S. (section I.D.3), ambient PM concentrations and trends in the U.S. (I.D.4), characterizing ambient $PM_{2.5}$ concentrations for exposure (section I.D.5), and background PM (section I.D.6). Additional detail on PM air quality can be found in Chapter 2 of the 2022 PA (U.S. EPA, 2022b).

1. Distribution of Particle Size in Ambient Air

In ambient air, PM is a mixture of substances suspended as small liquid and/or solid particles (U.S. EPA, 2019a, section 2.2) and distinct health and welfare effects have been linked with exposures to particles of different sizes. Particles in the atmosphere range in size from less than 0.01 to more than 10 μm

[27] In addition to the 2020 review's opening ''call for information'' (79 FR 71764, December 3, 2014), the 2019 ISA identified and evaluated studies and reports that have undergone scientific peer review and were published or accepted for publication between January 1, 2009, through approximately January 2018 (U.S. EPA, 2019a, p. ES–2). References that are cited in the 2019 ISA, the references that were considered for inclusion but not cited, and electronic links to bibliographic information and abstracts can be found at: *https://hero.epa.gov/hero/particulate-matter.*

[28] As described above, the ISA Supplement represents an evaluation of recent studies that are of greatest policy relevance and utility to the reconsideration of the 2020 final decision on the PM NAAQS (U.S. EPA, 2022a).

in diameter (U.S. EPA, 2019a, section 2.2). The EPA defines $PM_{2.5}$, also referred to as fine particles, as particles with aerodynamic diameters generally less than or equal to 2.5 μm. The size range for $PM_{10–2.5}$, also called coarse or thoracic coarse particles, includes those particles with aerodynamic diameters generally greater than 2.5 μm and less than or equal to 10 μm. PM_{10}, which is comprised of both fine and coarse fractions, includes those particles with aerodynamic diameters generally less than or equal to 10 μm. In addition, ultrafine particles (UFP) are often defined as particles with a diameter of less than 0.1 μm based on physical size, thermal diffusivity or electrical mobility (U.S. EPA, 2019a, section 2.2). Atmospheric lifetimes are generally longest for $PM_{2.5}$, which often remains in the atmosphere for days to weeks (U.S. EPA, 2019a, Table 2–1) before being removed by wet or dry deposition, while atmospheric lifetimes for UFP and $PM_{10–2.5}$ are shorter and are generally removed from the atmosphere within hours, through wet or dry deposition (U.S. EPA, 2019a, Table 2–1; U.S. EPA, 2022b, section 2.1).

2. Sources and Emissions Contributing to PM in the Ambient Air

PM is composed of both primary (directly emitted particles) and secondary particles. Primary PM is derived from direct particle emissions from specific PM sources while secondary PM originates from gas-phase precursor chemical compounds present in the atmosphere that have participated in new particle formation or condensed onto existing particles (U.S. EPA, 2019a, section 2.3). As discussed further in the 2019 ISA (U.S. EPA, 2019a, section 2.3.2.1), secondary PM is formed in the atmosphere by photochemical oxidation reactions of both inorganic and organic gas-phase precursors. Precursor gases include sulfur dioxide (SO_2), nitrogen oxides (NO_X), and volatile organic compounds (VOC) (U.S. EPA, 2019a, section 2.3.2.1). Ammonia also plays an important role in the formation of nitrate PM by neutralizing sulfuric acid and nitric acid. Sources and emissions of PM are discussed in more detail the 2022 PA (U.S. EPA, 2022b, section 2.1.1). Briefly, anthropogenic sources of PM include both stationary (*e.g.,* fuel combustion for electricity production and other purposes, industrial processes, agricultural activities) and mobile (*e.g.,* diesel- and gasoline-powered highway vehicles and other engine-driven sources) sources. Natural sources of PM include dust from the wind erosion of natural surfaces, sea salt, wildfires, primary biological aerosol particles (PBAP) such as bacteria and pollen, oxidation of biogenic hydrocarbons, such as isoprene and terpenes to produce secondary organic aerosol (SOA), and geogenic sources, such as sulfate formed from volcanic production of SO_2. Wildland fire, which encompass both wildfire and prescribed fire, accounts for 44% of emissions of primary $PM_{2.5}$ emissions (U.S. EPA, 2021b). Emissions from wildfire comprises 29% of primary $PM_{2.5}$ emissions.

In recent years, the frequency and magnitude of wildfires have increased (U.S. EPA, 2019a). The magnitude of the public health impact of wildfires is substantial both because of the increase in $PM_{2.5}$ concentrations as well as the duration of the wildfire smoke season, which is considered to range from May to November. Wildfire can make a large contribution to air pollution (including $PM_{2.5}$), and wildfire events can threaten public safety and life. The impacts of wildfire events can be mitigated through management of wildland vegetation, including through prescribed fire. Prescribed fire (and some wildfires) can mimic the natural processes necessary to maintain fire-dependent ecosystems, minimizing catastrophic wildfires and the risks they pose to safety, property and air quality (see, *e.g.,* 81 FR 58010, 58038, August 24, 2016). The EPA views the strategic use of prescribed fire as an important tool for reducing wildfire risk and the severity of wildfires and wildfire smoke (88 FR, 54118, 54126, August 9, 2023).[29] As noted in the PM NAAQS proposal, agencies have efforts in place to reduce the frequency and severity of human-caused wildfires (88 FR 5570, January 27, 2023).

Wildfire events produce high PM emissions that may impact the PM concentrations in ambient air to the extent that the concentrations result in an exceedance or violation which may affect the design value in a given area. The EPA's Exceptional Events Rule (81 FR 68216, October 3, 2016) describes the process by which air agencies may request to exclude 'event-influenced' data caused by exceptional events, which can include wildfires and prescribed fires on wildland. The EPA has issued guidance specifically addressing exceptional events demonstrations for both wildfires and prescribed fires on wildland. These documents are available on EPA's Exceptional Events Program website.[30] The EPA will develop fire-related exceptional events implementation tools, including updates as needed to existing guidance to facilitate more efficient processing of $PM_{2.5}$-related exceptional events demonstrations for both the 24-hour and annual standards.

3. Monitoring of Ambient PM

To promote uniform application of the air quality standards set forth under the CAA and to achieve the degree of public health and welfare protection intended for the NAAQS, the EPA establishes PM Federal Reference Methods (FRMs) for both PM_{10} and $PM_{2.5}$ in appendices J and L to 40 CFR part 50, both of which were amended following the 2006 and 2012 PM NAAQS reviews. The current PM monitoring network relies on FRMs and automated continuous Federal Equivalent Methods (FEMs) approved pursuant to 40 CFR part 53, in part to support changes necessary for implementation of the revised PM standards. Additionally, 40 CFR part 58, appendices A through E, detail the requirements to measure ambient air quality and report ambient air quality data and related information. More information on PM ambient monitoring networks is available in section 2.2 of the 2022 PA (U.S. EPA, 2022b).

The $PM_{2.5}$ monitoring program is one of the major ambient air monitoring programs with a robust, nationally consistent network of ambient air monitoring sites providing mass and/or chemical speciation measurements. 40 CFR part 58, appendix D, section 4.7 provides the applicable $PM_{2.5}$ network design criteria. For most urban locations, $PM_{2.5}$ monitors are sited at the neighborhood scale,[31] where $PM_{2.5}$ concentrations are reasonably homogeneous throughout an entire urban sub-region. In each CBSA with a monitoring requirement, at least one $PM_{2.5}$ monitoring station representing

[29] See also: *https://www.usda.gov/sites/default/files/documents/usda-epa-doi-cdc-mou.pdf.*

[30] See: *https://www.epa.gov/air-quality-analysis/final-2016-exceptional-events-rule-supporting-guidance-documents-updated-faqs.*

[31] For $PM_{2.5}$, neighborhood scale is defined at 40 CFR part 58, appendix D, 4.7.1(c)(3) as follows: Measurements in this category would represent conditions throughout some reasonably homogeneous urban sub-region with dimensions of a few kilometers and of generally more regular shape than the middle scale. Homogeneity refers to the particulate matter concentrations, as well as the land use and land surface characteristics. Much of the $PM_{2.5}$ exposures are expected to be associated with this scale of measurement. In some cases, a location carefully chosen to provide neighborhood scale data would represent the immediate neighborhood as well as neighborhoods of the same type in other parts of the city. $PM_{2.5}$ sites of this kind provide good information about trends and compliance with standards because they often represent conditions in areas where people commonly live and work for periods comparable to those specified in the NAAQS. In general, most $PM_{2.5}$ monitoring in urban areas should have this scale.

area-wide air quality is sited in an area of expected maximum concentration.[32] By ensuring the area of expected maximum concentration in a CBSA has a site compared to both the annual and 24-hour NAAQS, all other similar locations are thus protected. Sites that represent relatively unique microscale, localized hot-spot, or unique middle scale impact sites are only eligible for comparison to the 24-hour $PM_{2.5}$ NAAQS.

Under 40 CFR part 50, appendix L, and 40 CFR part 53, and 40 CFR part 58 appendix D there are three main methods components of the $PM_{2.5}$ monitoring program: filter-based FRMs measuring $PM_{2.5}$ mass, FEMs measuring $PM_{2.5}$ mass, and other samplers used to collect the aerosol used in subsequent laboratory analysis for measuring $PM_{2.5}$ chemical speciation. The FRMs are primarily used for comparison to the NAAQS, but also serve other important purposes, such as developing trends and evaluating the performance of FEMs. $PM_{2.5}$ FEMs are typically continuous methods used to support forecasting and reporting of the Air Quality Index (AQI) but are also used for comparison to the NAAQS. Samplers that are part of the Chemical Speciation Network (CSN) and Interagency Monitoring of Protected Visual Environments (IMPROVE) network are used to provide chemical composition of the aerosol and serve a variety of objectives. More detail on of each of these components of the $PM_{2.5}$ monitoring program and of recent changes to $PM_{2.5}$ monitoring requirements are described in detail in the 2022 PA (U.S. EPA, 2022b, section 2.2.3).

4. Ambient Concentrations and Trends

This section summarizes available information on recent ambient PM concentrations in the U.S. and on trends in PM air quality. Sections I.D.4.a and I.D.4.b summarize information on $PM_{2.5}$ mass and components, respectively. Section I.D.4.c summarizes information on PM_{10}. Sections I.D.4.d and I.D.4.e summarize the more limited information on $PM_{10-2.5}$ and UFP, respectively. Additional detail on PM air quality and trends can be found in the 2022 PA (U.S. EPA, 2022b, section 2.3).

a. $PM_{2.5}$ mass

At monitoring sites in the U.S., annual $PM_{2.5}$ concentrations from 2017 to 2019 averaged 8.0 μg/m³ (with the 10th and 90th percentiles at 5.9 and 10.0 μg/m³, respectively) and the 98th percentiles of 24-hour concentrations averaged 21.3 μg/m³ (with the 10th and 90th percentiles at 14.0 and 29.7 μg/m³, respectively) (U.S. EPA, 2022b, section 2.3.2.1). The highest ambient $PM_{2.5}$ concentrations occur in the western U.S., particularly in California and the Pacific Northwest (U.S. EPA, 2022b, Figure 2–15). Much of the eastern U.S. has lower ambient concentrations, with annual average concentrations generally at or below 12.0 μg/m³ and 98th percentiles of 24-hour concentrations generally at or below 30 μg/m³ (U.S. EPA, 2022b, section 2.3.2.1).

Recent ambient $PM_{2.5}$ concentrations reflect the substantial reductions that have occurred across much of the U.S. (U.S. EPA, 2022b, section 2.3.2.1). From 2000 to 2019, national annual average $PM_{2.5}$ concentrations declined from 13.5 μg/m³ to 7.6 μg/m³, a 43% decrease (U.S. EPA, 2022b, section 2.3.2.1).[33] These declines have occurred at urban and rural monitoring sites, although urban $PM_{2.5}$ concentrations remain consistently higher than those in rural areas (Chan et al., 2018) due to the impact of local sources in urban areas. Analyses at individual monitoring sites indicate that declines in ambient $PM_{2.5}$ concentrations have been most consistent across the eastern U.S. and in parts of coastal California, where both annual average and 98th percentiles of 24-hour concentrations declined significantly (U.S. EPA, 2022b, section 2.3.2.1). In contrast, trends in ambient $PM_{2.5}$ concentrations have been less consistent over much of the western U.S., with no significant changes since 2000 observed at some sites in the Pacific Northwest, the northern Rockies and plains, and the Southwest, particularly for 98th percentiles of 24-hour concentrations (U.S. EPA, 2022b, section 2.3.2.1). As noted below, some sites in the northwestern U.S. and California, where wildfire have been relatively common in recent years, have experienced high concentrations over shorter periods (*i.e.,* 2-hour averages).

The recent deployment of $PM_{2.5}$ monitors near major roads in large urban areas provides information on $PM_{2.5}$ concentrations near an important emissions source. For 2016–2018, Gantt et al. (2021) reported that 52% and 24% of the time near-road sites reported the highest annual and 24-hour $PM_{2.5}$ design value [34] in the CBSA, respectively. Of the CBSAs with the highest annual design values at near-road sites reported by Gantt et al. (2021), those design values were, on average, 0.8 μg/m³ higher than at the highest measuring non-near-road sites (range is 0.1 to 2.1 μg/m³ higher at near-road sites). Although most near-road monitoring sites do not have sufficient data to evaluate long-term trends in near-road $PM_{2.5}$ concentrations, analyses of the data at one near-road-like site in Elizabeth, NJ, [35] show that the annual average near-road increment has generally decreased between 1999 and 2017 from about 2.0 μg/m³ to about 1.3 μg/m³ (U.S. EPA, 2022b, section 2.3.2.1).

Ambient $PM_{2.5}$ concentrations can exhibit a diurnal cycle that varies due to impacts from intermittent emission sources, meteorology, and atmospheric chemistry. The $PM_{2.5}$ monitoring network in the U.S. has an increasing number of continuous FEM monitors reporting hourly $PM_{2.5}$ mass concentrations that reflect this diurnal variation. The 2019 ISA describes a two-peaked diurnal pattern in urban areas, with morning peaks attributed to rush-hour traffic and afternoon peaks attributed to a combination of rush hour traffic, decreasing atmospheric dilution, and nucleation (U.S. EPA, 2019a, section 2.5.2.3, Figure 2–32). Because a focus on annual average and 24-hour average $PM_{2.5}$ concentrations could mask subdaily patterns, and because some health studies examine PM exposure durations shorter than 24-hours, it is useful to understand the broader distribution of subdaily $PM_{2.5}$ concentrations across the U.S. The 2022 PA presents information on the frequency distribution of 2-hour average $PM_{2.5}$ mass concentrations from all FEM $PM_{2.5}$ monitors in the U.S. for 2017–2019. At sites meeting the current primary $PM_{2.5}$ standards, these 2-hour concentrations generally remain below 10 μg/m³, and rarely exceed 30 μg/m³. Two-hour concentrations are higher at sites violating the current standards, generally remaining below 16 μg/m³ and rarely exceeding 80 μg/m³ (U.S. EPA, 2022b, section 2.3.2.2.3). The extreme upper end of the distribution of 2-hour $PM_{2.5}$ concentrations is shifted higher during the warmer months, generally corresponding to the period of peak wildfire frequency (April to September) in the U.S. At sites meeting the current primary standards, the highest 2-hour concentrations measured rarely occur outside of the period of peak wildfire frequency. Most of the sites measuring

[32] 40 CFR part 58, app. D, 4.7.1(b)(2).

[33] See *https://www.epa.gov/air-trends/particulate-matter-pm25-trends* for up-to-date $PM_{2.5}$ trends information.

[34] A design value is considered valid if it meets the data handling requirements given in appendix N to 40 CFR part 50.

[35] The Elizabeth Lab site in Elizabeth, NJ, is situated approximately 30 meters from travel lanes of the Interchange 13 toll plaza of the New Jersey Turnpike and within 200 meters of travel lanes for Interstate 278 and the New Jersey Turnpike.

these very high concentrations are in the northwestern U.S. and California, where wildfires have been relatively common in recent years (see U.S. EPA, 2022b, Appendix A, Figure A–1). When the period of peak wildfire frequency is excluded from the analysis, the extreme upper end of the distribution is reduced (U.S. EPA, 2022b, section 2.3.2.2.3).

b. $PM_{2.5}$ Components

Based on recent air quality data, the major chemical components of $PM_{2.5}$ have distinct spatial distributions. Sulfate concentrations tend to be highest in the eastern U.S., while in the Ohio Valley, Salt Lake Valley, and California nitrate concentrations are highest, and relatively high concentrations of organic carbon are widespread across most of the continental U.S. (U.S. EPA, 2022b, section 2.3.2.3). Elemental carbon, crustal material, and sea salt are found to have the highest concentrations in the northeast U.S., southwest U.S., and coastal areas, respectively.

An examination of $PM_{2.5}$ composition trends can provide insight into the factors contributing to overall reductions in ambient $PM_{2.5}$ concentrations. The biggest change in $PM_{2.5}$ composition that has occurred in recent years is the reduction in sulfate concentrations due to reductions in SO_2 emissions. Between 2000 and 2015, the nationwide annual average sulfate concentration decreased by 17% at urban sites and 20% at rural sites. This change in sulfate concentrations is most evident in the eastern U.S. and has resulted in organic matter or nitrate now being the greatest contributor to $PM_{2.5}$ mass in many locations (U.S. EPA, 2019a, Figure 2–19). The overall reduction in sulfate concentrations has contributed substantially to the decrease in national average $PM_{2.5}$ concentrations as well as the decline in the fraction of PM_{10} mass accounted for by $PM_{2.5}$ (U.S. EPA, 2019a, section 2.5.1.1.6; U.S. EPA, 2022b, section 2.3.1).

c. PM_{10}

At long-term monitoring sites in the U.S., the 2017–2019 average of 2nd highest 24-hour PM_{10} concentration was 68 $\mu g/m^3$ (with 10th and 90th percentiles at 28 and 124 $\mu g/m^3$, respectively) (U.S. EPA, 2022b, section 2.3.2.4).[36] The highest PM_{10} concentrations tend to occur in the western U.S. Seasonal analyses indicate that ambient PM_{10} concentrations are generally higher in the summer months than at other times of year, though the most extreme high concentration events are more likely in the spring (U.S. EPA, 2019a, Table 2–5). This is due to fact that the major PM_{10} emission sources, dust and agriculture, are more active during the warmer and drier periods of the year.

Recent ambient PM_{10} concentrations reflect reductions that have occurred across much of the U.S. (U.S. EPA, 2022b, section 2.3.2.4). From 2000 to 2019, 2nd highest 24-hour PM_{10} concentrations have declined by about 46% (U.S. EPA, 2022b, section 2.3.2.4).[37] Analyses at individual monitoring sites indicate that annual average PM_{10} concentrations have generally declined at most sites across the U.S., with much of the decrease in the eastern U.S. associated with reductions in $PM_{2.5}$ concentrations (U.S. EPA, 2022b, section 2.3.2.4). Annual 2nd highest 24-hour PM_{10} concentrations have generally declined in the eastern U.S., while concentrations in much of the midwest and western U.S. have remained unchanged or increased since 2000 (U.S. EPA, 2022b, section 2.3.2.4).

Compared to previous reviews, data available from the NCore monitoring network in the current reconsideration allows a more comprehensive analysis of the relative contributions of $PM_{2.5}$ and $PM_{10–2.5}$ to PM_{10} mass. $PM_{2.5}$ generally contributes more to annual average PM_{10} mass in the eastern U.S. than the western U.S. (U.S. EPA, 2022b, Figure 2–23). At most sites in the eastern U.S., the majority of PM_{10} mass is comprised of $PM_{2.5}$. As ambient $PM_{2.5}$ concentrations have declined in the eastern U.S. (U.S. EPA, 2022b, section 2.3.2.2), the ratios of $PM_{2.5}$ to PM_{10} have also declined. For sites with days having concurrently very high $PM_{2.5}$ and PM_{10} concentrations (U.S. EPA, 2022b, Figure 2–24), the $PM_{2.5}/PM_{10}$ ratios are typically higher than the annual average ratios. This is particularly true in the northwestern U.S. where the high PM_{10} concentrations can occur during wildfires with high $PM_{2.5}$ (U.S. EPA, 2022b, section 2.3.2.4).

d. $PM_{10–2.5}$

Since the 2012 review, the availability of $PM_{10–2.5}$ ambient concentration data has greatly increased because of additions to the $PM_{10–2.5}$ monitoring capabilities to the national monitoring network. As illustrated in the 2022 PA (U.S. EPA, 2022b, section 2.3.2.5), annual average and 98th percentile $PM_{10–2.5}$ concentrations exhibit less distinct differences between the eastern and western U.S. than for either $PM_{2.5}$ or PM_{10}.

Due to the short atmospheric lifetime of $PM_{10–2.5}$ relative to $PM_{2.5}$, many of the high concentration sites are isolated and likely near emission sources associated with wind-blown and fugitive dust. The spatial distributions of annual average and 98th percentile concentrations of $PM_{10–2.5}$ are more similar than that of $PM_{2.5}$, suggesting that the same dust-related emission sources are affecting both long-term and episodic concentrations (U.S. EPA, 2022b, Figure 2–25). The highest concentrations of $PM_{10–2.5}$ are in the southwest U.S. where widespread dry and windy conditions contribute to wind-blown dust emissions. Additionally, compared to $PM_{2.5}$ and PM_{10}, changes in $PM_{10–2.5}$ concentrations have been small in magnitude and inconsistent in direction (U.S. EPA, 2022b, Figure 2–25). The majority of $PM_{10–2.5}$ sites in the U.S. do not have a concentration trend from 2000–2019, reflecting the relatively consistent level of dust emissions across the U.S. during the same time period (U.S. EPA, 2022b, section 2.3.2.5).[38]

e. UFP

Compared to $PM_{2.5}$ mass, there is relatively little data on U.S. particle number concentrations, which are dominated by UFP. In the published literature, annual average particle number concentrations reaching about 20,000 to 30,000 cm^3 have been reported in U.S. cities (U.S. EPA, 2019a). In addition, based on UFP measurements in two urban areas (New York City, Buffalo) and at a background site (Steuben County) in New York, there is a pronounced difference in particle number concentration between different types of locations (U.S. EPA, 2022b, Figure 2–26; U.S. EPA, 2019a, Figure 2–18). Urban particle number counts were several times higher than at the background site, and the highest particle number counts in an urban area with multiple sites (Buffalo) were observed at a near-road location (U.S. EPA, 2022b, section 2.3.2.6).

Long-term trends in UFP are not routinely available at U.S. monitoring

[36] The form of the current 24-hour PM_{10} standard is one-expected-exceedance, averaged over three years.

[37] For more information, see *https://www.epa.gov/air-trends/particulate-matter-pm10-trends#pmnat.*

[38] PM from dust emissions in the National Emissions Inventory (NEI) remain fairly consistent from year-to-year, except when there are severe weather incursions or there is a dust event that transports or causes major local dust storms to occur (particularly in the western U.S.). These dust events and weather incursions needed to effect dust emissions on a national level are not common and only seldomly occur. In the emissions trends analysis presented in the 2022 PA (U.S. EPA, 2022b, section 2.1.1), dust is included in the NEI sector labeled ''miscellaneous.''

sites. At one background site in Illinois with long-term data available, the annual average particle number concentration declined between 2000 and 2019, closely matching the reductions in annual $PM_{2.5}$ mass over that same period (U.S. EPA, 2022b, section 2.3.2.6). In addition, a small number of published studies have examined UFP trends over time. While limited, these studies also suggest that UFP number concentrations have declined over time along with decreases in $PM_{2.5}$ (U.S. EPA, 2022b, section 2.3.2.6). However, the relationship between changes in ambient $PM_{2.5}$ and UFPs cannot be comprehensively characterized due to the high variability and limited monitoring of UFPs (U.S. EPA, 2022b, section 2.3.2.6).

5. Characterizing Ambient $PM_{2.5}$ Concentrations for Exposure

Epidemiologic studies use various methods to characterize exposure to ambient $PM_{2.5}$. The methods used to estimate $PM_{2.5}$ concentrations can vary from traditional methods using monitoring data from ground-based monitors to newer methods using more complex hybrid modeling approaches. Studies using hybrid modeling approaches aim to broaden the spatial coverage, as well as estimate more spatially-resolved ambient $PM_{2.5}$ concentrations, by expanding beyond just those areas with monitors and providing estimates in areas that do not have ground-based monitors (*i.e.,* areas that are generally less densely populated and tend to have lower $PM_{2.5}$ concentrations) and at finer spatial resolutions (*e.g.,* 1 km x 1 km grid cells). Ground-based $PM_{2.5}$ monitors are generally sited in areas of expected maximum concentration. As such, the hybrid modeling approaches tend to broaden the areas captured in the exposure assessment, and in doing so, the studies that utilize these methods tend to report lower mean $PM_{2.5}$ concentrations than monitor-based approaches. Further, other aspects of the approaches applied in the various epidemiologic studies to estimate $PM_{2.5}$ exposure and/or to calculate the related study-reported mean concentration (*i.e.,* population weighting, trim mean approaches) can affect those data values. More detail related to hybrid modeling methods, performance of the methods, and how the reported mean concentrations compare across approaches is provided in section 2.3.3.2 of the 2022 PA (U.S. EPA, 2022b). The subsections below discuss the characterization of $PM_{2.5}$ concentrations based on monitoring data (I.D.5.a) and using hybrid modeling approaches (I.D.5.b).

a. Predicted Ambient $PM_{2.5}$ and Exposure Based on Monitored Data

Ambient concentrations of $PM_{2.5}$ are often characterized using measurements from national monitoring networks due to the accuracy and precision of the measurements and the public availability of data. For applications requiring $PM_{2.5}$ characterizations across large areas or provide complete coverage from the site measurements, data interpolation and averaging techniques (such as Average Nearest Neighbor tools, and area-wide or population-weighted averaging of monitors) are sometimes used (U.S. EPA, 2019a, chapter 3).

For an area to meet the NAAQS, all valid design values [39] in that area, including the highest annual and 24-hour design values, must be at or below the levels of the standards. Because the monitoring network siting requirements are specified to capture the high $PM_{2.5}$ concentrations (U.S. EPA, 2022b, section 2.2.3), areas meeting an annual $PM_{2.5}$ standard with a particular level would be expected to have long-term average monitored $PM_{2.5}$ concentrations (*i.e.,* averaged across space and over time in the area) somewhat below that standard level. This means that the $PM_{2.5}$ design value in an area is associated with a distribution of $PM_{2.5}$ concentrations in that area, and, based on monitoring siting requirements, should represent the highest concentration location applicable to be monitored under the $PM_{2.5}$ NAAQS. Analyses in the 2022 PA indicate that, based on recent air quality in U.S. CBSAs, maximum annual $PM_{2.5}$ design values are often 10% to 20% higher than annual average concentrations (*i.e.,* averaged across multiple monitors in the same CBSA) (U.S. EPA, 2022b, section 2.3.3.1, Figures 2–28 and 2–29). This difference between the maximum annual design value and the average concentration in an area can vary, depending on factors such as the number of monitors, monitor siting characteristics, and the distribution of ambient $PM_{2.5}$ concentrations. Given that higher $PM_{2.5}$ concentrations have been reported at some near-road monitoring sites relative to the surrounding area (U.S. EPA, 2022b, section 2.3.2.2.2), recent requirements for $PM_{2.5}$ monitoring at near-road locations in large urban areas (U.S. EPA, 2022b, section 2.2.3.3) may increase the ratios of maximum design values to average annual design values in some areas. Such ratios may also depend on how the averages are calculated (*i.e.,* averaged across monitors versus across modeled grid cells, as described below in section I.5.b). Compared to annual design values, the analysis in the 2022 PA indicates a more variable relationship between maximum 24-hour $PM_{2.5}$ design values and annual average concentrations (U.S. EPA, 2022b, section 2.3.3.1, Figure 2–29).

b. Comparison of $PM_{2.5}$ Hybrid Modeling Approaches in Estimating Exposure and Relative to Design Values

Two types of hybrid approaches that have been utilized in several key $PM_{2.5}$ epidemiologic studies in the 2019 ISA and ISA Supplement include neural network approaches and a satellite-based method with regression of residual $PM_{2.5}$ with land-use and other variables to improve estimates of $PM_{2.5}$ concentration in the U.S. As such, the 2022 PA further compares these two types of approaches across various scales (*e.g.,* CBSA versus nationwide), taking into account population weighting approaches utilized in epidemiologic studies when estimating $PM_{2.5}$ exposure (U.S. EPA, 2022b, section 2.3.3.2.4). Additionally, the 2022 PA assesses how average $PM_{2.5}$ concentrations computed in epidemiologic studies using these hybrid surfaces compare to the maximum design values measured at ground-based monitors. For this assessment, the 2022 PA evaluates the DI2019 [40] and HA2020 [41] hybrid surfaces, surfaces that are used in several of the key epidemiologic studies in the 2022 PA. This analysis is intended to help inform how the magnitude of the overall study-reported mean $PM_{2.5}$ concentrations in epidemiologic studies may be

[39] For the annual $PM_{2.5}$ standard, design values are calculated as the annual arithmetic mean $PM_{2.5}$ concentration, averaged over 3 years. For the 24-hour standard, design values are calculated as the 98th percentile of the annual distribution of 24-hour $PM_{2.5}$ concentrations, averaged over three years (appendix N of 40 CFR part 50).

[40] This analysis includes an updated version of the surface used in Di et al. (2016). Predictions in Di et al. (2016) were for 2000 to 2012 using a neural network model. The Di et al. (2019) study improved on that effort in several ways. First, a generalized additive model was used that accounted for geographic variations in performance to combine predictions from three models (neural network, random forest, and gradient boosting) to make the final optimal $PM_{2.5}$ predictions. Second, the datasets were updated that were used in model training and included additional variables such as 12-km CMAQ modeling as predictors. Finally, more recent years were included in the Di et al. (2019) study.

[41] The HA2020 field is based on the V4.NA.03 product available at: *https://sites.wustl.edu/acag/datasets/surface-pm2-5/*. The name ''HA2020'' comes from the references for this product (Hammer et al., 2020; van Donkelaar et al., 2019).

influenced by the approach used to compute that mean and how that value might compare to monitor reported concentrations. The $PM_{2.5}$ standards are expected to achieve a pattern of air quality through the attainment of a specific design value at each monitor in the monitoring network. As a result, it is important to be able to assess the relationship between monitor concentrations and patterns of air quality evaluated in the epidemiologic studies.

In estimating exposure, some studies focus on estimating concentrations in urban areas, while others examine the entire U.S. or large portions of the country. In general, the areas that are not included in the CBSA-only analysis tend to be more rural or less densely populated areas, tend to have lower $PM_{2.5}$ concentrations, and likely correspond to those locations where monitoring data availability is limited or nonexistent (U.S. EPA, 2022b, section 2.3.3.2.4, Figure 2–37). To evaluate the differences in mean $PM_{2.5}$ concentrations across different spatial scales, the 2022 PA analysis compares the DI2019 and HA2020 surfaces. At the national scale, the two surfaces generally produce similar average annual $PM_{2.5}$ concentrations, with the DI2019 surface being slightly higher compared to the HA2020 surface. The average annual $PM_{2.5}$ concentrations are also slightly higher using the DI2019 surface compared to the HA2020 surface when the analyses are conducted for CBSAs. Also, regardless of which surface is used, the average annual and 3-year average of the average annual $PM_{2.5}$ concentrations for the CBSA-only analyses are somewhat higher than for the nationwide analyses (4–8% higher) (U.S. EPA, 2022b, section 2.3.3.2.4, Table 2–5).[42] Overall, these analyses suggest that there are only slight differences in the average $PM_{2.5}$ concentrations depending on the hybrid modeling method employed, though including other hybrid modeling methods in this comparison could result in larger differences.

The 2022 PA next evaluates how the averages of the hybrid model surfaces compare to regulatory design values using both the DI2019 and HA2020 surfaces and how population weighting influences the mean $PM_{2.5}$ concentration.[43] As presented in the 2022 PA, the results using the DI2019 and HA2020 surfaces are similar for the average annual $PM_{2.5}$ concentrations, for each 3-year period. When population weighting is not applied, the average annual $PM_{2.5}$ concentrations generally range from 7.0 to 8.6 $\mu g/m^3$. When population weighting is applied, the average annual $PM_{2.5}$ concentrations are slightly higher, ranging from 8.2 to 10.2 $\mu g/m^3$. As with CBSAs versus the national comparison above, population weighting results in a higher average $PM_{2.5}$ concentration than when population weighting is not applied (U.S. EPA, 2022b, section 2.3.3.2.4, Table 2–7). For the CBSAs included in the population weighted analyses, the average maximum annual design values generally range from 9.5 to 11.7 $\mu g/m^3$. The results are similar for both the DI2019 and HA2020 surfaces and the maximum annual $PM_{2.5}$ design values measured at the monitors are often 40% to 50% higher than average annual $PM_{2.5}$ concentrations predicted by hybrid modeling methods when population weighting is not applied. However, when population weighting is applied, the ratio of the maximum annual $PM_{2.5}$ design values to the predicted average annual $PM_{2.5}$ concentrations are lower than when population weighting is not applied, with monitored design values generally 15% to 18% higher than population-weighted hybrid modeling average annual $PM_{2.5}$ concentrations (U.S. EPA, 2022b, section 2.3.3.2.4, Table 2–7).

6. Background PM

In this reconsideration, background PM is defined as all particles that are formed by sources or processes that cannot be influenced by actions within the jurisdiction of concern. U.S. background PM is defined as any PM formed from emissions other than U.S. anthropogenic (*i.e.,* manmade) emissions. Potential sources of U.S. background PM include both natural sources (*i.e.,* PM that would exist in the absence of any anthropogenic emissions of PM or PM precursors) and transboundary sources originating outside U.S. borders. Background PM is discussed in more detail in the 2022 PA (U.S. EPA, 2022b, section 2.4). At annual and national scales, estimated background PM concentrations in the U.S. are small compared to contributions from domestic anthropogenic sources.[44] For example, based on zero-out modeling in the last review of the PM NAAQS, annual background $PM_{2.5}$ concentrations were estimated to range from 0.5–3 $\mu g/m^3$ across the sites examined. In addition, speciated monitoring data from IMPROVE sites can provide some insights into how contributions from different sources, including sources of background PM, may have changed over time. Such data suggests the estimates of background concentrations using speciated monitoring data from IMPROVE monitors are around 1–3 $\mu g/m^3$ and have not changed significantly since the 2012 review. Contributions to background PM in the U.S. result mainly from sources within North America. Contributions from intercontinental events have also been documented (*e.g.,* transport from dust storms occurring in deserts in North Africa and Asia), but these events are less frequent and represent a relatively small fraction of background PM in most of the U.S. (U.S. EPA, 2022b, section 2.4).

II. Rationale for Decisions on the Primary $PM_{2.5}$ Standards

This section presents the rationale for the Administrator's decision to revise the primary annual $PM_{2.5}$ standard down to a level of 9 $\mu g/m^3$ and retain the primary 24-hour $PM_{2.5}$ standard. This rationale is based on a thorough review of the scientific evidence generally published through January 2018,[45] as evaluated in the 2019 ISA (U.S. EPA, 2019a), on the human health effects of $PM_{2.5}$ associated with long- and short-term exposures[46] to $PM_{2.5}$ in

[42] For the national scale, 3-year averages of the average annual $PM_{2.5}$ concentrations generally range from about 5.3 $\mu g/m^3$ to 8.1 $\mu g/m^3$, compared to the CBSA scale, which ranges from 5.7 $\mu g/m^3$ to 8.7 $\mu g/m^3$. (U.S. EPA, 2022b, section 2.3.3.2.4, Table 2–6).

[43] For this analysis, the 2022 PA includes CBSAs with three or more valid design values for the 3-year period. The regulatory design values for the CBSAs were calculated for each 3-year period for the CBSAs with 3 or more design values in each of the 3-year periods. Using the maximum design value for each CBSA and by each 3-year period, the ratio of maximum design values to modeled average annual $PM_{2.5}$ concentrations were calculated, for each 3-year period. More details about the analytical methods used for this analysis are described in section A.6 of Appendix A in the 2022 PA (U.S. EPA, 2022b).

[44] Sources that contribute to natural background PM include dust from the wind erosion of natural surfaces, sea salt, wildland fires, primary biological aerosol particles such as bacteria and pollen, oxidation of biogenic hydrocarbons such as isoprene and terpenes to produce secondary organic aerosols (SOA), and geogenic sources such as sulfate formed from volcanic production of SO_2 and oceanic production of dimethyl-sulfide (U.S. EPA, 2022b, section 2.4). While most of these sources release or contribute predominantly to fine aerosol, some sources including windblown dust, and sea salt also produce particles in the coarse size range (U.S. EPA, 2019a, section 2.3.3).

[45] In addition to the 2020 review's opening ''call for information'' (79 FR 71764, December 3, 2014), the 2019 ISA identified and evaluated studies and reports that have undergone scientific peer review and were published or accepted for publication between January 1, 2009, through approximately January 2018 (U.S. EPA, 2019a, p. ES–2). References that are cited in the 2019 ISA, the references that were considered for inclusion but not cited, and electronic links to bibliographic information and abstracts can be found at: *https://hero.epa.gov/hero/particulate-matter.*

[46] Short-term exposures are defined as those exposures occurring over hours up to 1 month,

the ambient air. Additionally, this rationale is based on a thorough evaluation of some studies that became available after the literature cutoff date of the 2019 ISA, as evaluated in the ISA Supplement, that could either further inform the adequacy of the current PM NAAQS or address key scientific topics that have evolved since the literature cutoff date for the 2019 ISA, generally through March 2021 (U.S. EPA, 2022a).[47] The Administrator's rationale also takes into account: (1) The 2022 PA evaluation of the policy-relevant information in the 2019 ISA and ISA Supplement and presentation of quantitative analyses of air quality and health risks; (2) CASAC advice and recommendations; and (3) public comments received during the development of these documents.

In presenting the rationale for the Administrator's decisions and its foundations, section II.A provides background on the general approach for this reconsideration and the basis for the existing standard, and also presents brief summaries of key aspects of the currently available health effects and risk information. Section II.B summarizes the CASAC advice and the basis for the proposed conclusions, addresses public comments received on the proposal and presents the Administrator's conclusions on the adequacy of the current standards, drawing on consideration of the scientific evidence and quantitative risk information, advice from the CASAC, and comments from the public. Section II.C summarizes the Administrator's decision on the primary $PM_{2.5}$ standards.

A. Introduction

The general approach for this reconsideration of the 2020 final decision on the primary $PM_{2.5}$ standards is fundamentally based on using the EPA's assessment of the current scientific evidence and associated quantitative analyses to inform the Administrator's judgment regarding primary $PM_{2.5}$ standards that protect public health with an adequate margin of safety. The EPA's assessments are primarily documented in the 2019 ISA, ISA Supplement, and 2022 PA, all of which have received CASAC review and public comment (83 FR 53471, October 23, 2018; 83 FR 55529, November 6, 2018; 85 FR 4655, January 27, 2020; 86 FR 52673, September 22, 2021; 86 FR 54186, September 30, 2021; 86 FR 56263, October 8, 2021; 87 FR 958, January 7, 2022; 87 FR 22207, April 14, 2022; 87 FR 31965, May 26, 2022). In bridging the gap between the scientific assessments of the 2019 ISA and ISA Supplement and the judgments required of the Administrator in determining whether the current standards provide the requisite public health protection, the 2022 PA evaluates policy implications of the evaluation of the current evidence in the 2019 ISA and ISA Supplement, and the risk information documented in the 2022 PA. In evaluating the public health protection afforded by the current standards, the four basic elements of the NAAQS (*i.e.,* indicator, averaging time, level, and form) are considered collectively.

The final decision on the adequacy of the current primary $PM_{2.5}$ standards is a public health policy judgment to be made by the Administrator. In reaching conclusions with regard to the standards, the decision will draw on the scientific information and analyses about health effects and population risks, as well as judgments about how to consider the range and magnitude of uncertainties that are inherent in the scientific evidence and analyses. This approach is based on the recognition that the available health effects evidence generally reflects a continuum, consisting of levels at which scientists generally agree that health effects are likely to occur, through lower levels at which the likelihood and magnitude of the response become increasingly uncertain. This approach is consistent with the requirements of the NAAQS provisions of the Clean Air Act and with how the EPA and the courts have historically interpreted the Act (summarized in section I.A above). These provisions require the Administrator to establish primary standards that, in the judgment of the Administrator, are requisite to protect public health with an adequate margin of safety. In so doing, the Administrator seeks to establish standards that are neither more nor less stringent than necessary for this purpose. The Act does not require that primary standards be set at a zero-risk level, but rather at a level that avoids unacceptable risks to public health, including the health of sensitive (also referred to as ''at-risk'') groups.[48]

1. Background on the Current Standards

The current primary $PM_{2.5}$ standards were retained in 2020 based on the scientific evidence and quantitative risk information available at that time, as well as the then-Administrator's judgments regarding the available health effects evidence and the appropriate degree of public health protection afforded by the existing standards (85 FR 82718, December 18, 2020). With the 2020 decision, the then-Administrator retained the primary annual $PM_{2.5}$ standard with its level of 12.0 $\mu g/m^3$ and retained the primary 24-hour $PM_{2.5}$ standard with its level of 35 $\mu g/m^3$. The key considerations and the then-Administrator's conclusions regarding the primary $PM_{2.5}$ standards in the 2020 review are summarized below.

The health effects evidence base available in the 2020 review included extensive evidence from previous reviews as well as the evidence that had emerged since the prior review had been completed in 2012. This evidence base, spanning several decades, documents the relationship between short- and long-term $PM_{2.5}$ exposure and mortality or serious morbidity effects. The evidence available in the 2019 ISA reaffirmed, and in some cases strengthened, the conclusions from the 2009 ISA regarding the health effects of $PM_{2.5}$ exposures (U.S. EPA, 2019a). Much of the evidence came from epidemiologic studies conducted in North America, Europe, or Asia examining short-term and long-term exposures that demonstrated generally positive, and often statistically significant, $PM_{2.5}$ health effect associations with a range of outcomes including non- accidental, cardiovascular, or respiratory mortality; cardiovascular- or respiratory-related hospitalizations or emergency department visits; and other mortality/morbidity outcomes (*e.g.,* lung cancer mortality or incidence, asthma development). Experimental evidence, as well as evidence from panel studies, strengthened support for potential biological pathways through which $PM_{2.5}$ exposures could lead to health effects reported in many population-based epidemiologic studies, including support for pathways that could lead to cardiovascular, respiratory, nervous system, and cancer-related effects.

whereas long-term exposures are defined as those exposures occurring over 1 month to years (U.S. EPA, 2019a, section P.3.1).

[47] The ISA Supplement represents an evaluation of recent studies that are of greatest policy relevance to the reconsideration of the 2020 final decision on the PM NAAQS. Specifically, the ISA Supplement focuses on studies of health effects for which the evidence in the 2019 ISA supported a ''causal relationship'' (*i.e.,* short- and long-term $PM_{2.5}$ exposure and mortality and cardiovascular effects) because those were the health effects that were most useful in informing conclusions in the 2020 PA. The ISA Supplement does not include an evaluation of studies for other $PM_{2.5}$-related health effects (U.S. EPA, 2022a).

[48] As noted in section I.A above, the legislative history describes such protection for the sensitive group of individuals and not for a single person in the sensitive group (see S. Rep. No. 91–1196, 91st Cong, 2d Sess. 10 [1970]); see also *Am. Lung Ass'n* v. *EPA,* 134 F.3d 388, 389 (D.C. Cir. 1998).

Based on this evidence, the 2019 ISA concluded there to be a causal relationship between long- and short-term $PM_{2.5}$ exposure and mortality and cardiovascular effects, as well as likely to be causal relationships between long- and short-term $PM_{2.5}$ exposure and respiratory effects, and between long-term $PM_{2.5}$ exposure and cancer and nervous system effects (U.S. EPA, 2019a, section 1.7).

Epidemiologic studies reported $PM_{2.5}$ health effect associations with mortality and/or morbidity across multiple U.S. cities and in diverse populations, including in studies examining populations and lifestages that may be at increased risk of experiencing a $PM_{2.5}$-related health effect (*e.g.,* older adults, children). The 2019 ISA cited extensive evidence indicating that ''both the general population as well as specific populations and lifestages are at risk for $PM_{2.5}$-related health effects'' (U.S. EPA, 2019a, p. 12–1), including children and older adults, people with pre-existing respiratory or cardiovascular disease, minority populations, and low socioeconomic status (SES) populations.

The risk information available in the 2020 review included risk estimates for air quality conditions just meeting the existing primary $PM_{2.5}$ standards, and also for air quality conditions just meeting potential alternative standards. The general approach to estimating $PM_{2.5}$-associated health risks combined concentration-response (C–R) functions from epidemiologic studies with model-based $PM_{2.5}$ air quality surfaces, baseline health incidence data, and population demographics for 47 urban areas (U.S. EPA, 2020b, section 3.3, Figure 3–10, Appendix C). The risk assessment estimated that the existing primary $PM_{2.5}$ standards could allow a substantial number of $PM_{2.5}$-associated deaths in the U.S. Uncertainty in risk estimates (*e.g.,* in the size of risk estimates) can result from a number of factors, including assumptions about the shape of the C–R relationship with mortality at low ambient $PM_{2.5}$ concentrations, the potential for confounding and/or exposure measurement error, and the methods used to adjust $PM_{2.5}$ air quality.

Consistent with the general approach routinely employed in NAAQS reviews, the initial consideration in the 2020 review of the primary $PM_{2.5}$ standards was with regard to the adequacy of the protection provided by the existing standards.

As an initial matter, the then-Administrator considered the range of scientific evidence evaluating these effects, including studies of at-risk populations, to inform his review of the primary $PM_{2.5}$ standards, placing the greatest weight on evidence of effects for which the 2019 ISA determined there to be a causal or likely to be causal relationship with long- and short-term $PM_{2.5}$ exposures (85 FR 82714–82715, December 18, 2020).

With regard to indicator, the then-Administrator recognized that, consistent with the evidence available in prior reviews, the scientific evidence continued to provide strong support for health effects following short- and long-term $PM_{2.5}$ exposures. He noted the 2020 PA conclusions that the information continued to support the $PM_{2.5}$ mass-based indicator and remained too limited to support a distinct standard for any specific $PM_{2.5}$ component or group of components, and too limited to support a distinct standard for the ultrafine fraction. Thus, the then-Administrator concluded that it was appropriate to retain $PM_{2.5}$ as the indicator for the primary standards for fine particles (85 FR 82715, December 18, 2020).

With respect to averaging time and form, the then-Administrator noted that the scientific evidence continued to provide strong support for health effects associations with both long-term (*e.g.,* annual or multi-year) and short-term (*e.g.,* mostly 24-hour) exposures to $PM_{2.5}$, consistent with the conclusions in the 2020 PA. In the 2019 ISA, epidemiologic and controlled human exposure studies examined a variety of $PM_{2.5}$ exposure durations. Epidemiologic studies continued to provide strong support for health effects associated with short-term $PM_{2.5}$ exposures based on 24-hour $PM_{2.5}$ averaging periods, and the EPA noted that associations with subdaily estimates are less consistent and, in some cases, smaller in magnitude (U.S. EPA, 2019a, section 1.5.2.1; U.S. EPA, 2020b, section 3.5.2.2). In addition, controlled human exposure and panel-based studies of subdaily exposures typically examined subclinical effects, rather than the more serious population-level effects that have been reported to be associated with 24-hour exposures (*e.g.,* mortality, hospitalizations). Taken together, the 2019 ISA concluded that epidemiologic studies did not indicate that subdaily averaging periods were more closely associated with health effects than the 24-hour average exposure metric (U.S. EPA, 2019a, section 1.5.2.1). Additionally, while controlled human exposure studies provided consistent evidence for cardiovascular effects following $PM_{2.5}$ exposures for less than 24 hours (*i.e.,* <30 minutes to 5 hours), exposure concentrations in the studies were well-above the ambient concentrations typically measured in locations meeting the existing standards (U.S. EPA, 2020b, section 3.2.3.1). Thus, these studies also did not suggest the need for additional protection against subdaily $PM_{2.5}$ exposures (U.S. EPA, 2020b, section 3.5.2.2). Therefore, the then-Administrator judged that the 24-hour averaging time remained appropriate (85 FR 82715, December 18, 2020).

With regard to the form of the 24-hour standard (98th percentile, averaged over three years), the then-Administrator noted that epidemiologic studies continued to provide strong support for health effect associations with short-term (*e.g.,* mostly 24-hour) $PM_{2.5}$ exposures (U.S. EPA, 2020b, section 3.5.2.3) and that controlled human exposure studies provided evidence for health effects following single short-term ''peak'' $PM_{2.5}$ exposures. Thus, the evidence supported retaining a standard focused on providing supplemental protection against short-term peak exposures and supported a 98th percentile form for a 24-hour standard. The then-Administrator further noted that this form also provided an appropriate balance between limiting the occurrence of peak 24-hour $PM_{2.5}$ concentrations and identifying a stable target for risk management programs (U.S. EPA, 2020b, section 3.5.2.3). As such, the then-Administrator concluded that the available information supported retaining the form and averaging time of the current 24-hour standard (98th percentile, averaged over three years) and annual standard (annual average, averaged over three years) (85 FR 82715, December 18, 2020).

With regard to the level of the standards, in reaching his final decision, the then-Administrator considered the large body of evidence presented and assessed in the 2019 ISA (U.S. EPA, 2019a), the policy-relevant and risk-based conclusions and rationales as presented in the 2020 PA (U.S. EPA, 2020b), advice from the CASAC, and public comments. In particular, in considering the 2019 ISA and 2020 PA, he considered key epidemiologic studies that evaluated associations between $PM_{2.5}$ air quality distributions and mortality and morbidity, including key accountability studies; the availability of experimental studies to support biological plausibility; controlled human exposure studies examining effects following short-term $PM_{2.5}$ exposures; air quality analyses; and the important uncertainties and limitations associated with the information (85 FR 82715, December 18, 2020).

As an initial matter, the then-Administrator considered the protection afforded by both the annual and 24-hour standards together against long- and short-term $PM_{2.5}$ exposures and health effects. The Administrator recognized that the annual standard was most effective in controlling ''typical'' $PM_{2.5}$ concentrations near the middle of the air quality distribution (*i.e.,* around the mean of the distribution), but also provided some control over short-term peak $PM_{2.5}$ concentrations. On the other hand, the 24-hour standard, with its 98th percentile form, was most effective at limiting peak 24-hour $PM_{2.5}$ concentrations, but in doing so also had an effect on annual average $PM_{2.5}$ concentrations. Thus, while either standard could be viewed as providing some measure of protection against both average exposures and peak exposures, the 24-hour and annual standards were not expected to be equally effective at limiting both types of exposures. Thus, consistent with previous reviews, the then-Administrator's consideration of the public health protection provided by the existing primary $PM_{2.5}$ standards was based on his consideration of the combination of the annual and 24-hour standards. Specifically, he recognized that the annual standard was more likely to appropriately limit the ''typical'' daily and annual exposures that are most strongly associated with the health effects observed in epidemiologic studies. The then-Administrator concluded that an annual standard (as the arithmetic mean, averaged over three years) remained appropriate for targeting protection against the annual and daily $PM_{2.5}$ exposures around the middle portion of the $PM_{2.5}$ air quality distribution. Further, recognizing that the 24-hour standard (with its 98th percentile form) was more directly tied to short-term peak $PM_{2.5}$ concentrations, and more likely to appropriately limit exposures to such concentrations, the then-Administrator concluded that the current 24-hour standard (with its 98th percentile form, averaged over three years) remained appropriate to provide a balance between limiting the occurrence of peak 24-hour $PM_{2.5}$ concentrations and identifying a stable target for risk management programs. However, the then-Administrator recognized that changes in $PM_{2.5}$ air quality to meet an annual standard would likely result not only in lower short- and long-term $PM_{2.5}$ concentrations near the middle of the air quality distribution, but also in fewer and lower short-term peak $PM_{2.5}$ concentrations. The then-Administrator further recognized that changes in air quality to meet a 24-hour standard, with a 98th percentile form, would result not only in fewer and lower peak 24-hour $PM_{2.5}$ concentrations, but also in lower annual average $PM_{2.5}$ concentrations (85 FR 82715–82716, December 18, 2020).

Thus, in considering the adequacy of the 24-hour standard, the then-Administrator noted the importance of considering whether additional protection was needed against short-term exposures to peak $PM_{2.5}$ concentrations. In examining the scientific evidence, he noted the limited utility of the animal toxicological studies in directly informing conclusions on the appropriate level of the standard given the uncertainty in extrapolating from effects in animals to those in human populations. The then-Administrator noted that controlled human exposure studies provided evidence for health effects following single, short-term $PM_{2.5}$ exposures that corresponded best to exposures that might be experienced in the upper end of the $PM_{2.5}$ air quality distribution in the U.S. (*i.e.,* ''peak'' concentrations). However, most of these studies examined exposure concentrations considerably higher than are typically measured in areas meeting the standards (U.S. EPA, 2020b, section 3.2.3.1). In particular, controlled human exposure studies often reported statistically significant effects on one or more indicators of cardiovascular function following 2-hour exposures to $PM_{2.5}$ concentrations at and above 120 $\mu g/m^3$ (at and above 149 $\mu g/m^3$ for vascular impairment, the effect shown to be most consistent across studies). To provide insight into what these studies may indicate regarding the primary $PM_{2.5}$ standards, the 2020 PA (U.S. EPA, 2020b, p. 3–49) noted that 2-hour ambient concentrations of $PM_{2.5}$ at monitoring sites meeting the current standards almost never exceeded 32 $\mu g/m^3$. In fact, even the extreme upper end of the distribution of 2-hour $PM_{2.5}$ concentrations at sites meeting the primary $PM_{2.5}$ standards remained well-below the $PM_{2.5}$ exposure concentrations consistently shown in controlled human exposure studies to elicit effects (*i.e.,* 99.9th percentile of 2-hour concentrations at these sites is 68 $\mu g/m^3$ during the warm season). Thus, the experimental evidence did not indicate the need for additional protection against exposures to peak $PM_{2.5}$ concentrations, beyond the protection provided by the combination of the 24-hour and the annual standards (U.S. EPA, 2020b, section 3.2.3.1; 85 FR 82716, December 18, 2020).

With respect to the epidemiologic evidence, the then-Administrator noted that the studies did not indicate that associations in those studies were strongly influenced by exposures to peak concentrations in the air quality distribution and thus did not indicate the need for additional protection against short-term exposures to peak $PM_{2.5}$ concentrations (U.S. EPA, 2020b, section 3.5.1). The then-Administrator noted that this was consistent with CASAC consensus support for retaining the current 24-hour standard. Thus, the then-Administrator concluded that the 24-hour standard with its level of 35 $\mu g/m^3$ was adequate to provide supplemental protection (*i.e.,* beyond that provided by the annual standard alone) against short-term exposures to peak $PM_{2.5}$ concentrations (85 FR 82716, December 18, 2020).

With regard to the level of the annual standard, the then-Administrator recognized that the annual standard, with its form based on the arithmetic mean concentration, was most appropriately meant to limit the ''typical'' daily and annual exposures that were most strongly associated with the health effects observed in epidemiologic studies. However, the then-Administrator also noted that while epidemiologic studies examined associations between distributions of $PM_{2.5}$ air quality and health outcomes, they did not identify particular $PM_{2.5}$ exposures that cause effects and thus, they could not alone identify a specific level at which the standard should be set, as such a determination necessarily required the then-Administrator's judgment. Thus, consistent with the approaches in previous NAAQS reviews, the then-Administrator recognized that any approach that used epidemiologic information in reaching decisions on what standards are appropriate necessarily required judgments about how to translate the information from the epidemiologic studies into a basis for appropriate standards. This approach included consideration of the uncertainties in the reported associations between daily or annual average $PM_{2.5}$ exposures and mortality or morbidity in the epidemiologic studies. Such an approach is consistent with setting standards that are neither more nor less stringent than necessary, recognizing that a zero-risk standard is not required by the Clean Air Act (CAA) (85 FR 82716, December 18, 2020).

The then-Administrator emphasized uncertainties and limitations that were present in epidemiologic studies in previous reviews and persisted in the 2020 review. These uncertainties

included exposure measurement error, potential confounding by copollutants, increasing uncertainty of associations at lower $PM_{2.5}$ concentrations, and heterogeneity of effects across different cities or regions (85 FR 82716, December 18, 2020). The then-Administrator also noted the advice given by the CASAC on this matter. As described in section I.C.5 above, the CASAC did not reach consensus on the adequacy of the primary annual $PM_{2.5}$ standard. ''Some CASAC members'' expressed support for retaining the primary annual $PM_{2.5}$ standard while ''other members'' expressed support for revising that standard in order to increase public health protection (Cox, 2019b, p. 1 of consensus letter). The CASAC members who supported retaining the annual standard expressed their concerns with the epidemiologic studies, asserting that these studies did not provide a sufficient basis for revising the existing standards. They also identified several key concerns regarding the associations reported in epidemiologic studies and concluded that ''while the data on associations should certainly be carefully considered, this data should not be interpreted more strongly than warranted based on its methodological limitations'' (Cox, 2019b, p. 8 consensus responses).

Taking into consideration the views expressed by the CASAC members who supported retaining the annual standard, the then-Administrator recognized that epidemiologic studies examined associations between distributions of $PM_{2.5}$ air quality and health outcomes, and they did not identify particular $PM_{2.5}$ exposures that cause effects (U.S. EPA, 2020b, section 3.1.2). While the Administrator remained concerned about placing too much weight on epidemiologic studies to inform conclusions on the adequacy of the primary standards, he noted the approach to considering such studies in the 2012 review. In the 2012 review, it was noted that the evidence of an association in any epidemiologic study was ''strongest at and around the long-term average where the data in the study are most concentrated'' (78 FR 3140, January 15, 2013). In considering the characterization of epidemiologic studies, the then-Administrator viewed that when assessing the mean concentrations of the key short-term and long-term epidemiologic studies in the U.S. that used ground-based monitoring (*i.e.,* those studies where the mean is most directly comparable to the current annual standard), the majority of studies had mean concentrations at or above the level of the existing annual standard, with the mean of the study-reported means or medians equal to 13.5 $\mu g/m^3$, a concentration level above the existing level of the primary annual standard of 12 $\mu g/m^3$. The then-Administrator further noted his caution in directly comparing the reported study mean values to the standard level given that study-reported mean concentrations, by design, are generally lower than the design value of the highest monitor in an area, which determines compliance. In the 2020 PA, analyses of recent air quality in U.S. CBSAs indicated that maximum annual $PM_{2.5}$ design values for a given three-year period were often 10% to 20% higher than average monitored concentrations (*i.e.,* averaged across multiple monitors in the same CBSA) (U.S. EPA, 2020b, Appendix B, section B.7). He further noted his concern in placing too much weight on any one epidemiologic study but instead judged that it was more appropriate to focus on the body of studies together and therefore noted the calculation of the mean of study-reported means (or medians). Thus, while the then-Administrator was cautious in placing too much weight on the epidemiologic evidence alone, he noted that: (1) The reported mean concentration in the majority of the key U.S. epidemiologic studies using ground-based monitoring data were above the level of the existing annual standard; (2) the mean of the reported study means (or medians) (*i.e.,* 13.5 $\mu g/m^3$) was above the level of the current standard; [49] (3) air quality analyses showed the study means to be lower than their corresponding design values by 10–20%; and (4) these analyses must be considered in light of uncertainties inherent in the epidemiologic evidence. When taken together, the then-Administrator judged that, even if it were appropriate to place more weight on the epidemiologic evidence, this information did not call into question the adequacy of the current standards (85 FR 82716–17, December 18, 2020).

In addition to the evidence, the then-Administrator also considered the potential implications of the risk assessment. He noted that all risk assessments have limitations and that he remained concerned about the uncertainties in the underlying epidemiologic data used in the risk assessment. The then-Administrator also noted that in previous reviews, these uncertainties and limitations have often resulted in less weight being placed on quantitative estimates of risk than on the underlying scientific evidence itself (*e.g.,* 78 FR 3086, 3098–99, January 15, 2013). These uncertainties and limitations included uncertainty in the shapes of C–R functions, particularly at low concentrations; uncertainties in the methods used to adjust air quality; and uncertainty in estimating risks for populations, locations and air quality distributions different from those examined in the underlying epidemiologic study (U.S. EPA, 2020b, section 3.3.2.4). Additionally, the then-Administrator noted similar concern expressed by some members of the CASAC who support retaining the existing standards; they highlighted similar uncertainties and limitations in the risk assessment (Cox, 2019b). In light of all of this, the then-Administrator judged it appropriate to place little weight on quantitative estimates of $PM_{2.5}$-associated mortality risk in reaching conclusions about the level of the primary $PM_{2.5}$ standards (85 FR 82717, December 18, 2020).

The then-Administrator additionally considered an emerging body of evidence from accountability studies that examined past reductions in ambient $PM_{2.5}$ and the degree to which those reductions resulted in public health improvements. While the then-Administrator agreed with public commenters that well-designed and conducted accountability studies can be informative, he viewed the interpretation of such studies in the context of the primary $PM_{2.5}$ standards as complicated by the fact that some of the available studies had not evaluated $PM_{2.5}$ specifically (*e.g.,* as opposed to PM_{10} or total suspended particulates), did not show changes in $PM_{2.5}$ air quality, or had not been able to disentangle health impacts of the interventions from background trends in health (U.S. EPA, 2020b, section 3.5.1). He further recognized that the small number of available studies that did report public health improvements following past declines in ambient $PM_{2.5}$ had not examined air quality meeting the existing standards (U.S. EPA, 2020b, Table 3–3). This included U.S. studies that reported increased life expectancy, decreased mortality, and decreased respiratory effects following past declines in ambient $PM_{2.5}$ concentrations. Such studies examined ''starting'' annual average $PM_{2.5}$ concentrations (*i.e.,* prior to the reductions being evaluated) ranging from about 13.2 to >20$\mu g/m^3$ (*i.e.,* U.S. EPA, 2020b, Table 3–3). Given the lack of available accountability studies

[49] The median of the study-reported mean (or median) $PM_{2.5}$ concentrations is 13.3 $\mu g/m^3$, which was also above the level of the existing standard.

reporting public health improvements attributable to reductions in ambient $PM_{2.5}$ in locations meeting the existing standards, together with his broader concerns regarding the lack of experimental studies examining $PM_{2.5}$ exposures typical of areas meeting the existing standards, the then-Administrator judged that there was considerable uncertainty in the potential for increased public health protection from further reductions in ambient $PM_{2.5}$ concentrations beyond those achieved under the existing primary $PM_{2.5}$ standards (85 FR 82717, December 18, 2020).

When the above considerations were taken together, the then-Administrator concluded that the scientific evidence assessed in the 2019 ISA, together with the analyses in the 2020 PA based on that evidence and consideration of CASAC advice and public comments, did not call into question the adequacy of the public health protection provided by the existing annual and 24-hour $PM_{2.5}$ standards. In particular, the then-Administrator judged that there was considerable uncertainty in the potential for additional public health improvements from reducing ambient $PM_{2.5}$ concentrations below the concentrations achieved under the existing primary standards and that, therefore, standards more stringent than the existing standards (*e.g.,* with lower levels) were not supported. That is, he judged that more stringent standards would be more than requisite to protect the public health with an adequate margin of safety. This judgment reflected the Administrator's consideration of the uncertainties in the potential implications of the lower end of the air quality distributions from the epidemiologic studies due in part to the lack of supporting evidence from experimental studies and retrospective accountability studies conducted at $PM_{2.5}$ concentrations meeting the existing standards (85 FR 82717, December 18, 2020).

In reaching this conclusion in the 2020 review, the then-Administrator judged that the existing standards provided an adequate margin of safety. With respect to the annual standard, the level of 12 $\mu g/m^3$ was below the lowest ''starting'' concentration (*i.e.,* 13.2 $\mu g/m^3$) in the available accountability studies that showed public health improvements attributable to reductions in ambient $PM_{2.5}$. In addition, while the then-Administrator placed less weight on the epidemiologic evidence for selecting a standard, he noted that the level of the annual standard was below the reported mean (and median) concentrations in the majority of the key U.S. epidemiologic studies using ground-based monitoring data (noting that these means tend to be 10–20% lower than their corresponding area design values which is the more relevant metric when considering the level of the standard) and below the mean of the reported means (or medians) of these studies (*i.e.,* 13.5 $\mu g/m^3$). In addition, the then-Administrator recognized that concentrations in areas meeting the existing 24-hour and annual standards remained well-below the $PM_{2.5}$ exposure concentrations consistently shown to elicit effects in human exposure studies (85 FR 82717–82718, December 18, 2020).

In addition, based on the then-Administrator's review of the science in the 2020 review, including controlled human exposure studies examining effects following short-term $PM_{2.5}$ exposures, the epidemiologic studies, and accountability studies conducted at levels just above the existing annual standard, he judged that the degree of public health protection provided by the existing annual standard is not greater than warranted. This judgment, together with the fact that no CASAC member expressed support for a less stringent standard, led the then- Administrator to conclude that standards less stringent than the existing standards (*e.g.,* with higher levels) were also not supported (85 FR 82718, December 18, 2020).

In reaching his final decision in the 2020 review, the then-Administrator concluded that the scientific evidence and technical information continued to support the existing annual and 24-hour $PM_{2.5}$ standards. This conclusion reflected the then-Administrator's view that there were important limitations and uncertainties that remained in the evidence. The then-Administrator concluded that these limitations contributed to considerable uncertainty regarding the potential public health implications of revising the existing primary $PM_{2.5}$ standards. Given this uncertainty, and noting the advice from some CASAC members, he concluded that the primary $PM_{2.5}$ standards, including the indicators ($PM_{2.5}$), averaging times (annual and 24-hour), forms (arithmetic mean and 98th percentile, averaged over three years) and levels (12.0 $\mu g/m^3$, 35 $\mu g/m^3$), when taken together, remained requisite to protect the public health. Therefore, in the 2020 review, the Administrator reached the conclusion that the primary 24-hour and annual $PM_{2.5}$ standards, together, were requisite to protect public health from fine particles with an adequate margin of safety, including the health of at-risk populations, and retained the standards, without revision (85 FR 82718, December 18, 2020).

2. Overview of the Health Effects Evidence

The information summarized here and further detailed in section II.B of the proposal (88 FR 5580, January 27, 2023), is an overview of the policy-relevant aspects of the health effects evidence available in this reconsideration; the assessment of this evidence is documented in the 2019 ISA (U.S. EPA, 2019a) and ISA Supplement (U.S. EPA, 2022a) and its policy implications are further discussed in the 2022 PA (U.S. EPA, 2022b). While the 2019 ISA provides the broad scientific foundation for this reconsideration, additional literature has become available since the cutoff date of the 2019 ISA that expands the body of evidence related to mortality and cardiovascular effects for both short- and long-term $PM_{2.5}$ exposure, which can inform the Administrator's judgment on the adequacy of the current primary $PM_{2.5}$ standards. As such, the ISA Supplement builds on the information presented within the 2019 ISA with a targeted identification and evaluation of new scientific information (U.S. EPA, 2022a, section 1.2). The ISA Supplement focuses on $PM_{2.5}$ health effects evidence where the 2019 ISA concludes a ''causal relationship,'' because such health effects are given the most weight in an Administrator's decisions in a NAAQS review. As such, in selecting the health effects to evaluate within the ISA Supplement (*i.e.,* newly available evidence related to short- and long-term $PM_{2.5}$ exposure and mortality and cardiovascular effects), the primary rationale is based on the causality determinations for health effect categories presented in the 2019 PM ISA, and the subsequent use of the health effects evidence in the 2020 PM PA. Specifically, U.S. and Canadian epidemiologic studies for mortality and cardiovascular effects, along with controlled human exposure studies associated with cardiovascular effects at near ambient concentrations, were considered to be of greatest utility in informing the Administrator's conclusions on the adequacy of the current primary $PM_{2.5}$ standards. Additionally, studies examining associations outside the U.S. or Canada reflect air quality and exposure patterns that may be less typical of the U.S., and thus less likely to be informative for purposes of reviewing the NAAQS (U.S. EPA, 2022b, p.1–3). While the ISA Supplement does not include information for health effects other than mortality and cardiovascular effects, the

scientific evidence for other health effect categories is evaluated in the 2019 ISA, which in combination with the ISA Supplement represents the complete scientific record for the reconsideration of the 2020 final decision.

The ISA Supplement also assessed accountability studies because these types of epidemiologic studies were part of the body of evidence that was a focus of the 2020 review. Accountability studies inform our understanding of the potential for public health improvements as ambient $PM_{2.5}$ concentrations have declined over time. Further, the ISA Supplement considered studies that employed statistical approaches that attempt to more extensively account for confounders and are more robust to model misspecification (*i.e.,* used alternative methods for confounder control),[50] given that such studies were highlighted by the CASAC and identified in public comments in the 2020 review. Since the literature cutoff date for the 2019 ISA, multiple accountability studies and studies that employ alternative methods for confounder control have become available for consideration in the ISA Supplement and, subsequently, in this reconsideration.

The ISA Supplement also considered recent health effects evidence that addresses key scientific issues where the literature has expanded since the completion of the 2019 ISA.[51] The 2019 ISA evaluated a couple of controlled human exposure studies that investigated the effect of exposure to near-ambient concentrations of $PM_{2.5}$ (U.S. EPA, 2019a, section 6.1.10 and 6.1.13). The ISA Supplement adds to this limited evidence, including a recent study conducted in young healthy individuals exposed to near-ambient $PM_{2.5}$ concentrations (U.S. EPA, 2022a, section 3.3.1). Given the importance of identifying populations at increased risk of $PM_{2.5}$-related effects, the ISA Supplement also included epidemiologic or exposure studies that examined whether there is evidence of exposure or risk disparities by race/ethnicity or SES. These types of studies provide additional information related to factors that may increase risk of $PM_{2.5}$-related health effects and provide additional evidence for consideration by the Administrator in reaching conclusions regarding the adequacy of the current standards. In addition, the ISA Supplement evaluated studies that examined the relationship between short- and long-term $PM_{2.5}$ exposures and SARS-CoV–2 infection and/or COVID–19 death, as these studies are a new area of research and were raised by a number of public commenters in the 2020 review.

The evidence presented within the 2019 ISA, along with the targeted identification and evaluation of new scientific information in the ISA Supplement, provides the scientific basis for the reconsideration of the 2020 final decision on the primary $PM_{2.5}$ standards. The subsections below briefly summarize the nature of $PM_{2.5}$-related health effects (II.A.2.a), with a focus on those health effects for which the 2019 ISA concluded a ''causal'' or ''likely to be causal'' relationship, the potential public health implications and populations at risk (II.A.2.b), and $PM_{2.5}$ concentrations in key studies reporting health effects (II.A.2.c).

a. Nature of Effects

The evidence base available in the reconsideration includes decades of research on $PM_{2.5}$-related health effects (U.S. EPA, 2004b; U.S. EPA, 2009a; U.S. EPA, 2019a), including the full body of evidence evaluated in the 2019 ISA (U.S. EPA, 2019a), along with the targeted evaluation of recent evidence in the ISA Supplement (U.S. EPA, 2022a). In considering the available scientific evidence, the sections below, and in more detail in section II.B.1 of the proposal (88 FR 5580, January 27, 2023), summarize the relationships between long-and short-term $PM_{2.5}$ exposures and mortality (II.A.2.a.i), cardiovascular effects (II.A.2.a.ii), respiratory effects (II.A.2.a.iii), cancer (II.A.2.a.iv), nervous system effects (II.A.2.a.v) and other effects (II.A.2.a.vi). For these outcomes, the 2019 ISA concluded that the evidence supports either a ''causal'' or a ''likely to be causal'' relationship.[52]

i. Mortality

Long-Term $PM_{2.5}$ Exposures

In the 2012 review, the 2009 ISA reported that the evidence was ''sufficient to conclude that the relationship between long-term $PM_{2.5}$ exposures and mortality is causal'' (U.S. EPA, 2009a, p. 7–96). The strongest evidence supporting this conclusion was provided by epidemiologic studies, particularly those examining two seminal cohorts, the American Cancer Society (ACS) cohort and the Harvard Six Cities cohort. Analyses of the Harvard Six Cities cohort included evidence indicating that reductions in ambient $PM_{2.5}$ concentrations are associated with reduced mortality risk (Laden et al., 2006) and increases in life expectancy (Pope et al., 2009). Further support was provided by other cohort studies conducted in North America and Europe that reported positive associations between long-term $PM_{2.5}$ exposure and mortality (U.S. EPA, 2019a).

Cohort studies, which have become available since the completion of the 2009 ISA and evaluated in the 2019 ISA, continue to provide consistent evidence of positive associations between long-term $PM_{2.5}$ exposures and mortality. These studies add support for associations with all-cause and total (non-accidental) mortality,[53] as well as with specific causes of mortality, including cardiovascular disease and respiratory disease (U.S. EPA, 2019a, section 11.2.2). Several of these studies conducted analyses over longer study durations and periods of follow-up than examined in the original ACS and Harvard Six Cities cohort studies and continue to report positive associations between long-term exposure to $PM_{2.5}$ and mortality (U.S. EPA, 2019a, section 11.2.2.1; Figures 11–18 and 11–19). In addition to studies focusing on the ACS and Harvard Six Cities cohorts, additional studies examining other cohorts also provide evidence of consistent, positive associations between long-term $PM_{2.5}$ exposure and mortality across a wide range of demographic groups (*e.g.,* age, sex, occupation), spatial and temporal extents, exposure assessment metrics, and statistical techniques (U.S. EPA, 2019a, sections 11.2.2.1, 11.2.5; U.S. EPA, 2022a, Table 11–8). This includes some of the largest cohort studies conducted to date, such as analyses of the U.S. Medicare cohort that includes

[50] As noted in the ISA Supplement (U.S. EPA, 2022a, p. 1–3): ''In the peer-reviewed literature, these epidemiologic studies are often referred to as causal inference studies or studies that used causal modeling methods. For the purposes of this Supplement, this terminology is not used to prevent confusion with the main scientific conclusions (*i.e.,* the causality determinations) presented within an ISA. In addition, as is consistent with the weight-of-evidence framework used within ISAs and discussed in the Preamble to the Integrated Science Assessments, an individual study on its own cannot inform causality, but instead represents a piece of the overall body of evidence.''

[51] As with the epidemiologic studies for long- and short-term $PM_{2.5}$ exposure and mortality and cardiovascular effects, epidemiologic studies of exposure or risk disparities and SARS–CoV–2 infection and/or COVID–19 death were limited to those conducted in the U.S. and Canada.

[52] In this reconsideration of the PM NAAQS, the EPA considers the full body of health evidence, placing the greatest emphasis on the health effects for which the evidence has been judged in the 2019 ISA to demonstrate a ''causal'' or ''likely to be causal'' relationship with $PM_{2.5}$ exposures.

[53] The majority of these studies examined non-accidental mortality outcomes, though some Medicare studies lack cause-specific death information and, therefore, examine total mortality.

nearly 61 million enrollees and studies that control for a range of individual and ecological covariates, including race, age, SES, smoking status, body mass index, and annual weather variables (*e.g.,* temperature, humidity) (U.S. EPA, 2019a).

In addition to those cohort studies evaluated in the 2019 ISA, recent North American cohort studies evaluated in the ISA Supplement continue to examine the relationship between long-term $PM_{2.5}$ exposure and mortality and report consistent, positive, and statistically significant associations. These recent studies also utilize large and demographically diverse cohorts that are generally representative of the national populations in both the U.S. and Canada. These ''studies published since the 2019 ISA support and extend the evidence base that contributed to the conclusion of a *causal relationship* between long-term $PM_{2.5}$ exposure and mortality'' (U.S. EPA, 2022a, section 3.2.2.2.1, Figure 3–19, Figure 3–20).

Furthermore, studies evaluated in the 2019 ISA and the ISA Supplement that examined cause-specific mortality expand upon previous research that found consistent, positive associations between $PM_{2.5}$ exposure and specific mortality outcomes, which include cardiovascular and respiratory mortality, as well as other mortality outcomes. For cardiovascular-related mortality, the evidence evaluated in the ISA Supplement is consistent with the evidence evaluated in the 2019 ISA with recent studies reporting positive associations with long-term $PM_{2.5}$ exposure. When evaluating cause-specific cardiovascular mortality, recent studies reported positive associations for a number of outcomes, such as ischemic heart disease (IHD) and stroke mortality (U.S. EPA, 2022a, Figure 3–23). Moreover, recent studies also provide some initial evidence that individuals with pre-existing health conditions, such as heart failure and diabetes, are at an increased risk of $PM_{2.5}$-related health effects (U.S. EPA, 2022a, section 3.2.2.4) and that these individuals have a higher risk of mortality overall, which was previously only examined in studies that used stratified analyses rather than a cohort of people with an underlying health condition (U.S. EPA, 2022a, section 3.2.2.4). With regard to respiratory mortality, epidemiologic studies evaluated in the 2019 ISA and ISA Supplement continue to provide support for associations between long-term $PM_{2.5}$ exposure and respiratory mortality (U.S. EPA, 2019a, section 5.2.10; U.S. EPA, 2022a, Table 3–2).

A series of epidemiologic studies evaluated in the 2019 ISA tested the hypothesis that past reductions in ambient $PM_{2.5}$ concentrations are associated with increased life expectancy or a decreased mortality rate and report that reductions in ambient $PM_{2.5}$ are associated with improvements in longevity (U.S. EPA, 2022a, section 11.2.2.5). Pope et al. (2009) conducted a cross-sectional analysis using air quality data from 51 metropolitan areas across the U.S., beginning in the 1970s through the early 2000s, and found that a 10 μg/m³ decrease in long-term $PM_{2.5}$ concentration was associated with a 0.61-year increase in life expectancy. In a subsequent analysis, the authors extended the period of analysis to include 2000 to 2007, a time period with lower ambient $PM_{2.5}$ concentrations and found a decrease in long-term $PM_{2.5}$ concentration continued to be associated with an increase in life expectancy, though the magnitude of the increase was smaller than during the earlier time period (*i.e.,* a 10 μg/m³ decrease in long-term $PM_{2.5}$ concentration was associated with a 0.35-year increase in life expectancy) (Correia et al., 2013). Additional studies conducted in the U.S. or Europe similarly report that reductions in ambient $PM_{2.5}$ are associated with improvements in longevity (U.S. EPA, 2022a, section 11.2.2.5).

Since the literature cutoff date for the 2019 ISA, a few epidemiologic studies were published that examined the relationship between long-term $PM_{2.5}$ exposure and life-expectancy (U.S. EPA, 2022a, section 3.2.1.3) and report results that are consistent with and expand upon the body of evidence from the 2019 ISA. For example, Bennett et al. (2019) reported that $PM_{2.5}$ concentrations above the lowest observed concentration (2.8 μg/m³) were associated with a 0.15 year decrease in national life expectancy for women and 0.13 year decrease in national life expectancy for men (U.S. EPA, 2022a, section 3.2.2.2.4, Figure 3–25). Another study compared participants living in areas with $PM_{2.5}$ concentrations >12 μg/m³ to participants living in areas with $PM_{2.5}$ concentrations <12 μg/m³ and reported that the number of years of life lost due to living in areas with higher $PM_{2.5}$ concentrations was 0.84 years over a 5-year period (Ward-Caviness et al., 2020; U.S. EPA, 2022a, section 3.2.2.2.4).

Additionally, a number of accountability studies, which are epidemiologic studies that evaluate whether an environmental policy or air quality intervention resulted in reductions in ambient air pollution concentrations and subsequent reductions in mortality or morbidity, have emerged and were evaluated in the ISA Supplement (U.S. EPA, 2022a, section 3.2.2.3). For example, Sanders et al. (2020a) examined whether policy actions (*i.e.,* the first annual $PM_{2.5}$ NAAQS implementation rule in 2005 for the 1997 annual $PM_{2.5}$ standard with a 3-year annual average of 15.0 μg/m³) reduced $PM_{2.5}$ concentrations and mortality rates in Medicare beneficiaries between 2000–2013, and found that following implementation of the annual $PM_{2.5}$ NAAQS, annual $PM_{2.5}$ concentrations decreased by 1.59 μg/m³ (95% CI: 1.39, 1.80) which corresponded to a 0.93% reduction in mortality rates among individuals 65 years and older ([95% CI: 0.10%, 1.77%) in non-attainment counties relative to attainment counties.

The 2019 ISA also evaluated a small number of studies that used alternative methods for confounder control to further assess relationship between long-term $PM_{2.5}$ exposure and mortality (U.S. EPA, 2019a, section 11.2.2.4). In addition, multiple epidemiologic studies that implemented alternative methods for confounder control and were published since the literature cutoff date of the 2019 ISA were evaluated in the ISA Supplement (U.S. EPA, 2022a, section 3.2.2.3). These studies used a variety of statistical methods including generalized propensity score (GPS), inverse probability weighting (IPW), and difference-in-difference (DID) to reduce uncertainties related to confounding bias in the association between long-term $PM_{2.5}$ exposure and mortality. These studies reported consistent positive associations between long-term $PM_{2.5}$ exposure and total mortality (U.S. EPA, 2022a, section 3.2.2.3), and provided further support for the associations reported in the cohort studies referenced above.

The 2019 ISA and ISA Supplement also evaluated the degree to which recent studies examining the relationship between long-term $PM_{2.5}$ exposure and mortality addressed key policy-relevant issues and/or previously identified data gaps in the scientific evidence, including methods to estimate exposure, methods to control for confounding (*e.g.,* co-pollutant confounding), the shape of the C–R relationship, as well as examining whether a threshold exists below which mortality effects do not occur. With respect to exposure assessment, based on its evaluation of the evidence, the 2019 ISA concludes that positive associations between long-term $PM_{2.5}$ exposures and mortality are robust

across recent analyses using various approaches to estimate $PM_{2.5}$ exposures (*e.g.,* based on monitors, models, satellite-based methods, or hybrid methods that combine information from multiple sources) (U.S. EPA, 2019a, section 11.2.5.1). Hart et al. (2015) report that correction for bias due to exposure measurement error increases the magnitude of the hazard ratios (confidence intervals widen but the association remains statistically significant), suggesting that failure to correct for exposure measurement error could result in attenuation or underestimation of risk estimates.

The 2019 ISA additionally concludes that positive associations between long-term $PM_{2.5}$ exposures and mortality are robust across statistical models that use different approaches to control for confounders or different sets of confounders (U.S. EPA, 2019a, sections 11.2.3 and 11.2.5), across diverse geographic regions and populations, and across a range of temporal periods including periods of declining PM concentrations (U.S. EPA, 2019a, sections 11.2.2.5 and 11.2.5.3). Additional evidence further demonstrates that associations with mortality remain robust in copollutants analyses (U.S. EPA, 2019a, section 11.2.3), and that associations persist in analyses restricted to long-term exposures (annual average $PM_{2.5}$ concentrations) below 12 μg/m^3 (Di et al., 2017b) or 10 μg/m^3 (Shi et al., 2016), indicating that risks are not disproportionately driven by the upper portions of the air quality distribution. Recent studies evaluated in the ISA Supplement further assess potential copollutant confounding and indicate that while there is some evidence of potential confounding of the $PM_{2.5}$-mortality association by copollutants in some of the studies (*i.e.,* those studies of the Mortality Air Pollution Associations in Low Exposure Environments (MAPLE) cohort), this result is inconsistent with other recent studies evaluated in the 2019 ISA that were conducted in the U.S. and Canada that found associations in both single and copollutant models (U.S. EPA, 2019a; U.S. EPA, 2022a, section 3.2.2.4)

Additionally, a few studies use statistical techniques to reduce uncertainties related to potential confounding to further inform conclusions on causality for long-term $PM_{2.5}$ exposure and mortality, as further detailed in section II.B.1.a.i of the proposal (88 FR 5582, January 27, 2023), studies by Greven et al. (2011), Pun et al. (2017), and Eum et al. (2018) completed sensitivity analyses as part of their Medicare cohort study in which they decompose ambient $PM_{2.5}$ into ''spatial'' and ''spatiotemporal'' components in order to evaluate the potential for bias due to unmeasured spatial confounding. Pun et al. (2017) observed positive associations for the ''temporal'' variation model and approximately null associations for the ''spatiotemporal'' variation model for all causes of death except for COPD mortality. The difference in the results of these two models for most causes of death suggests the presence of unmeasured confounding, though the authors do not indicate anything about the direction or magnitude of this bias. It is important to note that the ''temporal'' and ''spatiotemporal'' coefficients are not directly comparable to the results of other epidemiologic studies when examined individually and can only be used in comparison with one another to evaluate the potential for unmeasured confounding bias. Eum et al. (2018) and Wu et al. (2020) also attempted to address long-term trends and meteorological variables as potential confounders and found that not adjusting for temporal trends could overestimate the association, while effect estimates in analyses that excluded meteorological variables remained unchanged compared to the main analyses. While results of these analyses suggest the presence of some unmeasured confounding, they do not indicate the direction or magnitude of the bias.[54]

An additional important consideration in characterizing the public health impacts associated with $PM_{2.5}$ exposure is whether C–R relationships are linear across the range of concentrations or if nonlinear relationships exist along any part of this range. Studies evaluated in the 2019 ISA and the ISA Supplement examine this issue, and continue to provide evidence of linear, no-threshold relationships between long-term $PM_{2.5}$ exposures and all-cause and cause-specific mortality (U.S. EPA, 2019a, section 11.2.4; U.S. EPA, 2022a, section 3.2.2.2.7, Table 3–6). Across the studies evaluated in the 2019 ISA and the ISA Supplement, a variety of statistical methods have been used to assess whether there is evidence of deviations in linearity (U.S. EPA, 2019a, Table 11–7; U.S. EPA, 2022a, section 2.2.3.2). Studies have also conducted cut-point analyses that focus on examining risk at specific ambient $PM_{2.5}$ concentrations. Generally, the evidence remains consistent in supporting a no-threshold relationship, and in supporting a linear relationship for $PM_{2.5}$ concentrations >8 μg/m^3. However, uncertainties remain about the shape of the C–R curve at $PM_{2.5}$ concentrations <8 μg/m^3, with some recent studies providing evidence for either a sublinear, linear, or supralinear relationship at these lower concentrations (U.S. EPA, 2019a, section 11.2.4; U.S. EPA, 2022a, section 2.2.3.2). There was also some limited evidence indicating that the slope of the C–R function may be steeper (supralinear) at lower concentrations for cardiovascular mortality (U.S. EPA, 2022a, section 3.1.1.2.6).

The biological plausibility of $PM_{2.5}$-attributable mortality is supported by the coherence of effects across scientific disciplines (*i.e.,* animal toxicological, controlled human exposure studies, and epidemiologic) when evaluating respiratory and cardiovascular morbidity effects, which are some of the largest contributors to total (nonaccidental) mortality. The 2019 ISA outlines the available evidence for biologically plausible pathways by which inhalation exposure to $PM_{2.5}$ could progress from initial events (*e.g.,* pulmonary inflammation, autonomic nervous system activation) to endpoints relevant to population outcomes, particularly those related to cardiovascular diseases such as ischemic heart disease, stroke and atherosclerosis (U.S. EPA, 2019a, section 6.2.1), and to metabolic effects, including diabetes (U.S. EPA, 2019a, section 7.3.1). The 2019 ISA notes ''more limited evidence from respiratory morbidity'' (U.S. EPA, 2019a, p. 11–101) such as development of chronic obstructive pulmonary disease (COPD) (U.S. EPA, 2019a, section 5.2.1) to support the biological plausibility of mortality due to long-term $PM_{2.5}$ exposures (U.S. EPA, 2019a, section 11.2.1).

Taken together, epidemiologic studies, including those evaluated in the 2019 ISA and more recent studies evaluated in the ISA Supplement, consistently report positive associations between long-term $PM_{2.5}$ exposure and mortality across different geographic locations, populations, and analytic approaches (U.S. EPA, 2019a; U.S. EPA, 2022a, section 3.2.2.4). As such, these studies reduce key uncertainties identified in previous reviews, including those related to potential

[54] In public comments on the 2019 draft PA, the authors of the Pun et al. (2017) study further note that ''the presence of unmeasured confounding. . .was expected given that we did not control for several potential confounders that may impact $PM_{2.5}$-mortality associations, such as smoking, socio-economic status (SES), gaseous pollutants, $PM_{2.5}$ components, and long-term time trends in $PM_{2.5}$'' and that ''spatial confounding may bias mortality risks both towards and away from the null'' (Docket ID EPA–HQ–OAR–2015–0072–0065; accessible in *https://www.regulations.gov/*).

copollutant confounding, and provide additional information on the shape of the C–R curve. As evaluated in the 2019 ISA, experimental and epidemiologic evidence for cardiovascular effects, and respiratory effects to a more limited degree, supports the plausibility of mortality due to long-term $PM_{2.5}$ exposures. Overall, studies evaluated in the 2019 ISA support the conclusion of a causal relationship between long-term $PM_{2.5}$ exposure and mortality, which is supported and extended by evidence from recent epidemiologic studies evaluated in the ISA Supplement (U.S. EPA, 2022a, section 3.2.2.4).

Short-Term $PM_{2.5}$ Exposures

The 2009 ISA concluded that ''a causal relationship exists between short-term exposure to $PM_{2.5}$ and mortality'' (U.S. EPA, 2009a). This conclusion was based on the evaluation of both multi- and single-city epidemiologic studies that consistently reported positive associations between short-term $PM_{2.5}$ exposure and non-accidental mortality. These associations were strongest, in terms of magnitude and precision, primarily at lags of 0 to 1 days. Examination of the potential confounding effects of gaseous copollutants was limited, though evidence from single-city studies indicated that gaseous copollutants have minimal effect on the $PM_{2.5}$-mortality relationship (*i.e.,* associations remain robust to inclusion of other pollutants in copollutant models). The evaluation of cause-specific mortality found that effect estimates were larger in magnitude, but also had larger confidence intervals, for respiratory mortality compared to cardiovascular mortality. Although the largest mortality risk estimates were for respiratory mortality, the interpretation of the results was complicated by the limited coherence from studies of respiratory morbidity. However, the evidence from studies of cardiovascular morbidity provided both coherence and biological plausibility for the relationship between short-term $PM_{2.5}$ exposure and cardiovascular mortality.

Multicity studies evaluated in the 2019 ISA and the ISA Supplement provide evidence of primarily positive associations between daily $PM_{2.5}$ exposures and mortality, with percent increases in total mortality ranging from 0.19% (Lippmann et al., 2013) to 2.80% (Kloog et al., 2013) [55] at lags of 0 to 1 days in single-pollutant models. Whereas many studies assign exposures using data from ambient monitors, other studies employ hybrid modeling approaches, which estimate $PM_{2.5}$ concentrations using data from a variety of sources (*i.e.,* from satellites, land use information, and modeling, in addition to monitors) and enable the inclusion of less urban and more rural locations in analyses (*e.g.,* Kloog et al., 2013, Lee et al., 2015, Shi et al., 2016).

Some studies have expanded the examination of potential confounders including long-term temporal trends, weather, and co-occurring pollutants. Mortality associations were found to remain positive, although in some cases were attenuated, when using different approaches to account for temporal trends or weather covariates (*e.g.,* U.S. EPA, 2019a, section 11.1.5.1). For example, Sacks et al. (2012) examined the influence of model specification using the approaches for confounder adjustment from models employed in several multicity studies within the context of a common data set (U.S. EPA, 2019a, section 11.1.5.1). These models use different approaches to control for long-term temporal trends and the potential confounding effects of weather. The authors report that associations between daily $PM_{2.5}$ and cardiovascular mortality were similar across models, with the percent increase in mortality ranging from 1.5–2.0% (U.S. EPA, 2019a, Figure 11–4). Thus, alternative approaches to controlling for long-term temporal trends and for the potential confounding effects of weather may influence the magnitude of the association between $PM_{2.5}$ exposures and mortality but have not been found to influence the direction of the observed association (U.S. EPA, 2019a, section 11.1.5.1). Taken together, the 2019 ISA and the ISA Supplement conclude that recent multicity studies conducted in the U.S., Canada, Europe, and Asia continue to provide consistent evidence of positive associations between short-term $PM_{2.5}$ exposures and total mortality across studies that use different approaches to control for the potential confounding effects of weather (*e.g.,* temperature) (U.S. EPA, 2019a, section 1.4.1.5.1; U.S. EPA, 2022a, section 3.2.1.2).

With regard to copollutants, studies evaluated in the 2019 ISA provide additional evidence that associations between short-term $PM_{2.5}$ exposures and mortality remain positive and relatively unchanged in copollutant models with both gaseous pollutants and $PM_{10–2.5}$ (U.S. EPA, 2019a, section 11.1.4). Additionally, the low ($r < 0.4$) to moderate correlations ($r = 0.4–0.7$) between $PM_{2.5}$ and gaseous pollutants and $PM_{10–2.5}$ increase the confidence in $PM_{2.5}$ having an independent effect on mortality (U.S. EPA, 2019a, section 11.1.4). Consistent with the studies evaluated in the 2019 ISA, studies evaluated in the ISA Supplement that used data from more recent years also indicate that associations between short-term $PM_{2.5}$ exposure and mortality remain unchanged in copollutant models. However, the evidence indicates that the association could be larger in magnitude in the presence of some copollutants such as oxidant gases (Lavigne et al., 2018; Shin et al., 2021).

The generally positive associations reported with mortality are supported by a small group of studies employing alternative methods for confounder control or quasi-experimental statistical approaches (U.S. EPA, 2019a, section 11.1.2.1). For example, two studies by Schwartz et al. report associations between $PM_{2.5}$ instrumental variables and mortality (U.S. EPA, 2019a, Table 11–2), including in an analysis limited to days with 24-hour average $PM_{2.5}$ concentrations $<30\ \mu g/m^3$ (Schwartz et al., 2015; Schwartz et al., 2017). In addition to the main analyses, these studies conducted Granger-like causality tests as sensitivity analyses to examine whether there was evidence of an association between mortality and $PM_{2.5}$ after the day of death, which would support the possibility that unmeasured confounders were not accounted for in the statistical model. Neither study reports evidence of an association with $PM_{2.5}$ after death (*i.e.,* they do not indicate unmeasured confounding). Yorifuji et al. (2016) conducted a quasi-experimental study to examine whether a specific regulatory action in Tokyo, Japan (*i.e.,* a diesel emission control ordinance) resulted in a subsequent reduction in daily mortality (Yorifuji et al., 2016). The authors reported a reduction in mortality in Tokyo due to the ordinance, compared to Osaka, which did not have a similar diesel emission control ordinance in place. In another study, Schwartz et al. (2018) utilized three statistical methods including instrumental variable analysis, a negative exposure control, and marginal structural models to estimate the association between $PM_{2.5}$ and daily mortality (Schwartz et al., 2018). Results from this study continue to support a relationship between short-term $PM_{2.5}$ exposure and mortality. Additional epidemiologic studies evaluated in the ISA Supplement that employed alternative methods for confounder control to examine the association between short-term $PM_{2.5}$ exposure and

[55] As detailed in the Preface to the ISA, risk estimates are for a $10\ \mu g/m^3$ increase in 24-hour avg $PM_{2.5}$ concentrations, unless otherwise noted (U.S. EPA, 2019a).

mortality also report consistent positive associations in studies that examine effects across multiple cities in the U.S. (U.S. EPA, 2022a).

The positive associations for total mortality reported across the majority of studies evaluated are further supported by cause-specific mortality analyses, which generally report consistent, positive associations with both cardiovascular and respiratory mortality (U.S. EPA, 2019a, section 11.1.3). Recent multicity studies evaluated in the ISA Supplement add to the body of evidence indicating a relationship between short-term $PM_{2.5}$ exposure and cause-specific mortality, with more variability in the magnitude and precision of associations for respiratory mortality (U.S. EPA, 2022a; Figure 3–14). For both cardiovascular and respiratory mortality, there has been a limited assessment of potential copollutant confounding, though initial evidence indicates that associations remain positive and relatively unchanged in models with gaseous pollutants and $PM_{10–2.5}$, which further supports the copollutant analyses conducted for total mortality. The strong evidence for ischemic events and heart failure, as detailed in the assessment of cardiovascular morbidity (U.S. EPA, 2019a, Chapter 6), provides biological plausibility for $PM_{2.5}$-related cardiovascular mortality, which comprises the largest percentage of total mortality (*i.e.,* ~33%) (NHLBI, 2017). Although there is evidence for exacerbations of COPD and asthma, the collective body of respiratory morbidity evidence provides limited biological plausibility for $PM_{2.5}$-related respiratory mortality (U.S. EPA, 2019a, Chapter 5).

In the 2009 ISA, one of the main uncertainties identified was the regional and city-to-city heterogeneity in $PM_{2.5}$-mortality associations. Studies evaluated in the 2019 ISA examine both city-specific as well as regional characteristics to identify the underlying contextual factors that could contribute to this heterogeneity (U.S. EPA, 2019a, section 11.1.6.3). Analyses focusing on effect modification of the $PM_{2.5}$ mortality relationship by $PM_{2.5}$ components, regional patterns in $PM_{2.5}$ components and city specific differences in composition and sources indicate some differences in the $PM_{2.5}$ composition and sources across cities and regions, but these differences do not fully explain the observed heterogeneity. Additional studies find that factors related to potential exposure differences, such as housing stock and commuting, as well as city specific factors (*e.g.,* land use, port volume, and traffic information), may also explain some of the observed heterogeneity (U.S. EPA, 2019a, section 11.1.6.3). Collectively, studies evaluated in the 2019 ISA and the ISA Supplement indicate that the heterogeneity in $PM_{2.5}$ mortality risk estimates cannot be attributed to one factor, but instead a combination of factors including, but not limited to, PM composition and sources as well as community characteristics that could influence exposures (U.S. EPA, 2019a, section 11.1.12; U.S. EPA, 2022a, section 3.2.1.2.1).

A number of studies evaluated in the 2019 ISA and ISA Supplement conducted systematic evaluations of the lag structure of associations for the $PM_{2.5}$-mortality relationship by examining either a series of single day or multiday lags and these studies continue to support an immediate effect (*i.e.,* lag 0 to 1 days) of short-term $PM_{2.5}$ exposures on mortality (U.S. EPA, 2019a, section 11.1.8.1; U.S. EPA, 2022a, section 3.2.1.1). Recent studies also conducted analyses comparing the traditional 24-hour average exposure metric with a subdaily metric (*i.e.,* 1-hour max) and provide evidence of a similar pattern of associations for both the 24-hour average and 1-hour max metric, with the association larger in magnitude for the 24-hour average metric.

Multicity studies indicate that positive and statistically significant associations with mortality persist in analyses restricted to short-term (24-hour average $PM_{2.5}$ concentrations) $PM_{2.5}$ exposures below 35 μg/m³ (Lee et al., 2015),[56] below 30 μg/m³ (Shi et al., 2016), and below 25 μg/m³ (Di et al., 2017a), indicating that risks associated with short-term $PM_{2.5}$ exposures are not disproportionately driven by the peaks of the air quality distribution. Additional studies examined the shape of the C–R relationship for short-term $PM_{2.5}$ exposure and mortality and whether a threshold exists below which mortality effects do not occur (U.S. EPA, 2019a, section 11.1.10). These studies used various statistical approaches and consistently demonstrate linear C–R relationships with no evidence of a threshold.

Moreover, recent studies evaluated in the ISA Supplement provide additional support for a linear, no-threshold C–R relationship between short-term $PM_{2.5}$ exposure and mortality, with confidence in the shape decreasing at concentrations below 5 μg/m³ (Shi et al., 2016; Lavigne et al., 2018). Recent analyses provide initial evidence indicating that $PM_{2.5}$-mortality associations persist and may be stronger (*i.e.,* a steeper slope) at lower concentrations (*e.g.,* Di et al., 2017a; Figure 11–12 in U.S. EPA, 2019). However, given the limited data available at the lower end of the distribution of ambient $PM_{2.5}$ concentrations, the shape of the C–R curve remains uncertain at these low concentrations. Although difficulties remain in assessing the shape of the short-term $PM_{2.5}$-mortality C–R relationship, to date, studies have not conducted systematic evaluations of alternatives to linearity and recent studies evaluated in the ISA Supplement continue to provide evidence of a no-threshold linear relationship, with less confidence at concentrations lower than 5 μg/m³.

Overall, epidemiologic studies evaluated in the 2019 ISA and the ISA Supplement build upon and extend the conclusions of the 2009 ISA for the relationship between short-term $PM_{2.5}$ exposures and total mortality. Supporting evidence for $PM_{2.5}$-related cardiovascular morbidity, and more limited evidence from respiratory morbidity, provide biological plausibility for mortality due to short-term $PM_{2.5}$ exposures. The primarily positive associations observed across studies conducted in diverse geographic locations is further supported by the results from copollutant analyses indicating robust associations, along with evidence from analyses examining the C–R relationship. Overall, studies evaluated in the 2019 ISA support the conclusion of a causal relationship between short-term $PM_{2.5}$ exposure and mortality, which is further supported by evidence from recent epidemiologic studies evaluated in the ISA Supplement (U.S. EPA, 2022a, section 3.2.1.4, p. 3–69).

ii. Cardiovascular Effects

Long-Term $PM_{2.5}$ Exposures

The scientific evidence reviewed in the 2009 ISA was ''sufficient to infer a causal relationship between long-term $PM_{2.5}$ exposure and cardiovascular effects'' (U.S. EPA, 2009a). The strongest line of evidence comprised findings from several large epidemiologic studies of U.S. and Canadian cohorts that reported consistent positive associations between long-term $PM_{2.5}$ exposure and cardiovascular mortality (Pope et al., 2004; Krewski et al., 2009; Miller et al.,

[56] Lee et al. (2015) restrict exposures below 35 μg/m³ only in areas with annual average concentrations <12 μg/m³. Additionally, Lee et al. (2015) also report that positive and statistically significant associations between short-term $PM_{2.5}$ exposures and mortality persist in analyses restricted to areas with long-term concentrations below 12 μg/m³.

2007; Laden et al., 2006). Studies of long-term $PM_{2.5}$ exposure and cardiovascular morbidity were limited in number. Biological plausibility and coherence with the epidemiologic findings were provided by studies using genetic mouse models of atherosclerosis demonstrating enhanced atherosclerotic plaque development and inflammation, as well as changes in measures of impaired heart function, following 4- to 6-month exposures to $PM_{2.5}$ concentrated ambient particles (CAPs), and by a limited number of studies reporting CAPs-induced effects on coagulation factors, vascular reactivity, and worsening of experimentally induced hypertension in mice (U.S. EPA, 2009a).

Consistent with the evidence assessed in the 2009 ISA, the 2019 ISA concludes that recent studies, together with the evidence available in previous reviews, support a causal relationship between long-term exposure to $PM_{2.5}$ and cardiovascular effects. Additionally, recent epidemiologic studies published since the completion of the 2019 ISA and evaluated in the ISA Supplement expands the body of evidence and further supports such a conclusion (U.S. EPA, 2022a). As discussed above (section II.A.2.a.i), results from U.S. and Canadian cohort studies evaluated in the 2019 ISA conducted at varying spatial and temporal scales and employing a variety of exposure assessment and statistical methods consistently report positive associations between long-term $PM_{2.5}$ exposure and cardiovascular mortality (U.S. EPA, 2019, Figure 6–19, section 6.2.10). Positive associations between long-term $PM_{2.5}$ exposures and cardiovascular mortality are generally robust in copollutant models adjusted for ozone, NO_2, $PM_{10–2.5}$, or SO_2. In addition, most of the results from analyses examining the shape of the C–R relationship between long-term $PM_{2.5}$ exposures and cardiovascular mortality support a linear relationship and do not identify a threshold below which mortality effects do not occur (U.S. EPA, 2019a, section 6.2.16, Table 6–52).

The body of literature examining the relationship between long-term $PM_{2.5}$ exposure and cardiovascular morbidity has greatly expanded since the 2009 ISA, with positive associations reported in several cohorts evaluated in the 2019 ISA (U.S. EPA, 2019a, section 6.2). Though results for cardiovascular morbidity are less consistent than those for cardiovascular mortality (U.S. EPA, 2019a, section 6.2), studies in the 2019 ISA and the ISA Supplement provide some evidence for associations between long-term $PM_{2.5}$ exposures and the progression of cardiovascular disease. Positive associations with cardiovascular morbidity (*e.g.,* coronary heart disease, stroke, arrhythmias, myocardial infarction (MI), atherosclerosis progression) are observed in several epidemiologic studies (U.S. EPA, 2019a, sections 6.2.2 to 6.2.9; U.S. EPA, 2022a, section 3.1.2.2). Additionally, studies evaluated in the ISA Supplement report positive associations among those with pre-existing conditions, among patients followed after a cardiac event procedure, and among those with a first hospital admission for heart attacks among older adults enrolled in Medicare (U.S. EPA, 2022a, sections 3.1.1 and 3.1.2).

Recent studies published since the literature cutoff date of the 2019 ISA and evaluated in the ISA Supplement further assessed the relationship between long-term $PM_{2.5}$ exposure and cardiovascular effects by conducting accountability analyses or by using alternative methods for confounder control in evaluating the association between long-term $PM_{2.5}$ exposure and cardiovascular hospital admissions (U.S. EPA, 2022a, section 3.1.2.3). Studies that apply alternative methods for confounder control increase confidence in the relationship between long-term $PM_{2.5}$ exposure and cardiovascular effects by using methods that reduce uncertainties related to potential confounding through statistical and/or study design approaches. For example, to control for potential confounding Wei et al. (2021) used a doubly robust additive model (DRAM) and found an association between long-term exposure to $PM_{2.5}$ and cardiovascular effects, including MI, stoke, and atrial fibrillation, among the Medicare population. For example, an accountability study by Henneman et al. (2019) utilized a difference-in-difference (DID) approach to determine the relationship between coal-fueled power plant emissions and cardiovascular effects and found that reductions in $PM_{2.5}$ concentrations resulted in reductions of cardiovascular-related hospital admissions. Furthermore, several recent epidemiologic studies evaluated in the ISA Supplement reported that the association between long-term $PM_{2.5}$ exposure with stroke persisted after adjustment for NO_2 but was attenuated in the model with O_3 and oxidant gases represented by the redox weighted average of NO_2 and O_3 (U.S. EPA, 2022a, section 3.1.2.2.8). Overall, these studies report consistent findings that long-term $PM_{2.5}$ exposure is related to increased hospital admissions for a variety of cardiovascular disease outcomes among large nationally representative cohorts and provide additional support for a relationship between long-term $PM_{2.5}$ exposure and cardiovascular effects.

Positive associations reported in epidemiologic studies are supported by toxicological evidence evaluated in the 2019 ISA. The positive associations reported in epidemiologic studies are supported by toxicological evidence for increased plaque progression in mice following long-term exposure to $PM_{2.5}$ collected from multiple locations across the U.S. (U.S. EPA, 2019a, section 6.2.4.2). A small number of epidemiologic studies also report positive associations between long-term $PM_{2.5}$ exposure and heart failure, changes in blood pressure, and hypertension (U.S. EPA, 2019a, sections 6.2.5 and 6.2.7). Associations with heart failure are supported by animal toxicological studies demonstrating decreased cardiac contractility and function, and increased coronary artery wall thickness following long-term $PM_{2.5}$ exposure (U.S. EPA, 2019a, section 6.2.5.2). Similarly, a limited number of animal toxicological studies demonstrating a relationship between long-term $PM_{2.5}$ exposure and consistent increases in blood pressure in rats and mice are coherent with epidemiologic studies reporting positive associations between long-term exposure to $PM_{2.5}$ and hypertension.

Additionally, a number of studies evaluated in the ISA Supplement focusing on morbidity outcomes, including those that focused on incidence of MI, atrial fibrillation (AF), stroke, and congestive heart failure (CHF), expand the evidence pertaining to the shape of the C–R relationship between long-term $PM_{2.5}$ exposure and cardiovascular effects. These studies use statistical techniques that allow for departures from linearity (U.S. EPA, 2022a, Table 3–3), and generally support the evidence characterized in the 2019 ISA showing linear, no-threshold C–R relationship for most cardiovascular disease (CVD) outcomes. However, there is evidence for a sublinear or supralinear C–R relationship for some outcomes (U.S. EPA, 2022a, section 3.1.2.2.9).[57]

Longitudinal epidemiologic analyses also report positive associations with markers of systemic inflammation (U.S. EPA, 2019a, section 6.2.11), coagulation (U.S. EPA, 2019a, section 6.2.12), and

[57] As noted above for mortality, uncertainty in the shape of the C–R relationship increases near the upper and lower ends of the distribution due to limited data.

endothelial dysfunction (U.S. EPA, 2019a, section 6.2.13). These results are coherent with animal toxicological studies generally reporting increased markers of systemic inflammation, oxidative stress, and endothelial dysfunction (U.S. EPA, 2019a, section 6.2.12.2 and 6.2.14).

In summary, the 2019 ISA concludes that there is consistent evidence from multiple epidemiologic studies illustrating that long-term exposure to $PM_{2.5}$ is associated with mortality from cardiovascular causes. Epidemiologic studies evaluated in the ISA Supplement provide additional evidence of positive associations between long-term $PM_{2.5}$ exposure and cardiovascular morbidity (U.S. EPA, 2022a, section 3.1.2.2). Associations with coronary heart disease (CHD), stroke and atherosclerosis progression were observed in several additional epidemiologic studies, providing coherence with the mortality findings. Results from copollutant models generally support an independent effect of $PM_{2.5}$ exposure on mortality. Additional evidence of the independent effect of $PM_{2.5}$ on the cardiovascular system is provided by experimental studies in animals, which support the biological plausibility of pathways by which long-term exposure to $PM_{2.5}$ could potentially result in outcomes such as CHD, stroke, CHF, and cardiovascular mortality. Overall, studies evaluated in the 2019 ISA support the conclusion of a causal relationship between long-term $PM_{2.5}$ exposure and cardiovascular effects, which is supported and extended by evidence from recent epidemiologic studies evaluated in the ISA Supplement (U.S. EPA, 2022a, section 3.1.2.2).

Short-Term $PM_{2.5}$ Exposures

The 2009 ISA concluded that ''a causal relationship exists between short-term exposure to $PM_{2.5}$ and cardiovascular effects'' (U.S. EPA, 2009a). The strongest evidence in the 2009 ISA was from epidemiologic studies of emergency department (ED) visits and hospital admissions for IHD and heart failure (HF), with supporting evidence from epidemiologic studies of cardiovascular mortality (U.S. EPA, 2009a). Animal toxicological studies provided coherence and biological plausibility for the positive associations reported with MI, ED visits, and hospital admissions. These included studies reporting reduced myocardial blood flow during ischemia and studies indicating altered vascular reactivity. In addition, effects of $PM_{2.5}$ exposure on a potential indicator of ischemia (*i.e.,* ST segment depression on an electrocardiogram) were reported in both animal toxicological and epidemiologic panel studies.[58] Key uncertainties from the last review resulted from inconsistent results across disciplines with respect to the relationship between short-term exposure to $PM_{2.5}$ and changes in blood pressure, blood coagulation markers, and markers of systemic inflammation. In addition, while the 2009 ISA identified a growing body of evidence from controlled human exposure and animal toxicological studies, uncertainties remained with respect to biological plausibility.

Studies evaluated in the 2019 ISA provide additional support for a causal relationship between short-term $PM_{2.5}$ exposure and cardiovascular effects. This includes generally positive associations observed in multicity epidemiologic studies of emergency department visits and hospital admissions for IHD, heart failure (HF), and combined cardiovascular-related endpoints. In particular, nationwide studies of older adults (65 years and older) using Medicare records report positive associations between $PM_{2.5}$ exposures and hospital admissions for HF (U.S. EPA, 2019a, section 6.1.3.1). Moreover, recent multicity studies, published after the literature cutoff date of the 2019 ISA and evaluated in the ISA Supplement, are consistent with studies evaluated in the 2019 ISA that report positive association between short-term $PM_{2.5}$ exposure and ED visits and hospital admission for IHD, heart attacks, and HF (U.S. EPA, 2022a, section 3.1). Epidemiologic studies conducted in single cities contribute some support to the causality determination, though associations reported in single-city studies are less consistently positive than in multicity studies, and include a number of studies reporting null associations (U.S. EPA, 2019a, sections 6.1.2 and 6.1.3). As a whole, though, the recent body of IHD and HF epidemiologic evidence supports the evidence from previous ISAs reporting mainly positive associations between short-term $PM_{2.5}$ concentrations and emergency department visits and hospital admissions.

Consistent with the evidence assessed in the 2019 ISA, some studies evaluated in the ISA Supplement report no evidence of an association with stroke, regardless of stroke subtype. Additionally, as in the 2019 ISA, evidence evaluated in the ISA Supplement continues to indicate an immediate effect of $PM_{2.5}$ on cardiovascular-related outcomes primarily within the first few days after exposure, and that associations generally persisted in models adjusted for copollutants (U.S. EPA, 2022a, section 3.1.1.2).

The ISA Supplement includes additional epidemiologic studies, published since the literature cutoff date for the 2019 ISA, including accountability analyses and epidemiologic studies that employ alternative methods for confounder control to evaluate the association between short-term $PM_{2.5}$ exposure and cardiovascular-related effects (U.S. EPA, 2022a, section 3.1.1.3). These studies employ a number of statistical approaches and report positive associations, providing additional support for a relationship between short-term $PM_{2.5}$ exposure and cardiovascular effects, while also reducing uncertainties related to potential confounder bias.

A number of controlled human exposure, animal toxicological, and epidemiologic panel studies provide evidence that $PM_{2.5}$ exposure could plausibly result in IHD or HF through pathways that include endothelial dysfunction, arterial thrombosis, and arrhythmia (U.S. EPA, 2019a, section 6.1.1). The most consistent evidence from recent controlled human exposure studies is for endothelial dysfunction, as measured by changes in brachial artery diameter or flow mediated dilation. Multiple controlled human exposure studies that examined the potential for endothelial dysfunction report an effect of $PM_{2.5}$ exposure on measures of blood flow (U.S. EPA, 2019a, section 6.1.13.2). However, these studies report variable results regarding the timing of the effect and the mechanism by which reduced blood flow occurs (*i.e.,* availability vs sensitivity to nitric oxide). In addition, some controlled human exposure studies using CAPs report evidence for small increases in blood pressure (U.S. EPA, 2019a, section 6.1.6.3). Although not entirely consistent, there is also some evidence across controlled human exposure studies for conduction abnormalities/arrhythmia (U.S. EPA, 2019a, section 6.1.4.3), changes in heart rate variability (HRV) (U.S. EPA, 2019a, section 6.1.10.2), changes in hemostasis that could promote clot formation (U.S. EPA, 2019a, section 6.1.12.2), and increases in inflammatory cells and markers (U.S. EPA, 2019a, section 6.1.11.2). A recent study by Wyatt et al.

[58] Some animal studies included in the 2009 ISA examined exposures to mixtures, such as motor vehicle exhaust or woodsmoke. In these studies, it was unclear if the resulting cardiovascular effects could be attributed specifically to the fine particle component of the mixture.

(2020), evaluated in the ISA Supplement, adds to the limited evidence base of controlled human exposure studies conducted at near ambient $PM_{2.5}$ concentrations. The study, completed in healthy young adults subject to intermittent exercise, found some significant cardiovascular effects (*e.g.,* systematic inflammation markers, including C-reactive protein (CRP), and cardiac repolarization). Thus, when taken as a whole, controlled human exposure studies are coherent with epidemiologic studies in that they demonstrate that short-term exposures to $PM_{2.5}$ may result in the types of cardiovascular endpoints that could lead to emergency department visits and hospital admissions for IHD or HF, as well as mortality in some people.

Animal toxicological studies published since the 2009 ISA and evaluated in the 2019 ISA also support a relationship between short-term $PM_{2.5}$ exposure and cardiovascular effects. A study demonstrating decreased cardiac contractility and left ventricular pressure in mice is coherent with the results of epidemiologic studies that report associations between short-term $PM_{2.5}$ exposure and heart failure (U.S. EPA, 2019a, section 6.1.3.3). In addition, and as with controlled human exposure studies, there is generally consistent evidence in animal toxicological studies for indicators of endothelial dysfunction (U.S. EPA, 2019a, section 6.1.13.3). Some studies in animals also provide evidence for changes in a number of other cardiovascular endpoints following short-term $PM_{2.5}$ exposure including conduction abnormalities and arrhythmia (U.S. EPA, 2019a, section 6.1.4.4), changes in HRV (U.S. EPA, 2019a, section 6.1.10.3), changes in blood pressure (U.S. EPA, 2019a, section 6.1.6.4), and evidence for systemic inflammation and oxidative stress (U.S. EPA, 2019a, section 6.1.11.3).

In summary, evidence evaluated in the 2019 ISA extends the consistency and coherence of the evidence base evaluated in the 2009 ISA and prior assessments. Epidemiologic studies reporting robust associations in copollutant models are supported by direct evidence from controlled human exposure and animal toxicologic studies reporting independent effects of $PM_{2.5}$ exposures on endothelial dysfunction as well as endpoints indicating impaired cardiac function, increased risk of arrhythmia, changes in HRV, increases in BP, and increases in indicators of systemic inflammation, oxidative stress, and coagulation (U.S. EPA, 2019, section 6.1.16). For some cardiovascular effects, there are inconsistencies in results across some animal toxicological, controlled human exposure, and epidemiologic panel studies, though this may be due to substantial differences in study design and/or study populations. Overall, the results from epidemiologic panel, controlled human exposure, and animal toxicological studies, in particular those related to endothelial dysfunction, impaired cardiac function, ST segment depression, thrombosis, conduction abnormalities, and changes in blood pressure provide coherence and biological plausibility for the consistent results from epidemiologic studies observing positive associations between short-term $PM_{2.5}$ exposures and IHD and HF, and ultimately cardiovascular mortality. Overall, studies evaluated in the 2019 ISA support the conclusion of a causal relationship between short-term $PM_{2.5}$ exposure and cardiovascular effects, which is supported and extended by evidence from recent epidemiologic studies evaluated in the ISA Supplement (U.S. EPA, 2022a, section 3.1.1.4).

iii. Respiratory Effects

Long-Term $PM_{2.5}$ Exposures

The 2009 ISA concluded that ''a causal relationship is likely to exist between long-term $PM_{2.5}$ exposure and respiratory effects'' (U.S. EPA, 2009a). This conclusion was based mainly on epidemiologic evidence demonstrating associations between long-term $PM_{2.5}$ exposure and changes in lung function or lung function growth in children. Biological plausibility was provided by a single animal toxicological study examining pre- and post-natal exposure to $PM_{2.5}$ CAPs, which found impaired lung development. Epidemiologic evidence for associations between long-term $PM_{2.5}$ exposure and other respiratory outcomes, such as the development of asthma, allergic disease, and COPD; respiratory infection; and the severity of disease was limited, both in the number of studies available and the consistency of the results. Experimental evidence for other outcomes was also limited, with one animal toxicological study reporting that long-term exposure to $PM_{2.5}$ CAPs results in morphological changes in nasal airways of healthy animals. Other animal studies examined exposure to mixtures, such as motor vehicle exhaust and woodsmoke, and effects were not attributed specifically to the particulate components of the mixture.

Cohort studies evaluated in the 2019 ISA provided additional support for the relationship between long-term $PM_{2.5}$ exposure and decrements in lung function growth (as a measure of lung development), indicating a robust and consistent association across study locations, exposure assessment methods, and time periods (U.S. EPA, 2019a, section 5.2.13). This relationship was further supported by a retrospective study that reports an association between declining $PM_{2.5}$ concentrations and improvements in lung function growth in children (U.S. EPA, 2019a, section 5.2.11). Epidemiologic studies also examine asthma development in children (U.S. EPA, 2019a, section 5.2.3), with prospective cohort studies reporting generally positive associations, though several are imprecise (*i.e.,* they report wide confidence intervals). Supporting evidence is provided by studies reporting associations with asthma prevalence in children, with childhood wheeze, and with exhaled nitric oxide, a marker of pulmonary inflammation (U.S. EPA, 2019a, section 5.2.13). Additionally, the 2019 ISA includes an animal toxicological study showing the development of an allergic phenotype and an increase in a marker of airway responsiveness supports the biological plausibility of the development of allergic asthma (U.S. EPA, 2019a, section 5.2.13). Other epidemiologic studies report a $PM_{2.5}$-related acceleration of lung function decline in adults, while improvement in lung function was observed with declining $PM_{2.5}$ concentrations (U.S. EPA, 2019a, section 5.2.11). A longitudinal study found declining $PM_{2.5}$ concentrations are also associated with an improvement in chronic bronchitis symptoms in children, strengthening evidence reported in the 2009 ISA for a relationship between increased chronic bronchitis symptoms and long-term $PM_{2.5}$ exposure (U.S. EPA, 2019a, section 5.2.11). A common uncertainty across the epidemiologic evidence is the lack of examination of copollutants to assess the potential for confounding. While there is some evidence that associations remain robust in models with gaseous pollutants, a number of these studies examining copollutant confounding were conducted in Asia, and thus have limited generalizability due to high annual pollutant concentrations.

When taken together, the 2019 ISA concludes that the epidemiologic evidence strongly supports a relationship with decrements in lung function growth asthma development in children, as well as increased bronchitis symptoms in children with asthma. Additionally, the epidemiologic

evidence strongly supports a relationship with an acceleration of lung function decline in adults, and with respiratory mortality and cause-specific respiratory mortality for COPD and respiratory infection (U.S. EPA, 2019a, p. 1–34). In support of the biological plausibility of associations reported in epidemiologic studies associated with respiratory health effects, animal toxicological studies evaluated in the 2019 ISA continue to provide direct evidence that long-term exposure to $PM_{2.5}$ results in a variety of respiratory effects, including pulmonary oxidative stress, inflammation, and morphologic changes in the upper (nasal) and lower airways. Other results show that changes are consistent with the development of allergy and asthma, and with impaired lung development. Overall, the 2019 ISA concludes that ''the collective evidence is sufficient to conclude that a causal relationship is likely to exist between long-term $PM_{2.5}$ exposure and respiratory effects'' (U.S. EPA, 2019a, section 5.2.13).

Short-Term $PM_{2.5}$ Exposures

The 2009 ISA (U.S. EPA, 2009a) concluded that a ''causal relationship is likely to exist'' between short-term $PM_{2.5}$ exposure and respiratory effects. This conclusion was based mainly on the epidemiologic evidence demonstrating positive associations with various respiratory effects. Specifically, the 2009 ISA described epidemiologic evidence as consistently showing $PM_{2.5}$-associated increases in hospital admissions and ED visits for COPD and respiratory infection among adults or people of all ages, as well as increases in respiratory mortality. These results were supported by studies reporting associations with increased respiratory symptoms and decreases in lung function in children with asthma, though the epidemiologic evidence was inconsistent for hospital admissions or emergency department visits for asthma. Studies examining copollutant models showed that $PM_{2.5}$ associations with respiratory effects were robust to inclusion of CO or SO_2 in the model, but often were attenuated (though still positive) with inclusion of O_3 or NO_2. In addition to the copollutant models, evidence supporting an independent effect of $PM_{2.5}$ exposure on the respiratory system was provided by animal toxicological studies of $PM_{2.5}$ CAPs demonstrating changes in some pulmonary function parameters, as well as inflammation, oxidative stress, injury, enhanced allergic responses, and reduced host defenses. Many of these effects have been implicated in the pathophysiology for asthma exacerbation, COPD exacerbation, or respiratory infection. In the few controlled human exposure studies conducted in individuals with asthma or COPD, $PM_{2.5}$ exposure mostly had no effect on respiratory symptoms, lung function, or pulmonary inflammation. Available studies in healthy people also did not clearly demonstrate respiratory effects following short-term $PM_{2.5}$ exposures.

Epidemiologic studies evaluated in the 2019 ISA continue to provide strong evidence for a relationship between short-term $PM_{2.5}$ exposure and several respiratory-related endpoints, including asthma exacerbation (U.S. EPA, 2019a, section 5.1.2.1), COPD exacerbation (U.S. EPA, 2019a, section 5.1.4.1), and combined respiratory-related diseases (U.S. EPA, 2019a, section 5.1.6), particularly from studies examining ED visits and hospital admissions. The generally positive associations between short-term $PM_{2.5}$ exposure and asthma and COPD as well as ED visits and hospital admissions are supported by epidemiologic studies demonstrating associations with other respiratory-related effects such as symptoms and medication use that are indicative of asthma and COPD exacerbations (U.S. EPA, 2019a, sections 5.1.2.2 and 5.4.1.2). The collective body of epidemiologic evidence for asthma exacerbation is more consistent in children than in adults. Additionally, epidemiologic studies examining the relationship between short-term $PM_{2.5}$ exposure and respiratory mortality provide evidence of consistent positive associations, demonstrating a continuum of effects (U.S. EPA, 2019a, section 5.1.9).

Epidemiologic studies evaluated in the 2019 ISA expand the assessment of potential copollutant confounding evaluated in the 2009 ISA. There is some evidence that $PM_{2.5}$ associations with asthma exacerbation, combined respiratory-related diseases, and respiratory mortality remain relatively unchanged in copollutant models with gaseous pollutants including O_3, NO_2, SO_2, and with more limited evidence for CO, as well as other particle sizes (*i.e.,* $PM_{10-2.5}$) (U.S. EPA, 2019a, section 5.1.10.1).

Insight into whether there is an independent effect of $PM_{2.5}$ on respiratory health is also partially addressed by findings from animal toxicological studies evaluated in the 2019 ISA. Specifically, short-term exposure to $PM_{2.5}$ enhanced asthma-related responses in an animal model of allergic airways disease and enhanced lung injury and inflammation in an animal model of COPD (U.S. EPA, 2019a, sections 5.1.2.4.4 and 5.1.4.4.3). The experimental evidence provides biological plausibility for some respiratory-related endpoints, including limited evidence of altered host defense and greater susceptibility to bacterial infection as well as consistent evidence of respiratory irritant effects. However, animal toxicological evidence for other respiratory effects is inconsistent. A recent study evaluated in the ISA supplement by Wyatt et al. (2020) and conducted at near ambient $PM_{2.5}$ concentrations, adds to the limited evidence base of controlled human exposure studies. The study, completed in healthy young adults subject to intermittent exercise, found some significant respiratory effects (including decrease in lung function), however these findings were inconsistent with the controlled human exposure studies evaluated in the 2019 ISA (U.S. EPA, 2019a, section 5.1.7.2, 5.1.2.3, and 6.1.11.2.1).

The 2019 ISA concludes that ''[t]he strongest evidence of an effect of short-term $PM_{2.5}$ exposure on respiratory effects is provided by epidemiologic studies of asthma and COPD exacerbation. While animal toxicological studies provide biological plausibility for these findings, some uncertainty remains with respect to the independence of $PM_{2.5}$ effects'' (U.S. EPA, 2019a, p. 5–155). When taken together, the 2019 ISA concludes that this evidence ''is sufficient to conclude that a causal relationship is likely to exist between short-term $PM_{2.5}$ exposure and respiratory effects'' (U.S. EPA, 2019a, p. 5–155).

iv. Cancer

The 2009 ISA concluded that the overall body of evidence was ''suggestive of a causal relationship between relevant $PM_{2.5}$ exposures and cancer'' (U.S. EPA, 2009a). This conclusion was based primarily on positive associations observed in a limited number of epidemiologic studies of lung cancer mortality. The few epidemiologic studies that had evaluated $PM_{2.5}$ exposure and lung cancer incidence or cancers of other organs and systems generally did not show evidence of an association. Toxicological studies did not focus on exposures to specific PM size fractions, but rather investigated the effects of exposures to total ambient PM, or other source-based PM such as wood smoke. Collectively, results of in vitro studies were consistent with the larger body of evidence demonstrating that ambient PM and PM from specific combustion sources are mutagenic and genotoxic. However, animal inhalation studies

found little evidence of tumor formation in response to chronic exposures. A small number of studies provided preliminary evidence that PM exposure can lead to changes in methylation of DNA, which may contribute to biological events related to cancer.

Since the completion of the 2009 ISA, additional cohort studies provide evidence that long-term $PM_{2.5}$ exposure is positively associated with lung cancer mortality and with lung cancer incidence, and provide initial evidence for an association with reduced cancer survival (U.S. EPA, 2019a, section 10.2.5). Re-analyses of the ACS cohort using different years of $PM_{2.5}$ data and follow up, along with various exposure assignment approaches, provide consistent evidence of positive associations between long-term $PM_{2.5}$ exposure and lung cancer mortality (U.S. EPA, 2019a, Figure 10–3). Additional support for positive associations with lung cancer mortality is provided by recent epidemiologic studies using individual level data to control for smoking status, as well as by studies of people who have never smoked (though such studies generally report wide confidence intervals due to the small number of lung cancer mortality cases within this population), and in additional analyses of cohorts that relied upon proxy measures to account for smoking status (U.S. EPA, 2019a, section 10.2.5.1.1). Although studies that evaluate lung cancer incidence, including studies of people who have never smoked, are limited in number, studies in the 2019 ISA generally report positive associations with long-term $PM_{2.5}$ exposures (U.S. EPA, 2019a, section 10.2.5.1.2). A subset of the studies focusing on lung cancer incidence also examined histological subtype, providing some evidence of positive associations for adenocarcinomas, the predominate subtype of lung cancer observed in people who have never smoked (U.S. EPA, 2019a, section 10.2.5.1.2). Associations between long-term $PM_{2.5}$ exposure and lung cancer incidence were found to remain relatively unchanged, though in some cases confidence intervals widened, in analyses that attempted to reduce exposure measurement error by accounting for length of time at residential address or by examining different exposure assignment approaches (U.S. EPA, 2019a, section 10.2.5.1.2).

To date, relatively few studies have evaluated the potential for copollutant confounding of the relationship between long-term $PM_{2.5}$ exposure and lung cancer mortality or incidence. A small number of such studies have generally focused on O_3 and report that $PM_{2.5}$ associations remain relatively unchanged in copollutant models (U.S. EPA, 2019a, section 10.2.5.1.3). However, available studies have not systematically evaluated the potential for copollutant confounding by other gaseous pollutants or by other particle size fractions (U.S. EPA, 2019a, section 10.2.5.1.3).

Compared to total (non-accidental) mortality (U.S. EPA, 2019a, section 10.2.4.1.4), fewer studies have examined the shape of the C–R curve for cause-specific mortality outcomes, including lung cancer. Several studies of lung cancer mortality and incidence have reported no evidence of deviations from linearity in the shape of the C–R relationship (Lepeule et al., 2012; Raaschou-Nielsen et al., 2013; Puett et al., 2014), though authors provided only limited discussions of results (U.S. EPA, 2019a, section 10.2.5.1.4).

In support of the biological plausibility of an independent effect of $PM_{2.5}$ on lung cancer, the 2019 ISA notes evidence from experimental and epidemiologic studies demonstrating that $PM_{2.5}$ exposure can lead to a range of effects indicative of mutagenicity, genotoxicity, and carcinogenicity, as well as epigenetic effects (U.S. EPA, 2019a, section 10.2.7). For example, both in vitro and in vivo toxicological studies have shown that $PM_{2.5}$ exposure can result in DNA damage (U.S. EPA, 2019a, section 10.2.2). Although such effects do not necessarily equate to carcinogenicity, the evidence that PM exposure can damage DNA, and elicit mutations, provides support for the plausibility of epidemiologic associations exhibited with lung cancer mortality and incidence. Additional supporting studies indicate the occurrence of micronuclei formation and chromosomal abnormalities (U.S. EPA, 2019a, section 10.2.2.3), and differential expression of genes that may be relevant to cancer pathogenesis, following $PM_{2.5}$ exposures. Experimental and epidemiologic studies that examine epigenetic effects indicate changes in DNA methylation, providing some support that $PM_{2.5}$ exposure contributes to genomic instability (U.S. EPA, 2019a, section 10.2.3). Overall, there is limited evidence that long-term $PM_{2.5}$ exposure is associated with cancers in other organ systems, though there is some evidence that $PM_{2.5}$ exposure may reduce survival in individuals with cancer (U.S. EPA, 2019a, section 10.2.7; U.S. EPA, 2022a, section 2.1.1.4.1).

Epidemiologic evidence for associations between $PM_{2.5}$ and lung cancer mortality and incidence, together with evidence supporting the biological plausibility of such associations, contributes to the 2019 ISA's conclusion that the evidence ''is sufficient to conclude that a causal relationship is likely to exist between long-term $PM_{2.5}$ exposure and cancer'' (U.S. EPA, 2019, section 10.2.7).

v. Nervous System Effects

Reflecting the very limited evidence available in the 2012 review, the 2009 ISA did not make a causality determination for long-term $PM_{2.5}$ exposures and nervous system effects (U.S. EPA, 2009c). Since the 2012 review, this body of evidence has grown substantially (U.S. EPA, 2019, section 8.2). Animal toxicological studies assessed in in the 2019 ISA report that long-term $PM_{2.5}$ exposures can lead to morphologic changes in the hippocampus and to impaired learning and memory. This evidence is consistent with epidemiologic studies reporting that long-term $PM_{2.5}$ exposure is associated with reduced cognitive function (U.S. EPA, 2019a, section 8.2.5). Further, while the evidence is limited, the presence of early markers of Alzheimer's disease pathology has been demonstrated in rodents following long-term exposure to $PM_{2.5}$ CAPs. These findings support reported associations with neurodegenerative changes in the brain (*i.e.,* decreased brain volume), all-cause dementia, or hospitalization for Alzheimer's disease in a small number of epidemiologic studies (U.S. EPA, 2019a, section 8.2.6). Additionally, loss of dopaminergic neurons in the substantia nigra, a hallmark of Parkinson disease, has been reported in mice (U.S. EPA, 2019a, section 8.2.4), though epidemiologic studies provide only limited support for associations with Parkinson's disease (U.S. EPA, 2019a, section 8.2.6). Overall, the lack of consideration of copollutant confounding introduces some uncertainty in the interpretation of epidemiologic studies of nervous system effects, but this uncertainty is partly addressed by the evidence for an independent effect of $PM_{2.5}$ exposures provided by experimental animal studies.

While the findings described above are most relevant to older adults, several studies of neurodevelopmental effects in children have also been conducted. Epidemiologic studies provided limited evidence of an association between $PM_{2.5}$ exposure during pregnancy and childhood on cognitive and motor development (U.S. EPA, 2019, section 8.2.5.2). While some studies report positive associations between long-term

exposure to $PM_{2.5}$ during the prenatal period and autism spectrum disorder (ASD) (U.S. EPA, 2019, section 8.2.7.2), the interpretation of these epidemiologic studies is limited due to the small number of studies, their lack of control for potential confounding by copollutants, and uncertainty related to the critical exposure windows. Biological plausibility is provided for the ASD findings by a study in mice that found inflammatory and morphologic changes in the corpus collosum and hippocampus, as well as ventriculomegaly (*i.e.,* enlarged lateral ventricles) in young mice following prenatal exposure to $PM_{2.5}$ CAPs.

Taken together, the 2019 ISA concludes that studies indicate long-term $PM_{2.5}$ exposures can lead to effects on the brain associated with neurodegeneration (*i.e.,* neuroinflammation and reductions in brain volume), as well as cognitive effects in older adults (U.S. EPA, 2019a, Table 1–2). Animal toxicological studies provide evidence for a range of nervous system effects in adult animals, including neuroinflammation and oxidative stress, neurodegeneration, cognitive effects, and effects on neurodevelopment in young animals. The epidemiologic evidence is more limited, but studies generally support associations between long-term $PM_{2.5}$ exposure and changes in brain morphology, cognitive decrements and dementia. There is also initial, and limited, evidence for neurodevelopmental effects, particularly ASD. The consistency and coherence of the evidence supports the 2019 ISA's conclusion that ''the collective evidence is sufficient to conclude that a causal relationship is likely to exist between long-term $PM_{2.5}$ exposure and nervous system effects'' (U.S. EPA, 2019a, section 8.2.9).

vi. Other Effects

For other health effect categories that were evaluated for their relationship with $PM_{2.5}$ exposures (*i.e.,* short-term $PM_{2.5}$ exposure and nervous system effects and short- and long-term $PM_{2.5}$ exposure and metabolic effects, reproduction and fertility, and pregnancy and birth outcomes (U.S. EPA, 2022a, Table ES–1), the currently available evidence is ''suggestive of, but not sufficient to infer, a causal relationship,'' mainly due to inconsistent evidence across specific outcomes and uncertainties regarding exposure measurement error, the potential for confounding, and potential modes of action (U.S. EPA, 2019a, sections 7.14, 7.2.10, 8.1.6, and 9.1.5). The causality determination for short-term $PM_{2.5}$ exposure and nervous system effects in the 2019 ISA reflects a revision to the causality determination in the 2009 ISA from ''inadequate to infer a causal relationship,'' while this is the first-time assessments of causality were conducted for long-term $PM_{2.5}$ exposure and nervous system effects, as well as short- and long-term $PM_{2.5}$ exposure and metabolic effects reflect.

Recent studies evaluated in the 2019 ISA also further explored the relationship between short-and long-term UFP exposure and health effects. (*i.e.,* cardiovascular effects and short-term UFP exposures; respiratory effects and short-term UFP exposures; and nervous system effects and long- and short-term exposures (U.S. EPA, 2022a, Table ES–1). The currently available evidence is ''suggestive of, but not sufficient to infer, a causal relationship'' for short-term UFP exposure and cardiovascular and respiratory effects and for short- and long-term UFP exposure and nervous system effects, primarily due to uncertainties and limitations in the evidence, specifically, variability across studies in the definition of UFPs and the exposure metric used (U.S. EPA, 2019a, P.3.1; U.S. EPA, 2022a, section 3.3.1.6.3). The causality determinations for the other health effect categories evaluated in the 2019 ISA are ''inadequate to infer a causal relationship.'' Additionally, this is the first time assessments of causality were conducted for short- and long-term UFP exposure and metabolic effects and long-term UFP exposure and nervous system effects (U.S. EPA, 2022a, Table ES–1).

With the advent of the global COVID–19 pandemic, a number of recent studies evaluated in the ISA Supplement examined the relationship between ambient air pollution, specifically $PM_{2.5}$, and SARS–CoV–2 infections and COVID–19 deaths, including a few studies within the U.S. and Canada (U.S. EPA, 2022a, section 3.3.2).[59] Some studies examined whether daily changes in $PM_{2.5}$ can influence SARS–CoV–2 infection and COVID–19 death (U.S. EPA, 2022a, section 3.3.2.1). Additionally, several studies evaluated whether long-term $PM_{2.5}$ exposure increases the risk of SARS–CoV–2 infection and COVID–19 death in North America (U.S. EPA, 2022a, section 3.3.2.2). While there is initial evidence of positive associations with SARS–CoV–2 infection and COVID–19 death, uncertainties remain due to methodological issues that may influence the results, including: (1) The use of ecological study design; (2) studies were conducted during the ongoing pandemic when the etiology of COVID–19 was still not well understood (*e.g.,* specifically, there are important differences in COVID–19-related outcomes by a variety of factors such as race and SES); and (3) studies did not account for crucial factors that could influence results (*e.g.,* stay-at-home orders, social distancing, use of masks, and testing capacity) (U.S. EPA, 2022a, chapter 5). Taken together, while there is initial evidence of positive associations with SARS–CoV–2 infection and COVID–19 death, uncertainties remain due to methodological issues.

b. Public Health Implications and At-Risk Populations

The public health implications of the evidence regarding $PM_{2.5}$-related health effects, as for other effects, are dependent on the type and severity of the effects, as well as the size of the population affected. Such factors are discussed below in the context of our consideration of the health effects evidence related to $PM_{2.5}$ in ambient air. This section also summarizes the current information on population groups at increased risk of the effects of $PM_{2.5}$ in ambient air.

The information available in this reconsideration has not altered our understanding of human populations at risk of health effects from $PM_{2.5}$ exposures. As recognized in the 2020 review, the 2019 ISA cites extensive evidence indicating that ''both the general population as well as specific populations and lifestages are at risk for $PM_{2.5}$-related health effects'' (U.S. EPA, 2019a, p. 12–1). Factors that may contribute to increased risk of $PM_{2.5}$-related health effects include lifestage (children and older adults), pre-existing diseases (cardiovascular disease and

[59] While there is no exact corollary within the 2019 ISA for these types of studies, the 2019 ISA presented evidence that evaluates the potential relationship between short- and long-term $PM_{2.5}$ exposure and respiratory infection (U.S. EPA, 2022a, section 5.1.5 and 5.2.6). Studies assessed in the 2019 ISA report some evidence of positive associations between short-term $PM_{2.5}$ and hospital admissions and ED visits for respiratory infections, however the interpretation of these studies is complicated by the variability in the type of respiratory infection outcome examined (U.S. EPA, 2022a, Figure 5–7). In the 2019 ISA, studies of long-term $PM_{2.5}$ exposure were limited and while there were some positive associations reported, there was minimal overlap in respiratory infection outcomes examined across studies. Exposure to $PM_{2.5}$ has been shown to impair host defense, specifically altering macrophage function, providing a biological pathway by which $PM_{2.5}$ exposure could lead to respiratory infection (U.S. EPA, 2022a, sections 5.1.1 and 5.1.5.) There is some additional evidence that $PM_{2.5}$ exposure can lead to decreases in an individual's immune response, which can subsequently facilitate replication of respiratory viruses (Bourdrel et al., 2021).

respiratory disease), race/ethnicity, and SES.[60]

Children make up a substantial fraction of the U.S. population, and often have unique factors that contribute to their increased risk of experiencing a health effect due to exposures to ambient air pollutants because of their continuous growth and development.[61] Children may be particularly at risk for health effects related to ambient $PM_{2.5}$ exposures compared with adults because they have (1) a developing respiratory system, (2) increased ventilation rates relative to body mass compared with adults, and (3) an increased proportion of oral breathing, particularly in boys, relative to adults (U.S. EPA, 2019a, section 12.5.1.1). There is strong evidence that demonstrates $PM_{2.5}$ associated health effects in children, particularly from epidemiologic studies of long-term $PM_{2.5}$ exposure and impaired lung function growth, decrements in lung function, and asthma development. However, there is limited evidence from stratified analyses that children are at increased risk of $PM_{2.5}$-related health effects compared to adults. Additionally, there is some evidence that indicates that children receive higher $PM_{2.5}$ exposures than adults, and dosimetric differences in children compared to adults can contribute to higher doses (U.S. EPA, 2019a, section 12.5.1.1).

In the U.S., older adults, often defined as adults 65 years of age and older, represent an increasing portion of the population and often have pre-existing diseases or conditions that may compromise biological function. While there is limited evidence to indicate that older adults have higher exposures than younger adults, older adults may receive higher doses of $PM_{2.5}$ due to dosimetric differences. There is consistent evidence from studies of older adults demonstrating generally consistent positive associations in studies examining health effects from short- and long-term $PM_{2.5}$ exposure and cardiovascular or respiratory hospital admissions, emergency department visits, or mortality (U.S. EPA, 2019a, sections 6.1, 6.2, 11.1, 11.2, 12.5.1.2). Additionally, several animal toxicological, controlled human exposure, and epidemiologic studies did not stratify results by lifestage, but instead focused the analyses on older individuals, and can provide coherence and biological plausibility for the occurrence among this lifestage (U.S. EPA, 2019a, section 12.5.1.2).

Individuals with pre-existing disease may be considered at greater risk of an air pollution-related health effect than those without disease because they are likely in a compromised biological state that can vary depending on the disease and severity. With regard to cardiovascular disease, we first note that cardiovascular disease is the leading cause of death in the U.S., accounting for one in four deaths, and approximately 12% of the adult population in the U.S. has a cardiovascular disease (U.S. EPA, 2019a, section 12.3.1). Strong evidence demonstrates that there is a causal relationship between cardiovascular effects and long- and short-term exposures to $PM_{2.5}$. Some of the evidence supporting this conclusion is from studies of panels or cohorts with pre-existing cardiovascular disease, which provide supporting evidence but do not directly demonstrate an increased risk (U.S. EPA, 2019a, section 12.3.1). Epidemiologic evidence indicates that individuals with pre-existing cardiovascular disease may be at increased risk for $PM_{2.5}$-associated health effects compared to those without pre-existing cardiovascular disease. While the evidence does not consistently support increased risk for all pre-existing cardiovascular diseases, there is evidence that certain pre-existing cardiovascular diseases (*e.g.,* hypertension) may be a factor that increases $PM_{2.5}$-related risk. Furthermore, there is strong evidence supporting a causal relationship for long- and short-term $PM_{2.5}$ exposure and cardiovascular effects, particularly for IHD (U.S. EPA, 2019a, chapter 6, section 12.3.1).

With regard to respiratory disease, we first note that the most chronic respiratory diseases in the U.S. are asthma and COPD. Asthma affects a substantial fraction of the U.S. population and is the leading chronic disease among children. COPD primarily affects older adults and contributes to compromised respiratory function and underlying pulmonary inflammation. The body of evidence indicates that individuals with pre-existing respiratory diseases, particularly asthma and COPD, may be at increased risk for $PM_{2.5}$-related health effects compared to those without pre-existing respiratory diseases (U.S. EPA, 2019a, section 12.3.5). There is strong evidence indicating $PM_{2.5}$-associated respiratory effects among those with asthma, which forms the primary evidence base for the likely to be causal relationship between short-term exposures to $PM_{2.5}$ and respiratory health effects (U.S. EPA, 2019a, section 12.3.5). For asthma, epidemiologic evidence demonstrates associations between short-term $PM_{2.5}$ exposures and respiratory effects, particularly evidence for asthma exacerbation, and controlled human exposure and animal toxicological studies demonstrate support for the biological plausibility for asthma exacerbation with $PM_{2.5}$ exposures (U.S. EPA, 2019a, section 12.3.5.1). For COPD, epidemiologic studies report positive associations between short-term $PM_{2.5}$ exposures and hospital admissions and emergency department visits for COPD, with supporting evidence from panel studies demonstration COPD exacerbation. Epidemiologic evidence is supported by some experimental evidence of COPD-related effects, which provides support for the biological plausibility for COPD in response to $PM_{2.5}$ exposures (U.S. EPA, 2019a, section 12.3.5.2).

There is strong evidence for racial and ethnic disparities in $PM_{2.5}$ exposures and $PM_{2.5}$-related health risk, as assessed in the 2019 ISA and with even more evidence available since the literature cutoff date for the 2019 ISA and evaluated in the ISA Supplement. There is strong evidence demonstrating that Black and Hispanic populations, in particular, have higher $PM_{2.5}$ exposures than non-Hispanic White populations (U.S. EPA, 2019a, Figure 12–2; U.S. EPA, 2022a, Figure 3–38). Black populations or individuals that live in predominantly Black neighborhoods experience higher $PM_{2.5}$ exposures, in comparison to non-Hispanic White populations. There is also consistent evidence across multiple studies that demonstrate increased risk of $PM_{2.5}$-related health effects, with the strongest evidence for health risk disparities for mortality (U.S. EPA, 2019a, section 12.5.4). There is also evidence of health risk disparities for both Hispanic and non-Hispanic Black populations compared to non-Hispanic White populations for cause-specific mortality and incident hypertension (U.S. EPA, 2022a, section 3.3.3.2).

Socioeconomic status (SES) is a composite measure that includes metrics such as income, occupation, or education, and can play a role in access to healthy environments as well as access to healthcare. SES may be a factor that contributes to differential risk from $PM_{2.5}$-related health effects. Studies assessed in the 2019 ISA and ISA Supplement provide evidence that lower SES communities are exposed to higher concentrations of $PM_{2.5}$

[60] As described in the 2019 ISA, other factors that have the potential to contribute to increased risk include obesity, diabetes, genetic factors, smoking status, sex, diet, and residential location (U.S. EPA, 2019, chapter 12).

[61] Children, as used throughout this document, generally refers to those younger than 18 years old.

compared to higher SES communities (U.S. EPA, 2019a, section 12.5.3; U.S. EPA, 2022a, section 3.3.3.1.1). Studies using composite measures of neighborhood SES consistently demonstrated a disparity in both $PM_{2.5}$ exposure and the risk of $PM_{2.5}$-related health outcomes. There is some evidence that supports associations larger in magnitude between mortality and long-term $PM_{2.5}$ exposures for those with low income or living in lower income areas compared to those with higher income or living in higher income neighborhoods (U.S. EPA, 2019a, section 12.5.3; U.S. EPA, 2022a, section 3.3.3.1.1). Additionally, evidence supports conclusions that lower SES is associated with cause-specific mortality and certain health endpoints (*i.e.,* HI and CHF), but less so for all-cause or total (non-accidental) mortality (U.S. EPA, 2022a, section 3.3.3.1).

The magnitude and characterization of a public health impact is dependent upon the size and characteristics of the populations affected, as well as the type or severity of the effects. As summarized above, lifestage (children and older adults), race/ethnicity and SES are factors that increase the risk of $PM_{2.5}$-related health effects. The American Community Survey (ACS) for 2019 estimates that approximately 22% and 16% of the U.S. population are children (age<18) and older adults (age 65+), respectively. For all ages, non-Hispanic Black and Hispanic populations comprise approximately 12% and 18% of the overall U.S. population in 2019. Currently available information that helps to characterize key features of these population is included in the 2022 PA (U.S. EPA, 2022b, Table 3–2).

As noted above, individuals with pre-existing cardiovascular disease and pre-existing respiratory disease may also be at increased risk of $PM_{2.5}$-related health effects. Currently available information that helps to characterize key features of populations with cardiovascular or respiratory diseases or conditions is included in the 2022 PA (U.S. EPA, 2022b, Table 3–3). The National Center for Health Statistics data for 2018 indicate that, for adult populations, older adults (*e.g.,* those 65 years and older) have a higher prevalence of cardiovascular diseases compared to younger adults (*e.g.,* those 64 years and younger). For respiratory diseases, older adults also have a higher prevalence of emphysema than younger adults, and adults 44 years or older have a higher prevalence of chronic bronchitis. However, the prevalence for asthma is generally similar across all adult age groups.

With respect to race, American Indians or Alaskan Native populations have the highest prevalence of all heart disease and coronary heart disease, while Black populations have the highest prevalence of hypertension and stroke. Hypertension has the highest prevalence across all racial groups compared to other cardiovascular diseases or conditions, ranging from approximately 22% to 32% of each racial group. Overall, the prevalence of cardiovascular diseases or conditions is lowest for Asians compared to Whites, Blacks, and American Indians or Alaskan Natives. Asthma prevalence is highest among Black and American Indian or Alaska Native populations, while the prevalence of chronic bronchitis and emphysema is generally similar across racial groups. Overall, the prevalence of respiratory diseases is lowest for Asians compared to Whites, Blacks, and American Indians or Alaskan Natives. With regard to ethnicity, cardiovascular and respiratory disease prevalence across all diseases or conditions is generally similar between Hispanic and non-Hispanic populations, although non-Hispanics have a slightly higher prevalence compared to Hispanics.

Taken together, this information indicates that the groups at increased risk of $PM_{2.5}$-related health effects represent a substantial portion of the total U.S. population. In evaluating the primary $PM_{2.5}$ standards, an important consideration is the potential $PM_{2.5}$-related public health impacts in these populations.

c. $PM_{2.5}$ Concentrations in Key Studies Reporting Health Effects

To inform conclusions on the adequacy of the public health protection provided by the current primary $PM_{2.5}$ standards, the sections below summarize the 2022 PA's evaluation of the $PM_{2.5}$ exposures, specifically the concentrations that have been examined in controlled human exposure studies, animal toxicological studies, and epidemiologic studies. The 2022 PA places the greatest emphasis on the health outcomes for which the 2019 ISA concludes that the evidence supports a ''causal'' or a ''likely to be causal'' relationship with short- or long-term $PM_{2.5}$ exposures (U.S. EPA, 2022b, section 3.3.3). As described in greater detail in section II.A.2 above, this includes short- or long-term $PM_{2.5}$ exposures and mortality, cardiovascular effects, and respiratory effects and long-term $PM_{2.5}$ exposures and cancer and nervous system effects. While the causality determinations in the 2019 ISA are informed by studies evaluating a wide range of $PM_{2.5}$ concentrations,[62] the sections below summarize the considerations in the 2022 PA regarding the degree to which the evidence assessed in the 2019 ISA and ISA Supplement supports the occurrence of PM-related health effects at concentrations relevant to informing conclusions on the primary $PM_{2.5}$ standards. In so doing, the 2022 PA focuses on the available studies that are most directly informative to reaching conclusions regarding the adequacy of the current primary $PM_{2.5}$ standards (*e.g.,* epidemiologic studies with annual mean $PM_{2.5}$ concentrations near or below the level of the standard; and controlled human exposure studies at $PM_{2.5}$ exposures that elicit consistent effects, as well as examining $PM_{2.5}$ exposures at concentrations that are at or near the level of the standard).

i. $PM_{2.5}$ Exposure Concentrations Evaluated in Experimental Studies

Evidence for a particular $PM_{2.5}$-related health outcome is strengthened when results from experimental studies demonstrate biologically plausible mechanisms through which adverse human health outcomes could occur (U.S. EPA, 2015, p. 20). Two types of experimental studies are of particular importance in understanding the effects

[62] As described in more detail in section 5 of the Preamble to the ISAs, judgments regarding causality take into consideration a number of aspects when evaluating the available scientific evidence (U.S. EPA, 2015, Table I). In reaching conclusions regarding causality, ''evidence is evaluated for major outcome categories or groups of related endpoints (*e.g.,* respiratory effects, vegetation growth), integrating evidence from across disciplines, and evaluating the coherence of evidence across a spectrum of related endpoints'' (U.S. EPA, 2015, p. 24). Furthermore, ''[i]n drawing judgments regarding causality for the criteria air pollutants, the ISA focuses on evidence of effects in the range of relevant pollutant exposures or doses and not on determination of causality at any dose. Emphasis is placed on evidence of effects at doses (*e.g.,* blood Pb concentration) or exposures (*e.g.,* air concentrations) that are relevant to, or somewhat above, those currently experienced by the population. The extent to which studies of higher concentrations are considered varies by pollutant and major outcome category, but generally includes those with doses or exposures in the range of one to two orders of magnitude above current or ambient conditions to account for intra-species variability and toxicokinetic or toxicodynamic differences between experimental animals and humans. Studies that use higher doses or exposures may also be considered to the extent that they provide useful information to inform understanding of mode of action, inter-species differences, or factors that may increase risk of effects for a population and if biological mechanisms have not been demonstrated to differ based on exposure concentration. Thus, a causality determination is based on weight-of-evidence evaluation for health or welfare effects, focusing on the evidence from exposures or doses generally ranging from recent ambient concentrations to one or two orders of magnitude above recent ambient concentrations'' (U.S. EPA, 2015, p. 24).

of PM exposures: controlled human exposure and animal toxicological studies. In such studies, investigators expose human volunteers or laboratory animals, respectively, to known concentrations of air pollutants under carefully regulated environmental conditions and activity levels. Thus, controlled human exposure and animal toxicological studies can provide information on the health effects of experimentally administered pollutant exposures under highly controlled laboratory conditions (U.S. EPA, 2015, p. 11).

Controlled human exposure studies have reported that $PM_{2.5}$ exposures lasting from less than one hour up to five hours can impact cardiovascular function,[63] and the most consistent evidence from these studies is for impaired vascular function (U.S. EPA, 2019a, section 6.1.13.2). In addition, although less consistent, the 2019 ISA notes that studies examining $PM_{2.5}$ exposures also provide evidence for increased blood pressure (U.S. EPA, 2019a, section 6.1.6.3), conduction abnormalities/arrhythmia (U.S. EPA, 2019a, section 6.1.4.3), changes in heart rate variability (U.S. EPA, 2019a, section 6.1.10.2), changes in hemostasis that could promote clot formation (U.S. EPA, 2019a, section 6.1.12.2), and increases in inflammatory cells and markers (U.S. EPA, 2019a, section 6.1.11.2). The 2019 ISA concludes that, when taken as a whole, controlled human exposure studies demonstrate that short-term exposure to $PM_{2.5}$ may impact cardiovascular function in ways that could lead to more serious outcomes (U.S. EPA, 2019a, section 6.1.16). Thus, such studies can provide insight into the potential for specific $PM_{2.5}$ exposures to result in physiological changes that could increase the risk of more serious effects. Table 3–4 in the 2022 PA summarizes information from the 2019 ISA and 2022 ISA supplement on available controlled human exposure studies that evaluate effects on markers of cardiovascular function following exposure to $PM_{2.5}$ (U.S. EPA, 2022b). Most of the controlled human exposure studies in Table 3–4 of the 2022 PA have evaluated average $PM_{2.5}$ concentrations at or above about 100 μg/m^3, with exposure durations typically up to about two hours. Statistically significant effects on one or more indicators of cardiovascular function are often, though not always, reported following 2-hour exposures to average $PM_{2.5}$ concentrations at and above about 120 μg/m^3, with less consistent evidence for effects following exposures to concentrations lower than 120 μg/m^3. Impaired vascular function, the effect identified in the 2019 ISA as the most consistent across studies (U.S. EPA, 2019a, section 6.1.13.2) is shown following 2-hour exposures to $PM_{2.5}$ concentrations at and above 149 μg/m^3. Mixed results are reported in the studies that evaluated longer exposure durations (*i.e.,* longer than 2 hours) and lower (*i.e.,* near-ambient) $PM_{2.5}$ concentrations (U.S. EPA, 2022b, section 3.3.3.1). For example, significant effects for some outcomes were reported following 5-hour exposures to 24 μg/m^3 in Hemmingsen et al. (2015b), but not for other outcomes following 5-hour exposures to 24 μg/m^3 in Hemmingsen et al. (2015a) and not following 24-hour exposures to 10.5 μg/m^3 in Bräuner et al. (2008). Additionally, Wyatt et al. (2020) found significant effects for some cardiovascular (*e.g.,* systematic inflammation markers, cardiac repolarization, and decreased pulmonary function) effects following 4-hour exposures to 37.8 μg/m^3 in healthy young participants (18–35 years, n=21) who were subject to intermittent moderate exercise. The higher ventilation rate and longer exposure duration in this study compared to most controlled human exposure studies is roughly equivalent to a 2-hour exposure of 75–100 μg/m^3 of $PM_{2.5}$. Therefore, dosimetric considerations may explain the observed changes in inflammation in young healthy individuals. Though this study provides evidence of some effects at lower $PM_{2.5}$ concentrations, overall, there is inconsistent evidence for inflammation in other controlled human exposure studies evaluated in the 2019 ISA (U.S. EPA, 2019a, sections 5.1.7., 5.1.2.3.3, and 6.1.11.2.1; U.S. EPA, 2022a, section 3.3.1).

While controlled human exposure studies are important in establishing biological plausibility, it is unclear how the results from these studies alone and the importance of the effects observed in these studies, should be interpreted with respect to adversity to public health. More specifically, impaired vascular function can signal an intermediate effect along the potential biological pathways for cardiovascular effects following short-term exposure to $PM_{2.5}$ and show a role for exposure to $PM_{2.5}$ leading to potential worsening of IHD and heart failure followed potentially by ED visits, hospital admissions, or mortality (U.S. EPA, 2019a, section 6.1 and Figure 6–1). However, just observing the occurrence of impaired vascular function alone does not clearly suggest an adverse health outcome. Additionally, associated judgments regarding adversity or health significance of measurable physiological responses to air pollutants have been informed by guidance, criteria or interpretative statements developed within the public health community, including the American Thoracic Society (ATS) and the European Respiratory Society (ERS), which cooperatively updated the ATS 2000 statement *What Constitutes an Adverse Health Effect of Air Pollution* (ATS, 2000) with new scientific findings, including the evidence related to air pollution and the cardiovascular system (Thurston et al., 2017).[64] With regard to vascular function, the ATS/ERS statement considers the adversity of both chronic and acute reductions in endothelial function. While the ATS/ERS statement concluded that chronic endothelial and vascular dysfunction can be judged to be a biomarker of an adverse health effect from air pollution, they also conclude that ''the health relevance of acute reductions in endothelial function induced by air pollution is less certain'' (Thurston et al., 2017). This is particularly informative to our consideration of the controlled human exposure studies which are short-term in nature (*i.e.,* generally ranging from 2- to 5-hours), including those studies that are conducted at near-ambient $PM_{2.5}$ concentrations.

The 2022 PA also notes that it is important to recognize that controlled human exposure studies include a small number of individuals compared to epidemiologic studies. Additionally, these studies tend to include generally healthy adult individuals, who are at a lower risk of experiencing health effects.

[63] In contrast, controlled human exposure studies provide little evidence for respiratory effects following short-term $PM_{2.5}$ exposures (U.S. EPA, 2019a, section 5.1, Table 5–18). Therefore, this section focuses on cardiovascular effects evaluated in controlled human exposure studies of $PM_{2.5}$ exposure.

[64] The ATS/ERS described its 2017 statement as one ''intended to provide guidance to policymakers, clinicians and public health professionals, as well as others who interpret the scientific evidence on the health effects of air pollution for risk management purposes'' and further notes that ''considerations as to what constitutes an adverse health effect, in order to provide guidance to researchers and policymakers when new health effects markers or health outcome associations might be reported in future.'' The most recent policy statement by the ATS, which once again broadens its discussion of effects, responses and biomarkers to reflect the expansion of scientific research in these areas, reiterates that concept, conveying that it does not offer ''strict rules or numerical criteria, but rather proposes considerations to be weighed in setting boundaries between adverse and nonadverse health effects,'' providing a general framework for interpreting evidence that proposes a ''set of considerations that can be applied in forming judgments'' for this context (Thurston et al., 2017).

These studies, therefore, often do not include children, older adults, or individuals with pre-existing conditions. As such, these studies are somewhat limited in their ability to inform at what concentrations effects may be elicited in at-risk populations.

Nonetheless, to provide some insight into what these controlled human exposure studies may indicate regarding short-term exposure to peak $PM_{2.5}$ concentrations and how concentrations relate to ambient $PM_{2.5}$ concentrations, analyses in the 2022 PA (U.S. EPA, 2022b, Figure 2–19) examine monitored 2-hour $PM_{2.5}$ concentrations (the exposure window most often utilized in the controlled human exposure studies) at sites meeting the current primary $PM_{2.5}$ standards to evaluate the degree to which 2-hour ambient $PM_{2.5}$ concentrations at such locations are likely to exceed the 2-hour exposure concentrations in the controlled human exposure studies at which statistically significant effects are reported in multiple studies for one or more indicators of cardiovascular function. At sites meeting the current primary $PM_{2.5}$ standards, most 2-hour concentrations are below 10 $\mu g/m^3$, and almost never exceed 30 $\mu g/m^3$. The extreme upper end of the distribution of 2-hour $PM_{2.5}$ concentrations is shifted higher during the warmer months (April to September), generally corresponding to the period of peak wildfire frequency in the U.S. At sites meeting the current primary $PM_{2.5}$ standards, the highest 2-hour concentrations measured tend to occur during the period of peak wildfire frequency (*i.e.,* 99.9th percentile of 2-hour concentrations is 62 $\mu g/m^3$ during the warm season considered as a whole). Most of the sites measuring these very high concentrations are in the northwestern U.S. and California (U.S. EPA, 2022b, Appendix A, Figure A–1), where wildfires have been relatively common in recent years. When the typical fire season is excluded from the analysis, the extreme upper end of the distribution is reduced (*i.e.,* 99.9th percentile of 2-hour concentrations is 55 $\mu g/m^3$).[65] Given these results, the 2022 PA concludes that $PM_{2.5}$ exposure concentrations evaluated in most of these controlled human exposure studies are well-above the 2-hour ambient $PM_{2.5}$ concentrations typically measured in locations meeting the current primary standards.

With respect to animal toxicological studies, the 2019 ISA relies on animal toxicological studies to support the plausibility of a wide range of $PM_{2.5}$-related health effects. While animal toxicological studies often examine more severe health outcomes and longer exposure durations than controlled human exposure studies, there is uncertainty in extrapolating the effects seen in animals, and the $PM_{2.5}$ exposures and doses that cause those effects, to human populations. The 2022 PA considers these uncertainties when evaluating what the available animal toxicological studies may indicate with regard to the current primary $PM_{2.5}$ standards.

As with controlled human exposure studies, most animal toxicological studies evaluated in the 2019 ISA have examined effects following exposure to $PM_{2.5}$ well above the concentrations likely to be allowed by the current $PM_{2.5}$ standards. Such studies have generally examined short-term exposures to $PM_{2.5}$ concentrations ranging from 100 to >1,000 $\mu g/m^3$ and long-term exposures to concentrations from 66 to >400 $\mu g/m^3$ (*e.g.,* see U.S. EPA, 2019a, Table 1–2). Two exceptions are animal toxicological studies reporting impaired lung development following long-term exposures (*i.e.,* 24 hours per day for several months prenatally and postnatally) to an average $PM_{2.5}$ concentration of 16.8 $\mu g/m^3$ (Mauad et al., 2008) and increased carcinogenic potential following long-term exposures (*i.e.,* 2 months) to an average $PM_{2.5}$ concentration of 17.7 $\mu g/m^3$ (Cangerana Pereira et al., 2011). These two studies report serious effects following long-term exposures to $PM_{2.5}$ concentrations similar to the ambient concentrations reported in some $PM_{2.5}$ epidemiologic studies (U.S. EPA, 2019a, Table 1–2), though still above the ambient concentrations likely to occur in areas meeting the current primary $PM_{2.5}$ standards. However, noting uncertainty in extrapolating the effects seen in animals, and the $PM_{2.5}$ exposures and doses that cause those effects to human populations, animal toxicological studies are of limited utility in informing decisions on the public health protection provided by the current or alternative primary $PM_{2.5}$ standards. Therefore, the animal toxicological studies are most useful in providing further evidence to support the biological mechanisms and plausibility of various adverse effects.

ii. Ambient $PM_{2.5}$ Concentrations in Locations of Epidemiologic Studies

As summarized in section II.A.2.a above, epidemiologic studies examining associations between daily or annual average $PM_{2.5}$ exposures and mortality or morbidity represent a large part of the evidence base supporting several of the 2019 ISA's ''causal'' and ''likely to be causal'' determinations. The 2022 PA considers the ambient $PM_{2.5}$ concentrations present in areas where epidemiologic studies have evaluated associations with mortality or morbidity, and what such concentrations may indicate regarding the adequacy of the primary $PM_{2.5}$ standards. The use of information from epidemiologic studies to inform conclusions on the primary $PM_{2.5}$ standards is complicated by the fact that such studies evaluate associations between distributions of ambient $PM_{2.5}$ and health outcomes, and do not identify the specific exposures that can lead to the reported effects. Rather, health effects can occur over the entire distribution of ambient $PM_{2.5}$ concentrations evaluated, and epidemiologic studies conducted to date do not identify a population-level threshold below which it can be concluded with confidence that $PM_{2.5}$-associated health effects do not occur. Therefore, the 2022 PA evaluates the $PM_{2.5}$ air quality distributions over which epidemiologic studies support health effect associations (U.S. EPA, 2022b, section 3.3.3.2). In the absence of discernible thresholds, the 2022 PA considers the study-reported ambient $PM_{2.5}$ concentrations reflecting estimated exposure with a focus around the middle portion of the $PM_{2.5}$ air quality distribution, where the bulk of the observed data reside and which provides the strongest support for reported health effect associations. The section below, as well as in more detail in section II.B.3.b.i of the proposal (88 FR 5594, January 27, 2023), describes the consideration of the key epidemiologic studies and observations from these studies, as evaluated in the 2022 PA (U.S. EPA, 2022b, section 3.3.3.2).

As an initial matter, in considering the $PM_{2.5}$ air quality distributions associated with mortality or morbidity in the key epidemiologic studies, the 2022 PA recognizes that in previous reviews, the decision framework used to judge adequacy of the existing $PM_{2.5}$ standards, and what levels of any potential alternative standards should be considered, placed significant weight on epidemiologic studies that assessed associations between $PM_{2.5}$ exposure and health outcomes that were most strongly supported by the body of scientific evidence. In doing so, the decision framework recognized that while there is no specific point in the air quality distribution of any

[65] Similar analyses of 4-hour and 5-hour $PM_{2.5}$ concentrations are presented in Appendix A, Figure A–2 and Figure A–3, respectively of the 2022 PA (U.S. EPA, 2022b).

epidemiologic study that represents a ''bright line'' at and above which effects have been observed and below which effects have not been observed, there is significantly greater confidence in the magnitude and significance of observed associations for the part of the air quality distribution corresponding to where the bulk of the health events in each study have been observed, generally at or around the mean concentration. This is the case both for studies of daily $PM_{2.5}$ exposures and for studies of annual average $PM_{2.5}$ exposures (U.S. EPA, 2022b, section 3.3.3.2.1).

As discussed further in the 2022 PA, studies of daily $PM_{2.5}$ exposures examine associations between day-to-day variation in $PM_{2.5}$ concentrations and health outcomes, often over several years (U.S. EPA, 2022b, section 3.3.3.2.1). While there can be considerable variability in daily exposures over a multi-year study period, most of the estimated exposures reflect days with ambient $PM_{2.5}$ concentrations around the middle of the air quality distributions examined (*i.e.,* ''typical'' days rather than days with extremely high or extremely low concentrations). Similarly, for studies of annual $PM_{2.5}$ exposures, most of the health events occur at estimated exposures that reflect annual average $PM_{2.5}$ concentrations around the middle of the air quality distributions examined. In both cases, epidemiologic studies provide the strongest support for reported health effect associations for this middle portion of the $PM_{2.5}$ air quality distribution, which corresponds to the bulk of the underlying data, rather than the extreme upper or lower ends of the distribution. Consistent with this, as noted in the 2022 PA (U.S. EPA, 2022b, section 3.3.1.1), several epidemiologic studies report that associations persist in analyses that exclude the upper portions of the distributions of estimated $PM_{2.5}$ exposures, indicating that ''peak'' $PM_{2.5}$ exposures are not disproportionately responsible for reported health effect associations.

Thus, in considering $PM_{2.5}$ air quality data from epidemiologic studies, consistent with approaches in the 2012 and 2020 reviews (78 FR 3161, January 15, 2013; U.S. EPA, 2011, sections 2.1.3 and 2.3.4.1; 85 FR 82716–82717, December 18, 2020; U.S. EPA, 2020b, sections 3.1.2 and 3.2.3), the 2022 PA evaluates study-reported means (or medians) of daily and annual average $PM_{2.5}$ concentrations as indicators for the middle portions of the air quality distributions, over which studies generally provide strong support for reported associations and for which confidence in the magnitude and significance of associations observed in the epidemiologic studies is greatest (78 FR 3101, January 15, 2013). In addition to the overall study means, the 2022 PA also focuses on concentrations somewhat below the means (*e.g.,* 25th and 10th percentiles), when such information is available from the epidemiologic studies, which again is consistent with approaches used in previous reviews. In so doing, the 2022 PA notes, as in previous reviews, that a relatively small portion of the health events are observed in the lower part of the air quality distribution and confidence in the magnitude and significance of the associations begins to decrease in the lower part of the air quality distribution. Furthermore, consistent with past reviews, there is no single percentile value within a given air quality distribution that is most appropriate or ''correct'' to use to characterize where our confidence in associations becomes appreciably lower. However, and as detailed further in the 2022 PA, the range from the 25th to 10th percentiles is a reasonable range to consider as a region where there is appreciably less confidence in the associations observed in epidemiologic studies compared to the means (U.S. EPA, 2022b, p. 3–69).[66]

In evaluating the overall study-reported means, and concentrations somewhat below the means from epidemiologic studies, the 2022 PA focuses on the form, averaging time and level of the current primary annual $PM_{2.5}$ standard. Consistent with the approaches used in the 2012 and 2020 reviews (78 FR 3161–3162, January 15, 2013; 85 FR 82716–82717, December 18, 2020), the annual standard has been utilized as the primary means of providing public health protection against the bulk of the distribution of short- and long-term $PM_{2.5}$ exposures. Thus, the evaluation of the study-reported mean concentrations from key epidemiologic studies lends itself best to evaluating the adequacy of the annual $PM_{2.5}$ standard (rather than the 24-hour standard with its 98th percentile form). This is true for the study-reported means from both long-term and short-term exposure epidemiologic studies, recognizing that the overall mean $PM_{2.5}$ concentrations reported in studies of short-term (24-hour) exposures reflect averages across the study population and over the years of the study. Thus, mean concentrations from short-term exposure studies reflect long-term averages of 24-hour $PM_{2.5}$ exposure estimates. In this manner, the examination of study-reported means in key epidemiologic studies in the 2022 PA aims to evaluate the protection provided by the annual $PM_{2.5}$ standard against the exposures where confidence is greatest for associations with mortality and morbidity. In addition, the protection provided by the annual standard is evaluated in conjunction with that provided by the 24-hour standard, with its 98th percentile form, which aims to provide supplemental protection against the short-term exposures to peak $PM_{2.5}$ concentrations that can occur in areas with strong contributions from local or seasonal sources, even when overall ambient mean $PM_{2.5}$ concentrations in an area remain relatively low.

In focusing on the annual standard, and in evaluating the range of study-reported exposure concentrations for which the strongest support for adverse health effects exists, the 2022 PA examines exposure concentrations in key epidemiologic studies to determine whether the current primary annual $PM_{2.5}$ standard provides adequate protection against these exposure concentrations. This means, as in past reviews, application of a decision framework based on assessing means reported in key epidemiologic studies must also consider how the study means were computed and how these values compare to the annual standard metric (including the level, averaging time and form) and the use of the monitor with the highest $PM_{2.5}$ design value in an area for compliance. In the 2012 review, it was recognized that the key epidemiologic studies computed the study mean using an average across monitor-based $PM_{2.5}$ concentrations. As such, the Agency noted that this decision framework applied an approach of using maximum monitor concentrations to determine compliance with the standard, while selecting the standard level based on consideration of composite monitor concentrations. Further, the Agency included analyses (Hassett-Sipple et al., 2010; Frank, 2012) that examined the differences in these two metrics (*i.e.,* maximum monitor concentrations and composite monitor concentrations) across the U.S. and in areas included in the key epidemiologic studies and found that the maximum design value in an area was generally higher than the monitor average across that area, with the difference varying

[66] As detailed in the 2011 PA, we note the interrelatedness of the distributional statistics and a range of one standard deviation around the mean which represents approximately 68% of normally distributed data, and in that one standard deviation below the mean falls between the 25th and 10th percentiles (U.S. EPA, 2011, p. 2–71; U.S. EPA, 2005, p. 5–22).

based on location and concentration. This information was taken into account in the Administrator's final decision in selecting a level for the primary annual $PM_{2.5}$ standard the 2012 review and discussed more specifically in her considerations on adequate margin of safety.

Consistent with the approach taken in 2012, in assessing how the overall mean (or median) $PM_{2.5}$ concentrations reported in key epidemiologic studies can inform conclusions on the primary annual $PM_{2.5}$ standard, the 2022 PA notes that the relationship between mean $PM_{2.5}$ concentrations and the area design value continues to be an important consideration in evaluating the adequacy of the current or potential alternative annual $PM_{2.5}$ standard levels in this reconsideration. In a given area, the area design value is based on the monitor in an area with the highest $PM_{2.5}$ concentrations and is used to determine compliance with the standard. The highest $PM_{2.5}$ concentrations spatially distributed in the area would generally occur at or near the area design value monitor and the distribution of $PM_{2.5}$ concentrations would generally be lower in other locations and at monitors in that area. As such, when an area is meeting a specific annual standard level, the annual average exposures in that area are expected to be at concentrations lower than that level and the average of the annual average exposures across that area are expected (*i.e.,* a metric similar to the study-reported mean values) to be lower than that level.[67]

Another important consideration is that there are a substantial number of different types of epidemiologic studies available since the 2012 review, included in both the 2019 ISA and the ISA Supplement, that make understanding the relationship between the mean $PM_{2.5}$ concentrations and the area design value even more important (U.S. EPA, 2019a; U.S. EPA, 2022a). While the key epidemiologic studies in the 2012 review were all monitor-based studies, the newer studies include hybrid modeling approaches, which have emerged in the epidemiologic literature as an alternative to approaches that only use ground-based monitors to estimate exposure. As assessed in the 2019 ISA and ISA Supplement, a substantial number of epidemiologic studies used hybrid model-based methods in evaluating associations between $PM_{2.5}$ exposure and health effects (U.S. EPA, 2019a; U.S. EPA, 2022a). Hybrid model-based studies employ various fusion techniques that combine ground-based monitored data with air quality modeled estimates and/or information from satellites to estimate $PM_{2.5}$ exposures.[68] Additionally, hybrid modeling approaches tend to broaden the areas captured in the exposure assessment, and in so doing, tend to report lower mean $PM_{2.5}$ concentrations than monitor-based approaches because they include more suburban and rural areas where concentrations are lower. While these studies provide a broader estimation of $PM_{2.5}$ exposures compared to monitor-based studies (*i.e.,* $PM_{2.5}$ concentrations are estimated in areas without monitors), the hybrid modeling approaches result in study-reported means that are more difficult to relate to the annual standard metric and to the use of maximum monitor design values to assess compliance. In addition, and to further complicate the comparison, when looking across these studies, variations exist in how exposure is estimated between such studies, which in turn affects how the study means are calculated. Two important variations across studies include: (1) Variability in spatial scale used (*i.e.,* averages computed across the nation (or large portions of the country) versus a focus on only CBSAs) and (2) variability in exposure assignment methods (*i.e.,* averaging across all grid cells [non-population weighting], averaging across a scaled-up area like a ZIP code [aspects of population weighting applied], and/or applying population weighting). To elaborate further on the variability in exposure assignment methods, studies that use hybrid modeling approaches can estimate $PM_{2.5}$ concentrations at different spatial resolutions, including at 1 km x 1 km grid cells, at 12 km x 12 km grid cells, or at the census tract level. Mean reported $PM_{2.5}$ concentrations can then be estimated either by averaging up to a larger spatial resolution that corresponds to the spatial resolution for which health data exists (*e.g.,* ZIP code level) and therefore apply aspects of population weighting. These values are then averaged across all study locations at the larger spatial resolution (*e.g.,* averaged across all ZIP codes in the study) over the study period, resulting in the study-reported mean 24-hour average or average annual $PM_{2.5}$ concentration. Other studies that use hybrid modeling methods to estimate $PM_{2.5}$ concentrations may use each grid cell to calculate the study-reported mean 24-hour average or average annual $PM_{2.5}$ concentration. As such, these types of studies do not apply population weighting in their mean concentrations. In studies that use each grid cell to report a mean $PM_{2.5}$ concentration and do not apply aspects of population weighting, the study mean may not reflect the exposure concentrations used in the epidemiologic study to assess the reported association. The impact of the differences in methods is an important consideration when comparing mean concentrations across studies (U.S. EPA, 2022b, section 3.3.3.2.1). Thus, the 2022 PA also considers the methods used to estimate $PM_{2.5}$ concentrations, which vary from traditional methods using monitoring data from ground-based monitors[69] to those using more complex hybrid modeling approaches and how these methods calculate the study-reported mean $PM_{2.5}$ concentration.[70]

Given the emergence of the hybrid model-based epidemiologic studies since the 2012 review, the 2022 PA explores the relationship between the approaches used in these studies to estimate $PM_{2.5}$ concentrations and the impact that the different methods have on the study-reported mean $PM_{2.5}$ concentrations. The 2022 PA further seeks to understand how the approaches and resulting mean concentrations compare across studies, as well as what the resulting mean values represent relative to the annual standard. In so doing, the 2022 PA presents analyses that compare the area annual design values, composite monitor $PM_{2.5}$ concentrations, and mean concentrations from two hybrid modeling approaches, including evaluation of the means when population weighting is applied and when population weighting is not

[67] In setting a standard level that would require the design value monitor to meet a level equal to the study-reported mean $PM_{2.5}$ concentrations would generally result in lower concentrations of $PM_{2.5}$ across the entire area, such that even those people living near an area design value monitor (where PM concentrations are generally highest) will be exposed to $PM_{2.5}$ concentrations below the air quality conditions reported in the epidemiologic studies.

[68] More detailed information about hybrid model methods and performance is described in section 2.3.3.2 of the 2022 PA (U.S. EPA, 2022b).

[69] In those studies that use ground-based monitors alone to estimate long- or short-term $PM_{2.5}$ concentrations, approaches include: (1) $PM_{2.5}$ concentrations from a single monitor within a city/county; (2) average of $PM_{2.5}$ concentrations across all monitors within a city/county or other defined study area (*e.g.,* CBSA); or (3) population-weighted averages of exposures. Once the study location average $PM_{2.5}$ concentration is calculated, the study-reported long-term average is derived by averaging daily/annual $PM_{2.5}$ concentrations across all study locations over the entire study period.

[70] Detailed information on the methods by which mean $PM_{2.5}$ concentrations are calculated in key monitor- and hybrid model-based U.S. and Canadian epidemiologic studies are presented in Tables 3–6 through 3–9 in the 2022 PA (U.S. EPA, 2022b).

applied (U.S. EPA, 2022b, section 2.3.3.1).

In the air quality analyses comparing composite monitored $PM_{2.5}$ concentrations with annual $PM_{2.5}$ design values in U.S. CBSAs, maximum annual $PM_{2.5}$ design values were approximately 10% to 20% higher than annual average composite monitor concentrations (*i.e.,* averaged across multiple monitors in the same CBSA) (sections I.D.5.a above and U.S. EPA, 2022b, section 2.3.3.1, Figure 2–28 and Table 2–3). The difference between the maximum annual design value and average concentration in an area can be smaller or larger than this range (10–20%), depending on a variety of factors such as the number of monitors, monitor siting characteristics, the distribution of ambient $PM_{2.5}$ concentrations, and how the average concentrations are calculated (*i.e.,* averaged across monitors versus across modeled grid cells). Results of this analysis suggest that there will be a distribution of concentrations across an area and the maximum annual average monitored concentration in an area (at the design value monitor, used for compliance with the standard), will generally be 10–20% higher than the average $PM_{2.5}$ concentration across the other monitors in the area. Thus, in considering how the annual standard levels would relate to the study-reported means from key monitor-based epidemiologic studies, the 2022 PA generally concludes that an annual standard level that is no more than 10–20% higher than monitor-based study-reported mean $PM_{2.5}$ concentrations would generally maintain air quality exposures to be below those associated with the study-reported mean $PM_{2.5}$ concentrations, exposures for which the strongest support for adverse health effects occurring is available.

The 2022 PA also evaluates data from two hybrid modeling approaches (DI2019 and HA2020) that have been used in several recent epidemiologic studies (U.S. EPA, 2022b, section 2.3.3.2.4).[71] The analysis shows that the means differ when $PM_{2.5}$ concentrations are estimated in urban areas only (CBSAs) versus when the averages were calculated with all or most grid cells nationwide, likely because areas included outside of CBSAs tend to be more rural and have lower estimated $PM_{2.5}$ concentrations. The 2022 PA recognizes the importance of this variability in the means since the study areas included in the calculation of the mean, and more specifically whether a study is focused on nationwide, regional, or urban areas, will affect the calculation of the study mean based on how many rural areas, with lower estimated $PM_{2.5}$ concentrations, are included in the study area. While the determination of what spatial scale to use to estimate $PM_{2.5}$ concentrations does not inherently affect the quality of the epidemiologic study, the spatial scale can influence the calculated reported long-term mean concentration across the study area and period. The results of the analysis show that, regardless of the hybrid modeling approach assessed, the annual average $PM_{2.5}$ concentrations in CBSA-only analyses are 4–8% higher than for nationwide analyses, likely as a result of higher $PM_{2.5}$ concentrations in more densely populated areas, and exclusion of more rural areas (U.S. EPA, 2022b, Table 2–4). When evaluating comparisons between surfaces that estimate exposure using aspects of population weighting versus surfaces that do not calculate means using population weighting, surfaces that calculate long-term mean $PM_{2.5}$ concentrations with population-weighted averages have higher average annual $PM_{2.5}$ concentrations, compared to annual $PM_{2.5}$ concentrations in analyses that do not apply population weighting.[72] Analyses show that average maximum annual design values are 40 to 50% higher when compared to annual average $PM_{2.5}$ concentrations estimated without population weighting versus 15% to 18% higher when compared to average annual $PM_{2.5}$ concentrations estimated with population weighting applied (similar to the differences observed for the composite monitor comparison values for the monitor-based epidemiologic studies) (U.S. EPA, 2022b, section 2.3.3.2.4). Given these results, it is worth noting that for the studies using the hybrid modeling approaches, the choice of methodology employed in calculating the study-reported means (*i.e.,* using population weighting or not), and not a difference in estimates of exposure in the study itself, can produce substantially different study-reported mean values, where approaches that do not apply population weighting leading to much lower estimated mean $PM_{2.5}$ concentrations.

Based on these results, and similar to conclusions for the monitor-based studies, the 2022 PA generally concludes that study-reported mean concentrations in the studies that employ hybrid modeling approaches and calculate a population-weighted mean are associated with air quality conditions that would be achieved by meeting annual standard levels that are 15–18% higher than study-reported means. Therefore, an annual standard level that is no more than 15–18% higher than the study-reported means would generally maintain air quality exposures to be below those associated with the study-reported mean $PM_{2.5}$ concentrations, exposures for which we have the strongest support for adverse health effects occurring. For the studies that utilize hybrid modeling approaches but do not incorporate population weighting in calculating the mean, the annual design values associated with these air quality conditions are expected to be much higher (*i.e.,* 40–50% higher) and this larger difference makes it more difficult to consider how these studies can be used to determine the adequacy of the protection afforded by the current or potential alternative annual standards. Additionally, as noted above in studies that utilize hybrid modeling approaches and that do not incorporate population weighting in calculating the mean (*e.g.,* use each grid cell to calculate a mean $PM_{2.5}$ concentration), the study mean does not reflect the exposure concentrations used in the epidemiologic study to assess the reported association.

The 2022 PA notes that while these analyses can be useful to informing the understanding of the relationship between study-reported mean concentrations and the level of the annual standard, some limitations of this analysis must be recognized (U.S. EPA, 2022a, section 3.3.3.2.1). First, the comparisons used only two hybrid modeling approaches. Although these two hybrid modeling surfaces have been used in a number of recent epidemiologic studies, they represent just two of the many hybrid modeling approaches that have been used in epidemiologic studies to estimate $PM_{2.5}$ concentrations. These methods continue to evolve, with further development and improvement to prediction models that estimate $PM_{2.5}$ concentrations in epidemiologic studies. In addition to differences in hybrid modeling approaches, epidemiologic studies also use different methods to assign a population weighted average $PM_{2.5}$ concentration to their study population, and the assessment presented in the

[71] More details on the evaluation of the two hybrid modeling approaches is provided in section 2.3.3.2.4 of the 2022 PA (U.S. EPA, 2022b).

[72] The annual $PM_{2.5}$ concentrations for the population-weighted averages ranged from 8.2–10.2 $\mu g/m^3$, while those that do not apply population weighting ranged from 7.0–8.6 $\mu g/m^3$. Average maximum annual design values ranged from 9.5 to 11.7 $\mu g/m^3$.

2022 PA does not evaluate all of the potential methods that could be used.

Additionally, while some of these epidemiologic studies also provide information on the broader distributions of exposure estimates and/or health events and the $PM_{2.5}$ concentrations corresponding to the lower percentiles of those data (*e.g.,* 25th and/or 10th), the air quality analysis in the 2022 PA focuses on mean $PM_{2.5}$ concentrations and a similar comparison for lower percentiles of data was not assessed. Therefore, any direct comparison of study-reported $PM_{2.5}$ concentrations corresponding to lower percentiles and annual design values is more uncertain than such comparisons with the mean. Finally, air quality analysis presented in the 2022 PA and detailed above in section I.D.5 included two hybrid modeling-based approaches that used U.S.-based air quality information for estimating $PM_{2.5}$ concentrations. As such, the analyses are most relevant to interpreting the study-reported mean concentrations from U.S. epidemiologic studies and do not provide additional information about how the mean exposures concentrations reported in epidemiologic studies in other countries would compare to annual design values observed in the U.S. In addition, while information from Canadian studies can be useful in assessing the adequacy of the annual standard, differences in the exposure environments and population characteristics between the U.S. and other countries can affect the study-reported mean value and its relationship with the annual standard level. Sources and pollutant mixtures, as well as $PM_{2.5}$ concentration gradients, may be different between countries, and the exposure environments in other countries may differ from those observed in the U.S. Furthermore, differences in population characteristics and population densities can also make it challenging to directly compare studies from countries outside of the U.S. to a design value in the U.S.

As with the experimental studies discussed above, the 2022 PA focuses on epidemiologic studies assessed in the 2019 ISA and ISA Supplement that have the potential to be most informative in reaching decisions on the adequacy of the primary $PM_{2.5}$ standards. The 2022 PA focuses on epidemiologic studies that provide strong support for ''causal'' or ''likely to be causal'' relationships with $PM_{2.5}$ exposures in the 2019 ISA. Further, the 2022 PA also focuses on the health effect associations that are determined in the 2019 ISA and ISA Supplement to be consistent across studies, coherent with the broader body of evidence (*e.g.,* including animal and controlled human exposure studies), and robust to potential confounding by co-occurring pollutants and other factors.[73] In particular the 2022 PA considers the U.S. and Canadian epidemiologic studies to be more useful for reaching conclusions on the current standards than studies conducted in other countries, given that the results of the U.S. and Canadian studies are more directly applicable for quantitative considerations, whereas studies conducted in other countries reflect different populations, exposure characteristics, and air pollution mixtures. Additionally, epidemiologic studies outside of the U.S. and Canada generally reflect higher $PM_{2.5}$ concentrations in ambient air than are currently found in the U.S., and are less relevant to informing questions about adequacy of the current standards.[74] However, and as noted above, the 2022 PA also recognizes that while information from Canadian studies can be useful in assessing the adequacy of the annual standard, there are still important differences between the exposure environments in the U.S. and Canada and interpreting the data (*e.g.,* mean concentrations) from the Canadian studies in the context of a U.S.-based standard may present challenges in directly and quantitatively informing questions regarding the adequacy of the current or potential alternative the levels of the annual standard. Lastly, the 2022 PA emphasizes multicity/multistate studies that examine health effect associations, as such studies are more encompassing of the diverse atmospheric conditions and population demographics in the U.S. than studies that focus on a single city or State. Figures 3–4 through 3–7 in the 2022 PA summarize the study details for the key U.S. and Canadian epidemiologic studies (U.S. EPA, 2022b, section 3.3.3.2.1).[75]

The key epidemiologic studies identified in the 2022 PA indicate generally positive and statistically significant associations between estimated $PM_{2.5}$ exposures (short- or long-term) and mortality or morbidity across a range of ambient $PM_{2.5}$ concentrations (U.S. EPA, 2022b, section 3.3.3.2.1), report overall mean (or median) $PM_{2.5}$ concentrations, and include those for which the years of $PM_{2.5}$ air quality data used to estimate exposures overlap entirely with the years during which health events are reported.[76] Additionally, for studies that estimate $PM_{2.5}$ exposure using hybrid modeling approaches, the 2022 PA also considers the approach used to estimate $PM_{2.5}$ concentrations and the approach used to validate hybrid model predictions when evaluating those studies as key epidemiologic studies[77] and focuses on those studies that use recent methods based on surfaces that are with fused with monitored $PM_{2.5}$

[73] As described in the Preamble to the ISAs (U.S. EPA, 2015), ''the U.S. EPA emphasizes the importance of examining the pattern of results across various studies and does not focus solely on statistical significance or the magnitude of the direction of the association as criteria of study reliability. Statistical significance is influenced by a variety of factors including, but not limited to, the size of the study, exposure and outcome measurement error, and statistical model specifications. Statistical significance may be informative; however, it is just one of the means of evaluating confidence in the observed relationship and assessing the probability of chance as an explanation. Other indicators of reliability such as the consistency and coherence of a body of studies as well as other confirming data may be used to justify reliance on the results of a body of epidemiologic studies, even if results in individual studies lack statistical significance. Traditionally, statistical significance is used to a larger extent to evaluate the findings of controlled human exposure and animal toxicological studies. Understanding that statistical inferences may result in both false positives and false negatives, consideration is given to both trends in data and reproducibility of results. Thus, in drawing judgments regarding causality, the U.S. EPA emphasizes statistically significant findings from experimental studies, but does not limit its focus or consideration to statistically significant results in epidemiologic studies.''

[74] This emphasis on studies conducted in the U.S. or Canada is consistent with the approach in the 2012 and 2020 reviews of the PM NAAQS (U.S. EPA, 2011, section 2.1.3; U.S. EPA, 2020b, section 3.2.3.2.1) and with approaches taken in other NAAQS reviews. However, the importance of studies in the U.S., Canada, and other countries in informing an ISA's considerations of the weight of the evidence that informs causality determinations is recognized.

[75] The cohorts examined in the studies included in Figure 3–4 to Figure 3–7 of the 2022 PA include large numbers of individuals in the general population, and often also include those populations identified as at-risk (*i.e.,* children, older adults, minority populations, and individuals with pre-existing cardiovascular and respiratory disease).

[76] For some studies of long-term $PM_{2.5}$ exposures, exposure is estimated from air quality data corresponding to only part of the study period, often including only the later years of the health data, and are not likely to reflect the full ranges of ambient $PM_{2.5}$ concentrations that contributed to reported associations. While this approach can be reasonable in the context of an epidemiologic study that is evaluating health effect associations with long-term $PM_{2.5}$ exposures, under the assumption that spatial patterns in $PM_{2.5}$ concentrations are not appreciably different during time periods for which air quality information is not available (*e.g.,* Chen et al., 2016), the 2022 PA focuses on the distribution of ambient $PM_{2.5}$ concentrations that could have contributed to reported health outcomes. Therefore, the 2022 PA identifies studies as key epidemiologic studies when the years of air quality data and health data overlap in their entirety.

[77] Such studies are identified as those that use hybrid modeling approaches for which recent methods and models were used (*e.g.,* recent versions and configurations of the air quality models); studies that are fused with $PM_{2.5}$ data from national monitoring networks (*i.e.,* FRM/FEM data); and studies that reported a thorough model performance evaluation for core years of the study.

concentration data (U.S. EPA, 2022b, section 3.3.3.2.1).

Figure 1 below (U.S. EPA, 2022b, Figure 3–8) highlights the overall mean (or median) $PM_{2.5}$ concentrations reported in key U.S. studies that use ground-based monitors alone to estimate long- or short-term $PM_{2.5}$ exposure.[78] For the small subset of studies with available information on the broader distributions of underlying data, Figure 1 below also identifies the study-period $PM_{2.5}$ concentrations corresponding to the 25th and 10th percentiles of health events[79] (see Appendix B, Section B.2 of the 2022 PA for more information). Figure 2 (U.S. EPA, 2022a, Figure 3–14) presents overall means of predicted $PM_{2.5}$ concentrations for key U.S. model-based epidemiologic studies that apply aspects of population-weighting, and the concentrations corresponding to the 25th and 10th percentiles of estimated exposures or health events[80] when available (see Appendix B, section B.3 for additional information).[81]

[78] Canadian studies that use ground-based monitors estimate long- or short-term $PM_{2.5}$ exposures are found in Figure 3–9 of the 2022 PA, including concentrations corresponding to the 25th and 10th percentiles of estimated exposures or health events, when available (U.S. EPA, 2022b).

[79] That is, 25% of the total health events occurred in study locations with mean $PM_{2.5}$ concentrations (*i.e.,* averaged over the study period) below the 25th percentiles identified in Figure 3–8 of the 2022 PA and 10% of the total health events occurred in study locations with mean $PM_{2.5}$ concentrations below the 10th percentiles identified.

[80] For most studies in Figure 2 below (Figure 3–14 in the 2022 PA), 25th percentiles of exposure estimates are presented. The exception is Di et al. (2017b), for which Figure 2 (U.S. EPA, 2022b, Figure 3–14) presents the short-term $PM_{2.5}$ exposure estimates corresponding to the 25th and 10th percentiles of deaths in the study population (*i.e.,* 25% and 10% of deaths occurred at concentrations below these concentrations). In addition, the authors of Di et al. (2017b) provided population-weighted exposure values. The 10th and 25th percentiles of these population-weighted exposure estimates are 7.9 and 9.5 $\mu g/m^3$, respectively.

[81] Overall mean (or median) $PM_{2.5}$ concentrations reported in key Canadian studies that use model-based approaches to estimate long- or short-term $PM_{2.5}$ concentrations and the concentrations corresponding to the 25th and 10th percentiles of estimated exposures or health events, when available are found in Figure 3–9 of the 2022 PA (U.S. EPA, 2022b).

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Figure 1. Monitor-based $PM_{2.5}$ Concentrations in Key U.S. Epidemiologic Studies. (Asterisks denote studies included in the ISA Supplement)

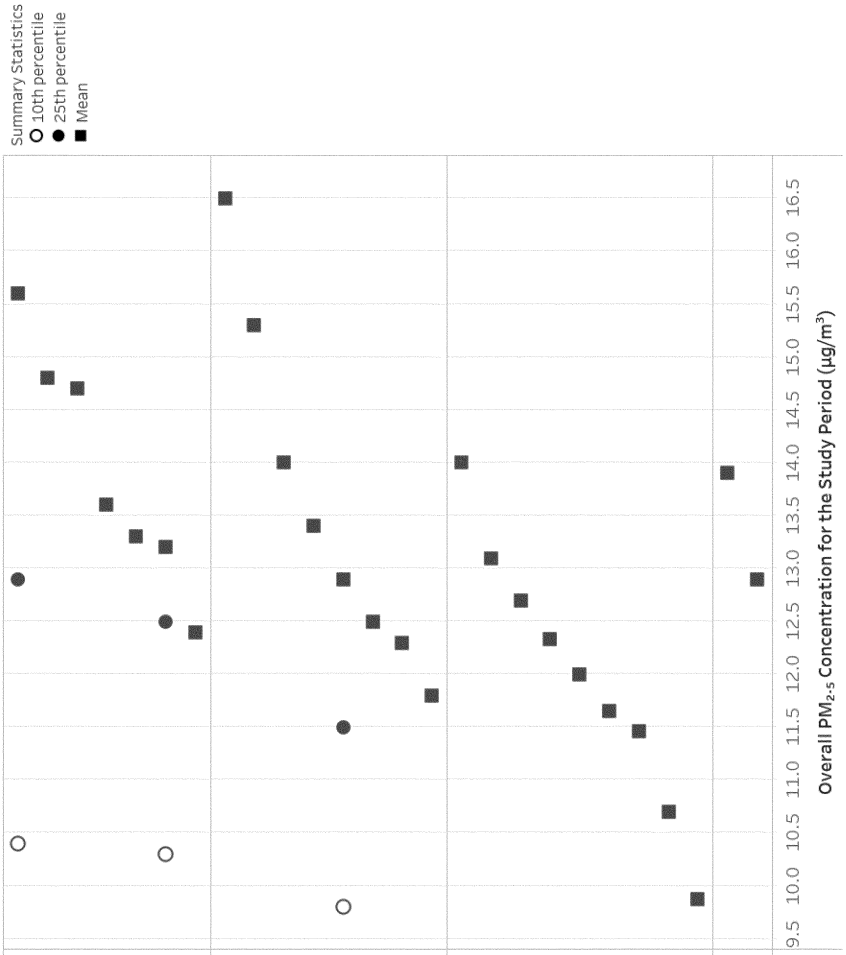
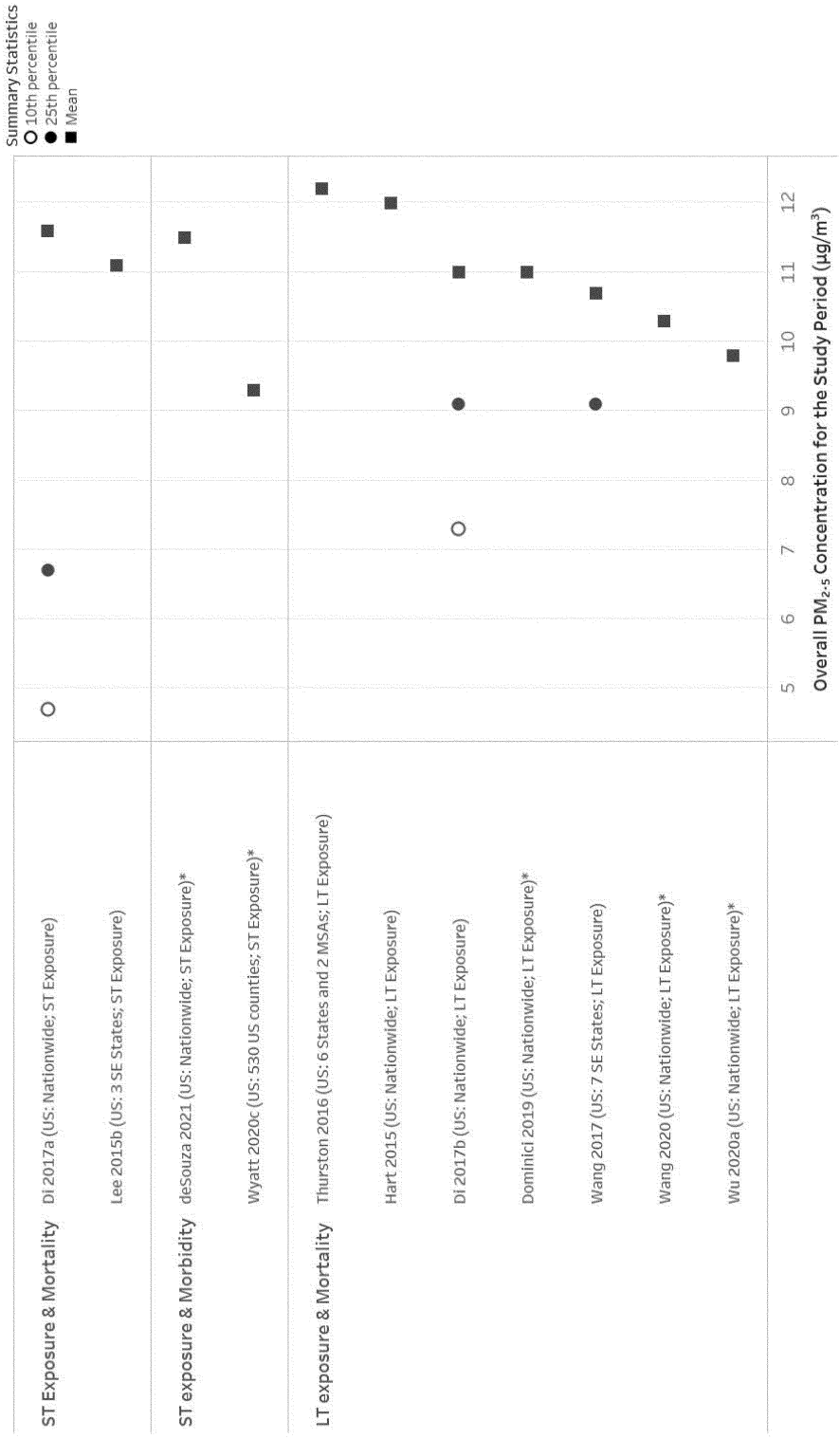


Figure 2. Hybrid Model-Predicted $PM_{2.5}$ Concentrations in Key U.S. Epidemiologic Studies that Apply Aspects of Population-Weighting. (Asterisks denote studies included in the ISA Supplement)



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Based on its evaluation of study-reported mean concentrations, the 2022 PA notes that key epidemiologic studies conducted in the U.S. or Canada report generally positive and statistically significant associations between estimated $PM_{2.5}$ exposures (short- or long-term) and mortality or morbidity across a wide range of ambient $PM_{2.5}$ concentrations (U.S. EPA, 2022b, section 3.3.3.2.1). The 2022 PA makes a number of observations with regard to the study-reported $PM_{2.5}$ concentrations in the key U.S. and Canadian epidemiologic studies.

The 2022 PA first considers the $PM_{2.5}$ concentrations from the key U.S. epidemiologic studies. For studies that use monitors to estimate $PM_{2.5}$ exposures, overall mean $PM_{2.5}$ concentrations range between 9.9 µg/m^3 [82] to 16.5 µg/m^3 (Figure 1 above and

[82] This is generally consistent with, but slightly below, the lowest study-reported mean $PM_{2.5}$ concentration from monitor-based studies available

Continued

U.S. EPA, 2022b, Figure 3–8). For key U.S. epidemiologic studies that use hybrid model-predicted exposures and apply aspects of population-weighting, mean $PM_{2.5}$ concentrations range from 9.3 μg/m³ to just above 12.2 μg/m³ (Figure 2 above and U.S. EPA, 2022b, Figure 3–14). In studies that average up from the grid cell level to the ZIP code, postal code, or census tract level, mean $PM_{2.5}$ concentrations range from 9.8 μg/m³ to 12.2 μg/m³. The one study that population-weighted the grid cell prior to averaging up to the ZIP code or census tract level reported mean $PM_{2.5}$ concentrations of 9.3 μg/m³. Based on air quality analyses noted above, these hybrid modelled epidemiologic studies are expected to report means similar to those from monitor-based studies.

Other key U.S. epidemiologic studies that use hybrid modeling approaches estimate mean $PM_{2.5}$ exposure by averaging each grid cell across the entire study area, whether that be the nation or a region of the country. These studies do not weight the estimated exposure concentrations based on population density or location of health events. As such, the study mean reported in these studies may not reflect the exposure concentrations used in the epidemiologic study to assess the reported association. As a result, these reported mean concentrations are the most different (and much lower) than the means reported in monitor-based studies. Due to the methodology employed in calculating the study-reported means and not necessarily a difference in estimates of exposure, these epidemiologic studies are expected to report some of the lowest mean values. For these studies, the reported mean $PM_{2.5}$ concentrations range from 8.1 μg/m³ to 11.9 μg/m³ (U.S. EPA, 2022b, Figure 3–14). As noted above, for studies that utilize hybrid modeling approaches but do not incorporate population weighting into the reported mean calculation, the associated annual design values would be expected to be much higher (*i.e.,* 40–50% higher) than the study-reported means. This larger difference between design values and study-reported mean concentrations makes it more difficult to consider how these studies can be used to determine the adequacy of the protection afforded by the current or potential alternative annual standards (U.S. EPA, 2022b, section 3.3.3.2.1).

In addition to the mean $PM_{2.5}$ concentrations, a subset of the key U.S. epidemiologic studies report $PM_{2.5}$ concentrations corresponding to the 25th and 10th percentiles of health data or exposure estimates to provide insight into the concentrations that comprise the lower quartile of the air quality distributions. In studies that use monitors to estimate $PM_{2.5}$ exposures, 25th percentiles of health events correspond to $PM_{2.5}$ concentrations (*i.e.,* averaged over the study period for each study city) at or above 11.5 μg/m³ and 10th percentiles of health events correspond to $PM_{2.5}$ concentrations at or above 9.8 μg/m³ (*i.e.,* 25% and 10% of health events, respectively, occur in study locations with $PM_{2.5}$ concentrations below these values) (Figure 1 above and U.S. EPA, 2022b, Figure 3–8). Of the key U.S. epidemiologic studies that use hybrid modeling approaches and apply population-weighting to estimate long-term $PM_{2.5}$ exposures, the ambient $PM_{2.5}$ concentrations corresponding to 25th percentiles of estimated exposures are 9.1 μg/m³ (Figure 2 and U.S. EPA, 2022b, Figure 3–14). In key U.S. epidemiologic studies that use hybrid modeling approaches and apply population-weighting to estimate short-term $PM_{2.5}$ exposures, the ambient concentrations corresponding to 25th percentiles of estimated exposures, or health events, are 6.7 μg/m³ (Figure 2 and U.S. EPA, 2022b, Figure 3–14). In key U.S. epidemiologic studies that use hybrid modeling approaches and do not apply population-weighting to estimate $PM_{2.5}$ exposures, the ambient concentrations corresponding to 25th percentiles of estimated exposures, or health events, range from 4.6 to 9.2 μg/m³ (U.S. EPA, 2022b, Figure 3–14).[83] In the key epidemiologic studies that apply hybrid modeling approaches with population-weighting and with information available on the 10th percentile of health events, the ambient $PM_{2.5}$ concentration corresponding to that 10th percentile range from 4.7 μg/m³ to 7.3 μg/m³ (Figure 2 and U.S. EPA, 2022b, Figure 3–14).

The 2022 PA next considers the $PM_{2.5}$ concentrations from the key Canadian epidemiologic studies. Generally, the study-reported mean concentrations in Canadian studies are lower than those reported in the U.S. studies for both monitor-based and hybrid model methods. For the majority of key Canadian epidemiologic studies that use monitor-based exposure, mean $PM_{2.5}$ concentrations generally ranged from 7.0 μg/m³ to 9.0 μg/m³ (U.S. EPA, 2022b, Figure 3–9). For these studies, 25th percentiles of health events correspond to $PM_{2.5}$ concentrations at or above 6.5 μg/m³ and 10th percentiles of health events correspond to $PM_{2.5}$ concentrations at or above 6.4 μg/m³ (U.S. EPA, 2022b, Figure 3–9). For the key Canadian epidemiologic studies that use hybrid model-predicted exposure, the mean $PM_{2.5}$ concentrations are generally lower than in U.S. model-based studies (U.S. EPA, 2022b, Figure 3–10), ranging from approximately 6.0 μg/m³ to just below 10.0 μg/m³ (U.S. EPA, 2022b, Figure 3–11). The majority of the key Canadian epidemiologic studies that used hybrid modeling were completed at the nationwide scale, while four studies were completed at the regional geographic spatial scale. In addition, all the key Canadian epidemiologic studies apply aspects of population weighting, where all grid cells within a postal code are averaged, individuals are assigned exposure at the postal code resolution, and study mean $PM_{2.5}$ concentrations are based on the average of individual exposures. The majority of studies estimating exposure nationwide range between just below 6.0 μg/m³ to 8.0 μg/m³ (U.S. EPA, 2022b, Figure 3–11). One study by Erickson et al. (2020) presents an analysis related immigrant status and length of residence in Canada versus non-immigrant populations, which accounts for the four highest mean $PM_{2.5}$ concentrations which range between 9.0 μg/m³ and 10.0 μg/m³ (U.S. EPA, 2022b, Figure 3–11). The four studies that estimate exposure at the regional scale report mean $PM_{2.5}$ concentrations that range from 7.8 μg/m³ to 9.8 μg/m³ (U.S. EPA, 2022b, Figure 3–11). Three key Canadian epidemiologic studies report information on the 25th percentile of health events. In these studies, the ambient $PM_{2.5}$ concentration corresponding to the 25th percentile is approximately 8.0 μg/m³ in two studies, and 4.3 μg/m³ in a third study (U.S. EPA, 2022b, Figure 3–11).

In addition to the expanded body of evidence from the key U.S. epidemiologic studies discussed above, there are also a subset of epidemiologic studies that have emerged that further inform an understanding of the relationship between $PM_{2.5}$ exposure and health effects, including studies with the highest exposures excluded (restricted analyses), epidemiologic studies that employed statistical approaches that attempt to more extensively account for confounders and are more robust to model misspecification (*i.e.,* used alternative

in the 2020 PA, which was 10.7 μg/m³ (U.S. EPA, 2020a, Figure 3–7).

[83] In the one study that reports 25th percentile exposure estimates of 4.6 μg/m³ (Shi et al., 2016), the authors report that most deaths occurred at or above the 75th percentile of annual exposure estimates (*i.e.,* 10 μg/m³). The short-term exposure estimates accounting for most deaths are not presented in the published study.

methods for confounder control),[84] and accountability studies (U.S. EPA, 2019a, U.S. EPA, 2021a, U.S. EPA, 2022a).

Restricted analyses are studies that examine health effect associations in analyses with the highest exposures excluded, restricting analyses to daily exposures less than the 24-hour primary $PM_{2.5}$ standard and annual exposures less than the annual $PM_{2.5}$ standard. The 2022 PA presents a summary of restricted analyses evaluated in the 2019 ISA and ISA Supplement (U.S. EPA, 2022b, Table 3–10). The restricted analyses can be informative in assessing the nature of the association between long-term exposures (*e.g.,* annual average concentrations <12.0 μg/m³) or short-term exposures (*e.g.,* daily concentrations <35 μg/m³) when looking only at exposures to lower concentrations, including whether the association persists in such restricted analyses compared to the same analyses for all exposures, as well as whether the association is stronger, in terms of magnitude and precision, than when completing the same analysis for all exposures. While these studies are useful in supporting the confidence and strength of associations at lower concentrations, these studies also have inherent uncertainties and limitations, including uncertainty in how studies exclude concentrations (*e.g.,* are they excluded at the modeled grid cell level, the ZIP code level) and in how concentrations in studies that restrict air quality data relate to design values for the annual and 24-hour standards. Further, these studies often do not report descriptive statistics (*e.g.,* mean $PM_{2.5}$ concentrations, or concentrations at other percentiles) that allow for additional consideration of this information. As such, while these studies can provide additional supporting evidence for associations at lower concentrations, the 2022 PA notes that there are also limitations in how to interpret these studies when evaluating the adequacy of the current or potential alternative standards.

Restricted analyses provide additional information on the nature of the association between long- or short-term exposures when analyses are restricted to lower $PM_{2.5}$ concentrations and indicate that effect estimates are generally greater in magnitude in the restricted analyses for long- and short-term $PM_{2.5}$ exposure compared to the main analyses. In two U.S. studies that report mean $PM_{2.5}$ concentrations in restricted analyses and that estimate effects associated with long-term exposure to $PM_{2.5}$, the effect estimates are greater in the restricted analyses than in the main analyses. Di et al. (2017a) and Dominici et al. (2019) report positive and statistically significant associations in analyses restricted to concentrations less than 12.0 μg/m³ for all-cause mortality and effect estimates are greater in the restricted analyses than effect estimates reported in main analyses. In addition, both studies report mean $PM_{2.5}$ concentrations of 9.6 μg/m³. While none of the U.S. studies of short-term exposure present mean $PM_{2.5}$ concentrations for the restricted analyses, these studies generally have mean 24-hour average $PM_{2.5}$ concentrations in the main analyses below 12.0 μg/m³, and report increases in the effect estimates in the restricted analyses compared to the main analyses. Additionally, in the one Canadian study of long-term $PM_{2.5}$ exposure, Zhang et al. (2021) conducted analyses where annual $PM_{2.5}$ concentrations were restricted to concentrations below 10.0 μg/m³ and 8.8 μg/m³, which presumably have lower mean concentrations than the mean of 7.8 μg/m³ reported in the main analyses, though restricted analysis mean $PM_{2.5}$ concentrations are not reported. Effect estimates for non-accidental mortality are greater in analyses restricted to $PM_{2.5}$ concentrations less than 10.0 μg/m³, but less in analyses restricted to <8.8 μg/m³.

The second type of studies that have recently emerged and further inform the consideration of the relationship between $PM_{2.5}$ exposure and health effects in the 2022 PA are those that employ alternative methods for confounder control. Alternative methods for confounder control seek to mimic randomized experiments through the use of study design and statistical methods to more extensively account for confounders and are more robust to model misspecification. The 2022 PA presents a summary of the studies that employ alternative methods for confounder control, and employ a variety of statistical methods, which are evaluated in the 2019 ISA and ISA Supplement (U.S. EPA, 2022b, Table 3–11). These studies reported consistent results among large study populations across the U.S. and can further inform the relationship between long- and short-term $PM_{2.5}$ exposure and total mortality. Studies that employ alternative methods for confounder control to assess the association between long-term exposure to $PM_{2.5}$ and mortality reduce uncertainties related to confounding and provide additional support for the associations reported in the broader body of cohort studies that examined long-term $PM_{2.5}$ exposure and mortality.

Lastly, there is a subset of epidemiologic studies that assess whether long-term reductions in ambient $PM_{2.5}$ concentrations result in corresponding reductions in health outcomes. These include studies that evaluate the potential for improvements in public health, including reductions in mortality rates, increases in life expectancy, and reductions in respiratory disease as ambient $PM_{2.5}$ concentrations have declined over time. Some of these studies, accountability studies, provide insight on whether the implementation of environmental policies or air quality interventions result in changes/reductions in air pollution concentrations and the corresponding effect on health outcomes.[85] The 2022 PA presents a summary of these studies, which are assessed in the 2019 ISA and ISA Supplement (U.S. EPA, 2022b, Table 3–12). These studies lend support for the conclusion that improvements in air quality are associated with improvements in public health.

More specifically, of the accountability studies that account for changes in $PM_{2.5}$ concentrations due to a policy or the implementation of an intervention and whether there was evidence of changes in associations with mortality or cardiovascular effects as a result of changes in annual $PM_{2.5}$ concentrations, Corrigan et al. (2018), Henneman et al. (2019) and Sanders et al. (2020a) present analyses with starting $PM_{2.5}$ concentrations (or concentrations prior to the policy or intervention) below 12.0 μg/m³. Henneman et al. (2019) explored changes in modeled $PM_{2.5}$ concentrations following the retirement of coal fired power plants in the U.S., and found that reductions from mean annual $PM_{2.5}$ concentrations of 10.0 μg/m³ in 2005 to mean annual $PM_{2.5}$ concentrations of 7.2 μg/m³ in 2012 from coal-fueled power plants resulted in corresponding reductions in the number of cardiovascular-related

[84] As noted in the ISA Supplement (U.S. EPA, 2022a, p. 1–3): ''In the peer-reviewed literature, these epidemiologic studies are often referred to as alternative methods for confounder control. For the purposes of this Supplement, this terminology is not used to prevent confusion with the main scientific conclusions (*i.e.,* the causality determinations) presented within an ISA. In addition, as is consistent with the weight-of-evidence framework used within ISAs and discussed in the Preamble to the Integrated Science Assessments, an individual study on its own cannot inform causality, but instead represents a piece of the overall body of evidence.''

[85] Given the nature of these studies, the majority tend to focus on time periods in the past during which ambient $PM_{2.5}$ concentrations were substantially higher than those measured more recently (*e.g.,* see U.S. EPA, 2022b, Figure 2–16).

hospital admissions, including for all cardiovascular disease, acute MI, stroke, heart failure, and ischemic heart disease in those aged 65 and older. Corrigan et al. (2018) examined whether there was a change in the cardiovascular mortality rate before (2000–2004) and after (2005–2010) implementation of the first annual $PM_{2.5}$ NAAQS implementation based on mortality data from the National Center for Health Statistics and reported 1.10 (95% confidence interval (CI): 0.37, 1.82) fewer cardiovascular deaths per year per 100,000 people for each 1 μg/m³ reduction in annual $PM_{2.5}$ concentrations. When comparing whether counties met the annual $PM_{2.5}$ standard (attainment counties), there were 1.96 (95% CI: 0.77, 3.15) fewer cardiovascular deaths for each 1 μg/m³ reduction in annual $PM_{2.5}$ concentrations between the two periods for attainment counties, whereas in non-attainment counties (*e.g.,* counties that did not meet the annual $PM_{2.5}$ standard), there were 0.59 (95% CI: − 0.54, 1.71) fewer cardiovascular deaths between the two periods. And lastly, Sanders et al. (2020a) examined whether policy actions (*i.e.,* the first annual $PM_{2.5}$ NAAQS implementation rule in 2005 for the 1997 annual $PM_{2.5}$ standard with a 3-year annual average of 15 μg/m³) reduced $PM_{2.5}$ concentrations and mortality rates in Medicare beneficiaries between 2000–2013. They report evidence of changes in associations with mortality (a decreased mortality rate of ~0.5 per 1,000 in attainment and non-attainment areas) due to changes in annual $PM_{2.5}$ concentrations in both attainment and non-attainment areas. Additionally, attainment areas had starting concentrations below 12.0 μg/m³ prior to implementation of the annual $PM_{2.5}$ NAAQS in 2005. In addition, following implementation of the annual $PM_{2.5}$ NAAQS, annual $PM_{2.5}$ concentrations decreased by 1.59 μg/m³ (95% CI: 1.39, 1.80) which corresponded to a reduction in mortality rates among individuals 65 years and older (0.93% [95% CI: 0.10%, 1.77%]) in non-attainment counties relative to attainment counties. In a life expectancy study, Bennett et al. (2019) reports increases in life expectancy in all but 14 counties (1325 of 1339 counties) that have exhibited reductions in $PM_{2.5}$ concentrations from 1999 to 2015. These studies provide support for improvements in public health following the implementation of policies, including in areas with $PM_{2.5}$ concentrations below the level of the current annual standard, as well as increases in life expectancy in areas with reductions in $PM_{2.5}$ concentrations.

d. Uncertainties in the Health Effects Evidence

The 2022 PA recognizes that there are a number of uncertainties and limitations associated with the available health effects evidence. Although the epidemiologic studies clearly demonstrate associations between long- and short-term $PM_{2.5}$ exposures and health outcomes, several uncertainties and limitations in the health effects evidence remain. Epidemiologic studies evaluating short-term $PM_{2.5}$ exposure and health effects have reported heterogeneity in associations between cities and geographic regions within the U.S. Heterogeneity in the associations observed across epidemiologic studies may be due in part to exposure error related to measurement-related issues, the use of central fixed-site monitors to represent population exposure to $PM_{2.5}$, and a limited understanding of factors including exposure error related to measurement-related issues, variability in $PM_{2.5}$ composition regionally, and factors that result in differential exposures (*e.g.,* topography, the built environment, housing characteristics, personal activity patterns). Heterogeneity is expected when the methods or the underlying distribution of covariates vary across studies (U.S. EPA, 2019a, p. 6–221). Studies assessed in the 2019 ISA and ISA Supplement have advanced the state of exposure science by presenting innovative methodologies to estimate PM exposure, detailing new and existing measurement and modeling methods, and further informing our understanding of the influence of exposure measurement error due to exposure estimation methods on the associations between $PM_{2.5}$ and health effects reported in epidemiologic studies (U.S. EPA, 2019a, section 1.2.2; U.S. EPA, 2022a). Data from $PM_{2.5}$ monitors continue to be commonly used in health studies as a surrogate for $PM_{2.5}$ exposure, and often provide a reasonable representation of exposures throughout a study area (U.S. EPA, 2019a, section 3.4.2.2; U.S. EPA, 2022a, section 3.2.2.2.2). However, an increasing number of studies employ hybrid modeling methods to estimate $PM_{2.5}$ exposure using data from several sources, often including satellites and models, in addition to ground-based monitors. These hybrid models typically have good cross-validation, especially for $PM_{2.5}$, and have the potential to reduce exposure measurement error and uncertainty in the health effect estimates from epidemiologic models of long-term exposure (U.S. EPA, 2019a, section 3.5; U.S. EPA, 2022a, section 2.3.3).

While studies using hybrid modeling methods have reduced exposure measurement error and uncertainty in the health effect estimates, these studies use a variety of approaches to estimate $PM_{2.5}$ concentrations and to assign exposure to assess the association between health outcomes and $PM_{2.5}$ exposure. This variability in methodology has inherent limitations and uncertainties, as described in more detail in section 2.3.3.1.5 of the 2022 PA, and the performance of the modeling approaches depends on the availability of monitoring data which varies by location. Factors that likely contribute to poorer model performance often coincide with relatively low ambient $PM_{2.5}$ concentrations, in areas where predicted exposures are at a greater distance to monitors, and under conditions where the reliability and availability of key datasets (*e.g.,* air quality modeling) are limited. Thus, uncertainty in hybrid model predictions becomes an increasingly important consideration as lower predicted concentrations are considered.

Regardless of whether a study uses monitoring data or a hybrid modeling approach when estimating $PM_{2.5}$ exposures, one key limitation that persists is associated with the interpretation of the study-reported mean $PM_{2.5}$ concentrations and how they compare to design values, the metric that describes the air quality status of a given area relative to the NAAQS.[86] As discussed above in section II.B.3.b, the overall mean $PM_{2.5}$ concentrations reported by key epidemiologic studies reflect averaging of short- or long-term $PM_{2.5}$ exposure estimates across location (*i.e.,* across multiple monitors or across modeled grid cells) and over time (*i.e.,* over several years). For monitor-based studies, the comparison is somewhat more straightforward than for studies that use hybrid modeling methods, as the monitors used to estimate exposure in the epidemiologic studies are generally the same monitors that are used to calculate design values for a given area. It is expected that areas meeting a $PM_{2.5}$ standard with a particular level would be expected to have average $PM_{2.5}$ concentrations (*i.e.,* averaged across space and over time in the area) somewhat below that standard level., but the difference between the maximum annual design value and

[86] For the annual $PM_{2.5}$ standard, design values are calculated as the annual arithmetic mean $PM_{2.5}$ concentration, averaged over 3 years. For the 24-hour standard, design values are calculated as the 98th percentile of the annual distribution of 24-hour $PM_{2.5}$ concentrations, averaged over three years (Appendix N of 40 CFR part 50).

average concentration in an area can be smaller or larger than analyses presented above in section I.D.5.a, likely depending on factors such as the number of monitors, monitor siting characteristics, and the distribution of ambient $PM_{2.5}$ concentrations. For studies that use hybrid modeling methods to estimate $PM_{2.5}$ concentrations, the comparison between study-reported mean $PM_{2.5}$ concentrations and design values is more complicated given the variability in the modeling methods, temporal scales (*i.e.,* daily versus annual), and spatial scales (*i.e.,* nationwide versus urban) across studies. Analyses above in section I.D.5.b and detailed more in the 2022 PA (U.S. EPA, 2022b, section 2.3.3.2.4) present a comparison between two hybrid modeling surfaces, which explored the impact of these factors on the resulting mean $PM_{2.5}$ concentrations and provided additional information about the relationship between mean concentrations from studies using hybrid modeling methods and design values. However, the results of those analyses only reflect two surfaces and two types of approaches, so uncertainty remains in understanding the relationship between estimated modeled $PM_{2.5}$ concentrations and design values more broadly across hybrid modeling studies. Moreover, this analysis was completed using two hybrid modeling methods that estimate $PM_{2.5}$ concentrations in the U.S., thus an additional uncertainty includes understanding the relationship between modeled $PM_{2.5}$ concentrations and design values reported in Canada.

In addition, where $PM_{2.5}$ and other pollutants (*e.g.,* ozone, nitrogen dioxide, and carbon monoxide) are correlated, it can be difficult to distinguish whether attenuation of effects in some studies results from copollutant confounding or collinearity with other pollutants in the ambient mixture (U.S. EPA, 2019a, section 1.5.1; U.S. EPA, 2022a, section 2.2.1). Studies evaluated in the 2019 ISA and ISA Supplement further examined the potential confounding effects of both gaseous and particulate copollutants on the relationship between long- and short-term $PM_{2.5}$ exposure and health effects. As noted in the Appendix to the 2019 ISA (U.S. EPA, 2019a, Table A–1), copollutant models are not without their limitations, such as instances for which correlations are high between pollutants resulting in greater copollutant confounding bias in results. However, the studies continue to provide evidence indicating that associations with $PM_{2.5}$ are relatively unchanged in copollutants models (U.S. EPA, 2019a, section 1.5.1; U.S. EPA, 2022a, section 2.2.1).

Another area of uncertainty is associated with other potential confounders, beyond copollutants. Some studies have expanded the examination of potential confounders to not only include copollutants, but also systematic evaluations of the potential impact of inadequate control from long-term temporal trends and weather (U.S. EPA, 2019a, section 11.1.5.1). Analyses examining these covariates further confirm that the relationship between $PM_{2.5}$ exposure and mortality is unlikely to be biased by these factors. Other studies have explored the use of alternative methods for confounder control to more extensively account for confounders and are more robust to model misspecification that can further inform the causality determination for long-term and short-term $PM_{2.5}$ and mortality and cardiovascular effects (U.S. EPA, 2019a, section 11.2.2.4; U.S. EPA, 2022a, sections 3.1.1.3, 3.1.2.3, 3.2.1.2, and 3.2.2.3). These studies indicate that bias from unmeasured confounders can occur in either direction, although controlling for these confounders did not result in the elimination of the association, but instead provided additional support for associations between long-term $PM_{2.5}$ exposure and mortality when accounting for additional confounders (U.S. EPA, 2022a, section 3.2.2.2.6).

Another important limitation associated with the evidence is that, while epidemiologic studies indicate associations between $PM_{2.5}$ and health effects, the currently available evidence does not identify particular $PM_{2.5}$ concentrations that do not elicit health effects. Rather, health effects can occur over the entire distribution of ambient $PM_{2.5}$ concentrations evaluated, and epidemiologic studies conducted to date do not identify a population-level threshold below which it can be concluded with confidence that $PM_{2.5}$-related effects do not occur.

Overall, evidence assessed in the 2019 ISA and ISA Supplement continues to indicate a linear, no-threshold C–R relationship for $PM_{2.5}$ concentrations >8 $\mu g/m^3$. However, uncertainties remain about the shape of the C–R curve at $PM_{2.5}$ concentrations <8 $\mu g/m^3$, with some recent studies providing evidence for either a sublinear, linear, or supralinear relationship at these lower concentrations (U.S. EPA, 2019a, section 11.2.4; U.S. EPA, 2022a, section 2.2.3.2).

There are also a number of uncertainties and limitations associated with the experimental evidence (*i.e.,* controlled human exposure studies and animal toxicological studies). With respect to controlled human exposure studies, the PA recognizes that these studies include a small number of individuals compared to epidemiologic studies. Additionally, these studies tend to include generally healthy adult individuals, who are at a lower risk of experiencing health effects. These studies, therefore, often do not include populations that are at increased risk of $PM_{2.5}$-related health effects, including children, older adults, or individuals with pre-existing conditions. As such, these studies are somewhat limited in their ability to inform at what concentrations effects may be elicited in at-risk populations. With respect to animal toxicological studies, while these studies often examine more severe health outcomes and longer exposure durations and higher exposure concentrations than controlled human exposure studies, there is uncertainty in extrapolating the effects seen in animals, and the $PM_{2.5}$ exposures and doses that cause those effects, to human populations.

Consideration of health effects are informed by the epidemiologic, controlled human exposure, and animal toxicological studies. The evaluation and integration of the scientific evidence in the ISA focuses on evaluating the findings from the body of evidence across disciplines, including evaluating the strengths and weaknesses in the overall collection of studies across disciplines. Integrating evidence across disciplines can strengthen causal inference, such that a weak inference from one line of evidence can be addressed by other lines of evidence, and coherence of these lines of evidence can add support to a cause-effect interpretation of the association. Evaluation and integration of the evidence also includes consideration of uncertainties that are inherent in the scientific findings (U.S. EPA, 2015, pp. 13–15), some of which are described above.

3. Summary of Exposure and Risk Estimates

Beyond the consideration of the scientific evidence, discussed above in section II.B, the EPA also considers the extent to which new or updated quantitative analyses of $PM_{2.5}$ air quality, exposure, or health risks could inform conclusions on the adequacy of the public health protection provided by the current primary $PM_{2.5}$ standards. Additionally, the 2022 PA includes an at-risk analysis that assesses $PM_{2.5}$-attributable risk associated with $PM_{2.5}$ air quality that has been adjusted to simulate air quality scenarios of policy

interest (*e.g.,* ''just meeting'' the current or potential alternative standards). Drawing on the summary in section II.C of the proposal, the sections below provide a brief overview of key aspects of the assessment design (II.A.3.a), key limitations and uncertainties (II.A.3.b), and exposure/risk estimates (II.A.3.c).

a. Key Design Aspects

Risk assessments combine data from multiple sources and involve various assumptions and uncertainties. Input data for these analyses includes C–R functions from epidemiologic studies for each health outcome and ambient annual or 24-hour $PM_{2.5}$ concentrations for the study areas utilized in the risk assessment (U.S. EPA, 2022b, section 3.4.1). Additionally, quantitative and qualitative methods were used to characterize variability and uncertainty in the risk estimates (U.S. EPA, 2022b, section 3.4.1.7).

Concentration-response functions used in the risk assessment are from large, multicity U.S. epidemiologic studies that evaluate the relationship between $PM_{2.5}$ exposures and mortality. Epidemiologic studies and concentration-response studies that were used in the risk assessment to estimate risk were identified using criteria that take into account factors such as study design, geographic coverage, demographic populations, and health endpoints (U.S. EPA, 2022b, section 3.4.1.1).[87] The risk assessment focuses on all-cause or nonaccidental mortality associated with long-term and short-term $PM_{2.5}$ exposures, for which the 2019 ISA concluded that the evidence provides support for a ''causal relationship'' (U.S. EPA, 2022b, section 3.4.1.2).[88]

As described in more detail in the 2022 PA, the risk assessment first estimated health risks associated with air quality for 2015 adjusted to simulate ''just meeting'' the current primary $PM_{2.5}$ standards (*i.e.,* the annual standard with its level of 12.0 μg/m^3 and the 24-hour standard with its level of 35 μg/m^3). Air quality modeling was then used to simulate air quality just meeting an alternative standard with a level of 10.0 μg/m^3 (annual) and 30 μg/m^3 (24-hour). In addition to the model-based approach, for the subset of 30 areas controlled by the annual standard linear interpolation and extrapolation were employed to simulate just meeting alternative annual standards with levels of 11.0 (interpolated between 12.0 and 10.0 μg/m^3), 9.0 μg/m^3, and 8.0 μg/m^3 (both extrapolated from 12.0 and 10.0 μg/m^3) (U.S. EPA, 2022b, section 3.4.1.3). The 2022 PA notes that there is greater uncertainty regarding whether a revised 24-hour standard (*i.e.,* with a lower level) is needed to further limit ''peak'' $PM_{2.5}$ concentration exposure and whether a lower 24-hour standard level would most effectively reduce $PM_{2.5}$-associated health risks associated with ''typical'' daily exposures. The risk assessment estimates health risks associated with air quality adjusted to meet a revised 24-hour standard with a level of 30 μg/m^3, in conjunction with estimating the health risks associated with meeting a revised annual standard with a level of 10.0 μg/m^3 (U.S. EPA, 2022b, section 3.4.1.3). More details on the air quality adjustment approaches used in the risk assessment are described in section 3.4.1.4 and Appendix C of the 2022 PA (U.S. EPA, 2022b).

When selecting U.S. study areas for inclusion in the risk assessment, the available ambient monitors, geographic diversity, and ambient $PM_{2.5}$ air quality concentrations were taken into consideration (U.S. EPA, 2022b, section 3.4.1.4). When these factors were applied, 47 urban study areas were identified, which include nearly 60 million people aged 30–99, or approximately 30% of the U.S population in this age range (U.S. EPA, 2022b, section 3.4.1.5, Appendix C, section C.1.3). Of the 47 study areas, there were 30 study areas where just meeting the current standards is controlled by the annual standard,[89] 11 study areas where just meeting the current standards is controlled by the daily standard,[90] and 6 study areas where the controlling standard differed depending on the air quality adjustment approach (U.S. EPA, 2022b, section 3.4.1.5).[91]

In addition to the overall risk assessment, the 2022 PA also includes an at-risk analysis and estimates exposures and health risks of specific populations identified as at-risk that would be allowed under the current and potential alternative standards to further inform the Administrator's conclusions regarding the adequacy of the public health protection provided by the current primary $PM_{2.5}$ standards. In so doing, the 2022 PA evaluates exposure and $PM_{2.5}$ mortality risk for older adults (*e.g.,* 65 years and older), stratified for White, Black, Asian, Native American, Non-Hispanic, and Hispanic individuals residing in the same study areas included in the overall risk assessment. This analysis utilizes a recent epidemiologic study that provides race- and ethnicity-specific risk coefficients (Di et al., 2017b).

b. Key Limitations and Uncertainties

Uncertainty in risk estimates (*e.g.,* in the size of risk estimates) can result from a number of factors, including the assumptions about the shape of the C–R function with mortality at low ambient PM concentrations, the potential for confounding and/or exposure measurement error in the underlying epidemiologic studies, and the methods used to adjust $PM_{2.5}$ air quality. More specifically, the use of air quality modeling to adjust $PM_{2.5}$ concentrations are limited as they rely on model predictions, are based on emission changes scaled by fixed percentages, and use only two of the full set of possible emission scenarios and linear interpolation/extrapolation to adjust air quality that may not fully capture potential non-linearities associated with real-world changes in air quality. Additionally, the selection of case study areas is limited to urban areas predominantly located CA and in the Eastern U.S. that are controlled by the annual standard. While the risk assessment does not report quantitative uncertainty in the risk estimates as exposure concentrations are reduced, it does provide information on the distribution of concentrations associated with the risk estimates when evaluating progressively lower alternative annual standards. Based on these data, as lower alternative annual standards are evaluated, larger proportions of the distributions in risk occur at or below 10 μg/m^3 (at concentrations below or near most of the study-reported means from the key U.S. epidemiologic studies) and at or below 8 μg/m^3 (the concentration at which the ISA reports increasing uncertainty in the shape of the C–R curve based on the body of epidemiologic evidence).

[87] Additional detail regarding the selection of epidemiologic studies and specification of C–R functions is provided in the 2022 PA (U.S. EPA, 2022b, Appendix C, section C.1.1).

[88] While the 2019 ISA also found that evidence supports the determination of a ''causal relationship'' between long- and short-term $PM_{2.5}$ exposures and cardiovascular effects, cardiovascular mortality was not included as a health outcome as it will be captured in the estimates of all-cause mortality.

[89] For these areas, the annual standard is the ''controlling standard'' because when air quality is adjusted to simulate just meeting the current or potential alternative annual standards, that air quality also would meet the 24-hour standard being evaluated.

[90] For these areas, the 24-hour standard is the controlling standard because when air quality is adjusted to simulate just meeting the current or potential alternative 24-hour standards, that air quality also would meet the annual standard being evaluated. Some areas classified as being controlled by the 24-hour standard also violate the annual standard.

[91] In these 6 areas, the controlling standard depended on the air quality adjustment method used and/or the standard scenarios evaluated.

Similarly, the at-risk analysis is also subject to many of these same uncertainties noted above. Additionally, the at-risk analysis included C–R functions from only one study (Di et al., 2017b), which reported associations between long-term $PM_{2.5}$ exposures and mortality, stratified by race/ethnicity, in populations age 65 and older, as opposed to the multiple studies used in the overall risk assessment to convey risk estimate variability. These and other sources of uncertainty in the overall risk assessment and the at-risk analyses are characterized in more depth in the 2022 PA (U.S. EPA, 2022b, section 3.4.1.7, section 3.4.1.8, Appendix C, section C.3).

c. Summary of Risk Estimates

Although limitations in the underlying data and approaches lead to some uncertainty regarding estimates of $PM_{2.5}$-associated risk, the risk assessment estimates that the current primary $PM_{2.5}$ standards could allow a substantial number of $PM_{2.5}$-associated deaths in the U.S. For example, when air quality in the 47 study areas is adjusted to simulate just meeting the current standards, the risk assessment estimates up to 45,100 deaths in 2015 are attributable to long-term $PM_{2.5}$ exposures associated with just meeting the current annual and 24-hour $PM_{2.5}$ standards (U.S. EPA, 2022b, section 3.4.2.1). Additionally, as described in more detail in the 2022 PA, the at-risk analysis suggests that a lower annual standard level (*i.e.,* below 12 $\mu g/m^3$ and down as low as 8 $\mu g/m^3$) will help to reduce $PM_{2.5}$ exposure and may also help to mitigate exposure and risk disparities in populations identified as particularly at-risk for adverse effects from PM exposures (*i.e.,* minority populations).

Compared to the current annual standard, meeting a revised annual standard with a lower level is estimated to reduce $PM_{2.5}$-associated health risks in the 30 study areas controlled by the annual standard by about 7–9% for a level of 11.0 $\mu g/m^3$, 15–19% for a level of 10.0 $\mu g/m^3$, 22–28% for a level of 9.0 $\mu g/m^3$, and 30–37% for a level of 8.0 $\mu g/m^3$) (U.S. EPA, 2022b, Table 3–17). Meeting a revised annual standard with a lower level may also help to mitigate exposure and risk disparities in populations identified as particularly at-risk for adverse effects from PM exposures (*i.e.,* minority populations) in simulated scenarios just meeting alternative annual standards. However, though reduced, disparities by race and ethnicity persist even at an alternative annual standard level of 8 $\mu g/m^3$, the lowest alternative annual standard included in the risk assessment (U.S. EPA, 2022b, section 3.4.2.4).

Revising the level of the 24-hour standard to 30 $\mu g/m^3$ is estimated to lower $PM_{2.5}$-associated risks across a more limited population and number of areas than revising the annual standard (U.S. EPA, 2022, section 3.4.2.4). Risk reduction predictions are largely confined to areas located in the western U.S., several of which are also likely to experience risk reductions upon meeting a revised annual standard. In the 11 areas controlled by the 24-hour standard, when air quality is simulated to just meet the current 24-hour standard, $PM_{2.5}$ exposures are estimated to be associated with as many as 2,570 deaths annual. Compared to just meeting the current standard, air quality just meeting an alternative 24-hour standard level of 30 $\mu g/m^3$ is associated with reductions in estimated risk of 9–13% (U.S. EPA, 2022b, section 3.4.2.3).

B. Conclusions on the Primary $PM_{2.5}$ Standards

In drawing conclusions on the adequacy of the current primary $PM_{2.5}$ standards, in view of the advances in scientific knowledge and additional information now available, the Administrator has considered the evidence base, information, and policy judgments that were the foundation of the 2012 and 2020 reviews and reflects upon the body of evidence and information newly available in this reconsideration. In so doing, the Administrator has taken into account both evidence-based and risk-based considerations, as well as advice from the CASAC and public comments. Evidence-based considerations draw upon the EPA's integrated assessment of the scientific evidence of health effects related to $PM_{2.5}$ exposure presented in the 2019 ISA and ISA Supplement (summarized in the proposal in sections II.B (88 FR 5580, January 27, 2023) and II.D.2.a (88 FR 5609, January 27, 2023), and also in section II.A.2 above) to address key policy-relevant questions in the reconsideration. Similarly, the risk-based considerations draw upon the assessment of population exposure and risk (summarized in the proposal in sections II.C (88 FR 5605, January 27, 2023) and II.D.2.b (88 FR 5614, January 27, 2023), and also in section II.A.3 above) in addressing policy-relevant questions focused on the potential for $PM_{2.5}$ exposures associated with mortality under air quality conditions just meeting the current and potential alternative standards.

The approach to reviewing the primary standards is consistent with requirements of the provisions of the CAA related to the review of the NAAQS and with how the EPA and the courts have historically interpreted the CAA. As discussed in section I.A above, these provisions require the Administrator to establish primary standards that, in the Administrator's judgment, are requisite (*i.e.,* neither more nor less stringent than necessary) to protect public health with an adequate margin of safety. Consistent with the Agency's approach across all NAAQS reviews, the EPA's approach to informing these judgments is based on a recognition that the available health effects evidence generally reflects a continuum that includes ambient air exposures for which scientists generally agree that health effects are likely to occur through lower levels at which the likelihood and magnitude of response become increasingly uncertain. The CAA does not require the Administrator to establish a primary standard at a zero-risk level or at background concentration levels, but rather at a level that reduces risk sufficiently so as to protect public health, including the health of sensitive groups, with an adequate margin of safety.

The decisions on the adequacy of the current primary $PM_{2.5}$ standards described below is a public health policy judgment by the Administrator that draws on the scientific evidence for health effects, quantitative analyses of population exposures and/or health risks, and judgments about how to consider the uncertainties and limitations that are inherent in the scientific evidence and quantitative analyses. The four basic elements of the NAAQS (*i.e.,* indicator, averaging time, form, and level) have been considered collectively in evaluating the public health protection afforded by the current standards.

Section II.B.2 below briefly summarizes the basis for the Administrator's proposed decision, drawing from section II.D.3 of the proposal (88 FR 5617, January 27, 2023). The advice and recommendations of the CASAC and public comments on the proposed decision are addressed below in sections II.B.1 and II.B.3, respectively. The Administrator's final conclusions in this reconsideration regarding the adequacy of the current primary $PM_{2.5}$ standards and whether any revisions are appropriate are described in section II.B.4.

1. CASAC Advice

As part of its review of the 2019 draft PA, the CASAC provided advice on the adequacy of the public health protection afforded by the current primary $PM_{2.5}$ standards. Its advice is documented in

a letter sent to the EPA Administrator (Cox, 2019b). In this letter, the committee recommended retaining the current 24-hour $PM_{2.5}$ standard but did not reach consensus on whether the scientific and technical information support retaining or revising the current annual standard. In particular, though the CASAC agreed that there is a long-standing body of health evidence supporting relationships between $PM_{2.5}$ exposures and various health outcomes, including mortality and serious morbidity effects, individual CASAC members ''differ[ed] in their assessments of the causal and policy significance of these associations'' (Cox, 2019b, p. 8 of consensus responses). Drawing from this evidence, ''some CASAC members'' expressed support for retaining the current annual standard while ''other members'' expressed support for revising that standard in order to increase public health protection (Cox, 2019b, p.1 of letter). These views are summarized below.

The CASAC members who supported retaining the current annual standard expressed the view that substantial uncertainty remains in the evidence for associations between $PM_{2.5}$ exposures and mortality or serious morbidity effects. These committee members asserted that ''such associations can reasonably be explained in light of uncontrolled confounding and other potential sources of error and bias'' (Cox, 2019b, p. 8 of consensus responses). They noted that associations do not necessarily reflect causal effects, and they contended that recent epidemiologic studies assessed in the 2019 ISA that report positive associations at lower estimated exposure concentrations mainly confirm what was anticipated or already assumed in setting the 2012 NAAQS. In particular, they concluded that such studies have some of the same limitations as prior studies and do not provide new information calling into question the existing standard. They further asserted that ''accountability studies provide potentially crucial information about whether and how much decreasing $PM_{2.5}$ causes decreases in future health effects'' (Cox, 2019b, p. 10 of consensus responses), and they cited recent reviews (*i.e.,* Henneman et al., 2017; Burns et al., 2019) to support their position that in such studies, ''reductions of $PM_{2.5}$ concentrations have not clearly reduced mortality risks'' (Cox, 2019b, p. 8 of consensus responses). Thus, the committee members who supported retaining the current annual standard advise that, ''while the data on associations should certainly be carefully considered, this data should not be interpreted more strongly than warranted based on its methodological limitations'' (Cox, 2019b, p. 8 of consensus responses).

These members of the CASAC further concluded that the quantitative risk assessment included in the 2019 draft PA does not provide a valid basis for revising the current standards. This conclusion was based on concerns that (1) ''the risk assessment treats regression coefficients as causal coefficients with no justification or validation provided for this decision;'' (2) the estimated regression concentration-response functions ''have not been adequately adjusted to correct for confounding, errors in exposure estimates and other covariates, model uncertainty, and heterogeneity in individual biological (causal) [concentration-response] functions;'' (3) the estimated concentration-response functions ''do not contain quantitative uncertainty bands that reflect model uncertainty or effects of exposure and covariate estimation errors;'' and (4) ''no regression diagnostics are provided justifying the use of proportional hazards . . . and other modeling assumptions'' (Cox, 2019b, p. 9 of consensus responses). These committee members also contended that details regarding the derivation of concentration-response functions, including specification of the beta values and functional forms, were not well-documented, hampering the ability of readers to evaluate these design details. Thus, these members ''think that the risk characterization does not provide useful information about whether the current standard is protective'' (Cox, 2019b, p. 11 of consensus responses).

Drawing from their evaluation of the evidence and the risk assessment in the 2019 draft PA, these committee members concluded that ''the Draft PM PA does not establish that new scientific evidence and data reasonably call into question the public health protection afforded by the . . . 2012 $PM_{2.5}$ annual standard'' (Cox, 2019b, p.1 of letter).

In contrast, ''[o]ther members of CASAC conclude[d] that the weight of the evidence, particularly reflecting recent epidemiology studies showing positive associations between $PM_{2.5}$ and health effects at estimated annual average $PM_{2.5}$ concentrations below the current standard, does reasonably call into question the adequacy of the 2012 annual $PM_{2.5}$ [standard] to protect public health with an adequate margin of safety'' (Cox, 2019b, p.1 of letter). The committee members who supported this conclusion noted that the body of health evidence for $PM_{2.5}$ not only includes the repeated demonstration of associations in epidemiologic studies, but also includes support for biological plausibility established by controlled human exposure and animal toxicology studies. They pointed to recent studies demonstrating that the associations between $PM_{2.5}$ and health effects occur in a diversity of locations, in different time periods, with different populations, and using different exposure estimation and statistical methods. They concluded that ''the entire body of evidence for PM health effects justifies the causality determinations made in the Draft PM ISA'' (Cox, 2019b, p. 8 of consensus responses).

The members of the CASAC who supported revising the current annual standard particularly emphasized recent findings of associations with $PM_{2.5}$ in areas with average long-term $PM_{2.5}$ concentrations below the level of the annual standard and studies that show positive associations even when estimated exposures above 12 $\mu g/m^3$ are excluded from analyses. They found it ''highly unlikely'' that the extensive body of evidence indicating positive associations at low estimated exposures could be fully explained by confounding or by other non-causal explanations (Cox, 2019b, p. 8 of consensus responses). They additionally concluded that ''the risk characterization does provide a useful attempt to understand the potential impacts of alternate standards on public health risks'' (Cox, 2019b, p. 11 of consensus responses). These CASAC members concluded that the available evidence reasonably calls into question the protection provided by the current primary $PM_{2.5}$ standards and supports revising the annual standard to increase that protection (Cox, 2019b).

As a part of this reconsideration, the CASAC reviewed the 2021 draft PA (developed to support the reconsideration as described in section I.C.5 above). As a part of their review of the 2021 draft PA, the CASAC provided advice on the adequacy of the current primary $PM_{2.5}$ standards. The range of views summarized here generally reflects differing judgments as to the relative weight to place on various types of evidence, the risk-based information, and the associated uncertainties, as well as differing judgments about the importance of various $PM_{2.5}$-related health effects from a public health perspective.

In its comments on the 2021 draft PA, the CASAC stated that: ''[o]verall the CASAC finds the Draft PA to be well-

written and appropriate for helping to 'bridge the gap' between the agency's scientific assessments and quantitative technical analyses, and the judgments required of the Administrator in determining whether it is appropriate to retain or revise the National Ambient Air Quality Standards (NAAQS)'' (Sheppard, 2022a, p. 1 of consensus letter). The CASAC also stated that the ''[d]raft PA adequately captures and appropriately characterizes the key aspects of the evidence assessed and integrated in the 2019 ISA and Draft ISA Supplement of $PM_{2.5}$-related health effects'' (Sheppard, 2022b, p. 2 of consensus letter). The CASAC also stated that ''[t]he interpretation of the risk assessment for the purpose of evaluating the adequacy of the current primary $PM_{2.5}$ annual standard is appropriate given the scientific findings presented'' (Sheppard, 2022a, p. 2 of consensus letter).

With regard to the adequacy of the current primary annual $PM_{2.5}$ standard, ''all CASAC members agree that the current level of the annual standard is not sufficiently protective of public health and should be lowered'' (Sheppard, 2022a, p. 2 of consensus letter). Additionally, ''the CASAC reached consensus that the indicator, form, and averaging time should be retained, without revision'' (Sheppard, 2022a, p. 2 of consensus letter). With regard to the level of the primary annual $PM_{2.5}$ standard, the CASAC had differing recommendations for the appropriate range for an alternative level. The majority of the CASAC ''judge[d] that an annual average in the range of 8–10 $\mu g/m^3$'' was most appropriate, while the minority of the CASAC members stated that ''the range of the alternative standard of 10–11 $\mu g/m^3$ is more appropriate'' (Sheppard, 2022a, p. 16 of consensus responses). The CASAC did highlight, however, that ''the alternative standard level of 10 $\mu g/m^3$ is within the range of acceptable alternative standards recommended by all CASAC members, and that an annual standard below 12 $\mu g/m^3$ is supported by a larger and coherent body of evidence'' (Sheppard, 2022a, p. 16 of consensus responses).

In reaching conclusions on a recommended range of 8–10 $\mu g/m^3$ for the primary annual $PM_{2.5}$ standard, the majority of the CASAC placed weight on various aspects of the available scientific evidence and quantitative risk assessment information discussed in the 2021 draft PA (Sheppard, 2022a, p. 16 of consensus responses). In particular, these members cited recent U.S.- and Canadian-based epidemiologic studies that show positive associations between $PM_{2.5}$ exposure and mortality with study-reported mean concentrations below 10 $\mu g/m^3$. Further, these members also noted that the lower portions of the air quality distribution (*i.e.,* concentrations below the mean) provide additional information to support associations between health effects and $PM_{2.5}$ concentrations lower than the reported long-term mean concentration. In addition, the CASAC members recognized that the available evidence has not identified a threshold concentration, below which an association no longer remains, pointing to the conclusion in the draft ISA Supplement that the ''evidence remains clear and consistent in supporting a no-threshold relationship, and in supporting a linear relationship for $PM_{2.5}$ concentrations >8 $\mu g/m^3$'' (Sheppard, 2022a, p. 16 of consensus responses). Finally, these CASAC members placed weight on the at-risk analysis as providing support for protection of at-risk demographic groups, including minority populations.

In recommending a range of 10–11 $\mu g/m^3$ for the primary annual $PM_{2.5}$ standard, the minority of the CASAC emphasized that there were few key epidemiologic studies that reported positive and statistically significant health effects associations for $PM_{2.5}$ air quality distributions with overall mean concentrations below 9.6 $\mu g/m^3$ (Sheppard, 2022a, p. 17 of consensus responses). In so doing, the minority of the CASAC specifically noted the variability in the relationship between study-reported means and area annual design values based on the methods utilized in the studies, noting that design values are generally higher than area average exposure levels. Further, the minority of the CASAC stated that ''uncertainties related to copollutants and confounders make it difficult to justify a recommendation below 10–11 $\mu g/m^3$'' (Sheppard, 2022a, p. 17 of consensus responses). Finally, the minority of the CASAC placed less weight on the risk assessment results, noting large uncertainties, including the approaches used for adjusting air quality to simulate just meeting the current and alternative standards.

With regard to the current primary 24-hour $PM_{2.5}$ standard, in their review of the 2021 draft PA, the CASAC did not reach consensus regarding the adequacy of the public health protection provided by the current standard. As described further below, the majority of the CASAC members concluded ''that the available evidence calls into question the adequacy of the current 24-hour standard'' (Sheppard, 2022a, p. 3 of consensus letter), while the minority of the CASAC members agreed with ''the EPA's preliminary conclusion [in the draft PA] to retain the current 24-hour $PM_{2.5}$ standard without revision'' (Sheppard, 2022a, p. 4 of consensus letter). The CASAC recommended that in future reviews, the EPA should also consider alternative forms for the primary 24-hour $PM_{2.5}$ standard. Specifically, the CASAC ''suggests considering a rolling 24-hour average and examining alternatives to the 98th percentile of the 3-year average,'' pointing to concerns that computing 24-hour average $PM_{2.5}$ concentrations using the current midnight-to-midnight timeframe could potentially underestimate the effects of high 24-hour exposures, especially in areas with wood-burning stoves and wintertime stagnation (Sheppard, 2022a, p. 18 of consensus responses).

As noted above, the majority of the CASAC favored revising the level of the primary 24-hour $PM_{2.5}$ standard, suggesting that a range of 25–30 $\mu g/m^3$ would be adequately protective. In so doing, the majority of the CASAC placed weight on the available epidemiologic evidence, including epidemiologic studies that restricted analyses to 24-hour $PM_{2.5}$ concentrations below 25 $\mu g/m^3$. These members also placed weight on results of controlled human exposure studies with exposures close to the current standard, which they note provide support for the epidemiologic evidence to lower the standard. These members noted the limitations in using controlled human exposure studies alone in considering the adequacy of the 24-hour standard, recognizing that controlled human exposure studies preferentially recruit less susceptible individuals and have a typical exposure duration shorter than 24 hours. These members also placed ''greater weight on the scientific evidence than on the values estimated by the risk assessment,'' citing their concerns that the risk assessment ''may not adequately capture areas with wintertime stagnation and residential wood-burning where the annual standard is less likely to be protective'' (Sheppard, 2022a, p. 17 of consensus responses). Furthermore, these CASAC members ''also are less confident that the annual standard could adequately protect against health effects of short-term exposures'' (Sheppard, 2022a, p. 17 of consensus responses).

The minority of the CASAC agreed with the EPA's preliminary conclusion in the 2021 draft PA to retain the current primary 24-hour $PM_{2.5}$ standard. In so doing, the minority of the CASAC placed greater weight on the risk assessment, noting that the risk

assessment accounts for both the level and the form of the current standard and the manner by which attainment with the standard is determined. Further, the minority of the CASAC stated that the ''risk assessment indicates that the annual standard is the controlling standard across most of the urban study areas evaluated and revising the level of the 24-hour standard is estimated to have minimal impact on the $PM_{2.5}$-associated risks'' and therefore, ''the annual standard can be used to limit both long- and short-term $PM_{2.5}$ concentrations'' (Sheppard, 2022a, p. 18 of consensus responses). Further, the minority of the CASAC placed more weight on the controlled human exposure studies, which show ''effects at $PM_{2.5}$ concentrations well above those typically measured in areas meeting the current standards'' and which suggest that ''the current standards are providing adequate protection against these exposures'' (Sheppard, 2022a, p. 18 of consensus responses).

While the CASAC members expressed differing opinions on the appropriate revisions to the current standards, they did ''find that both primary standards, 24-hour and annual, are critical to protect public health given the evidence on detrimental health outcomes at both short-term and long-term exposures including peak events'' (Sheppard, 2022a, p. 13 of consensus responses). The comments from the CASAC also took note of uncertainties that remain in this reconsideration of the primary $PM_{2.5}$ standards and they identified a number of additional areas for future research and data gathering and dissemination that would inform future reviews of the primary $PM_{2.5}$ NAAQS (Sheppard, 2022a, pp. 14–15 of consensus responses).

2. Basis for the Proposed Decision

In reaching his proposed decisions to revise the level of the primary annual $PM_{2.5}$ standard from its current level of 12.0 $\mu g/m^3$ to within the range of 9.0 to 10.0 $\mu g/m^3$, and to retain the current primary 24-hour $PM_{2.5}$ standard (88 FR 5558, January 27, 2023), the Administrator carefully considered the assessment of the current evidence and conclusions reached in the 2019 ISA and ISA Supplement; the currently available exposure and risk information, including associated limitations and uncertainties, described in detail in the 2022 PA; the considerations and staff conclusions and associated rationales presented in the 2022 PA; the advice and recommendations from the CASAC; and public comments that had been offered up to that point (88 FR 5558, January 27, 2023).

In reaching his proposed conclusions on whether the currently available scientific evidence and quantitative risk-based information support or call into question the adequacy of the public health protection afforded by the current primary $PM_{2.5}$ standards, and as is the case with NAAQS reviews in general, the extent to which the current primary $PM_{2.5}$ standards are judged to be adequate will depend on a variety of factors, including science policy and public health policy judgments to be made by the Administrator on the strength and uncertainties of the scientific evidence. The factors relevant to judging the adequacy of the standards also include the interpretation of, and decisions as to the weight to place on, different aspects of the results of the risk assessment for the study areas included and the associated uncertainties. Thus, in reaching proposed conclusions of the current standards, the Administrator recognized that such a determination depends in part on judgments regarding aspects of the evidence and risk estimates, and judgments about the degree of protection that is requisite to protect public health with an adequate margin of safety.

The Administrator's full rationale for his proposed conclusions is presented in section II.D.3 of proposal (88 FR 5658, January 27, 2023), but is also briefly summarized here. In reaching the proposed decision to revise the annual standard level to 9–10 $\mu g/m^3$, the Administrator placed weight on the full body of scientific information. He noted that the 2019 ISA finds that exposure to $PM_{2.5}$ causes mortality and cardiovascular effects and is likely to cause respiratory effects, cancer, and nervous system effects as detailed further in section II.B.1 of the proposal. As detailed further in section II.B.4 of the proposal, he additionally noted that the 2019 ISA identifies at-risk populations at greater risk of health effects from exposure to $PM_{2.5}$, including children, older adults, people with pre-existing respiratory or cardiovascular disease, minority populations, and low socioeconomic status (SES) populations.

The Administrator also recognized that epidemiologic studies provide the strongest scientific evidence when evaluating the adequacy of the level of the annual standard. He noted that there is no specific point in the air quality distribution of any epidemiologic study that represents a 'bright line' at and above which effects have been observed and below which effects have not been observed. In his proposed decision, he noted previous decision-making frameworks, which placed weight on values at or near the study-reported mean $PM_{2.5}$ concentrations, which is where the most confidence in the reported association of the epidemiologic study exists. He further noted that there are a number of epidemiologic studies available in this reconsideration that use new $PM_{2.5}$ exposure estimation techniques (*e.g.,* hybrid modeling) that were not used in epidemiologic studies that were available in previous reviews. These recent epidemiologic studies that use new exposure estimation techniques report long-term mean $PM_{2.5}$ concentrations that are well below corresponding design values, which is an important consideration in reaching decisions on the level of the annual $PM_{2.5}$ standard.

In reaching his proposed decision, the Administrator noted that a level of 9–10 $\mu g/m^3$ would near or below the reported 25th percentiles in key U.S. based epidemiologic studies, while also recognizing that he has less confidence in the magnitude and significance of the association at even lower percentiles (*e.g.,* 10th percentile), where even fewer health events are observed. The Administrator also noted that a proposed level of 9–10 $\mu g/m^3$ would be near the mean $PM_{2.5}$ reported in Canadian based studies, though he also recognized that there are a number of factors associated with the studies in Canada (*e.g.,* exposure environments) that make it more difficult to compare mean concnetrations from Canadian studies to design values, which determine compliance with the standard in the U.S.

The Administrator took note of additional pieces of scientific evidence, which were not available in previous reviews, including restricted analyses, which support that the association seen in epidemiologic studies does not just occur from the peaks of the exposure distribution. Additionally, he notes that a level of 9–10 $\mu g/m^3$ would be below the starting concentration in newly available accountability studies, though he did note that it is more difficult to interpret these studies in the context of selecting the level of the annual $PM_{2.5}$ standard.

Further, the Administrator took into consideration the advice of the CASAC, noting that all members included 10 $\mu g/m^3$ in their recommended range, and that the proposed range of 9–10 $\mu g/m^3$ for the level of the primary annual $PM_{2.5}$ standard was within the range recommended by the majority of the CASAC.

In reaching the proposed conclusion of a range between 9–10 $\mu g/m^3$, the Administrator noted that a level as high

as 11 μg/m³ might not provide an adequate margin of safety, given that 11 μg/m³ was well above many of the epidemiologic study-reported mean $PM_{2.5}$ concentrations. Additionally, the Administrator noted the uncertainties associated with the scientific and quantitative information supporting a level as low as 8 μg/m³, which call into question the potential public health improvements of a standard below 9 μg/m³. The Administrator specifically noted the lack of key U.S. studies with mean concentrations below 9.3 μg/m³ and he further noted that the risk assessment suggests that the risk remaining under a standard of 8 μg/m³ would occur at very low concentrations (*e.g.,* mainly 7 μg/m³ and below).

As such, the Administrator's proposed decision noted that the current $PM_{2.5}$ annual standard did not adequately provide requisite protection against exposures to $PM_{2.5}$ and that a proposed range of 9–10 μg/m³ would provide an adequate margin of safety.

In his proposed decision to retain the current primary 24-hour $PM_{2.5}$ standard with a level of 35 μg/m³, the Administrator first considered the scientific information related to short-term exposures to $PM_{2.5}$ and health effects. He noted that the controlled human exposure studies are the strongest line of evidence for informing his conclusions regarding the adequacy of the current 24-hour standard. In so doing, the Administrator recognized that controlled human exposure studies are conducted with healthy adult volunteers and that these studies do not include individuals who may be at increased risk of $PM_{2.5}$-related health effects (*i.e.,* children, older adults, people with pre-existing diseases). He also noted that the effects observed in the controlled human exposure studies (*e.g.,* changes in vascular function) are not effects that are judged to be clearly adverse. He recognized the most consistent evidence of effects in these studies occurs at higher concentrations (*e.g.,* >120 μg/m³) following 1–5 hour exposures, and that one study observed effects at concentrations as low as 38 μg/m³ following 4-hour exposures. However, the Administrator reiterated that these studies do not tell us at exactly what concentrations an adverse effect might occur, especially for at-risk populations. As noted above in section II.A.2.c, controlled human exposure studies tend to include generally healthy adult individuals who are at a lower risk of experiencing health effects, and often do not include at-risk populations (*e.g.,* children, older adults, or individuals with pre-existing conditions). As such, the Administrator recognized that these studies are somewhat limited in their ability to inform at what concentrations effects may be elicited in in at-risk populations. The Administrator also considered air quality analyses in the 2022 PA that demonstrate that there will be very few, if any, days with $PM_{2.5}$ concentrations at levels evaluated in controlled human exposure studies that are associated with effects in areas that meet the current primary 24-hour $PM_{2.5}$ standard.

The Administrator also noted that as, in previous PM NAAQS reviews, the protection provided by the suite of standards (*e.g.,* annual and 24-hour standards) is evaluated together. He noted that the annual standard is the controlling standard in most areas of the country. He also considered air quality analyses in the 2022 PA that suggest that revision of the annual standard to a level between 9–10 μg/m³ would also control 24-hour $PM_{2.5}$ concentrations in most areas to, or below, 30 μg/m³. Finally, the Administrator noted the agreement with the advice from the minority of CASAC and additionally noted the limited rationale and evidence provided by the majority CASAC's recommendation to support revision of the 24-hour standard. As such, the Administrator proposed to retain the current 24-hour standard with its level of 35 μg/m³.

Additionally, the Administrator proposed to conclude that it is appropriate to retain all other elements (*i.e.,* indicator, averaging time, and form) of the annual and 24-hour standards.

3. Comments on the Proposed Decision

With respect to the adequacy of the primary annual $PM_{2.5}$ standard, a number of commenters, primarily those from industry and industry groups, non-governmental organizations, and some State and local governments, disagree with the EPA's proposed decision to revise the level of the primary annual $PM_{2.5}$ standard. These commenters generally expressed the view that the current standards provide the requisite degree of public health protection and should be retained, consistent with the 2020 final decision. In supporting their view, these commenters assert that the scientific evidence available in this reconsideration is essentially unchanged since the 2020 final decision and that the additional scientific evidence and quantitative risk information available for the reconsideration does not support strengthening the primary annual $PM_{2.5}$ standard. These commenters also assert that uncertainties associated with the available scientific evidence have not changed since the 2020 final decision, and they note that these uncertainties were essential factors in the then-Administrator's decision to retain the primary annual $PM_{2.5}$ standard. These commenters argue that, while the current Administrator acknowledges these uncertainties, he does not place enough weight on them in reaching his conclusions regarding the current standard. The commenters specifically highlight uncertainties related to exposure misclassification, confounding, and other sources of potential bias, which they claim supports retaining the current level of the annual standard. These commenters also note that these uncertainties were emphasized by the minority of the CASAC in their review of the 2021 draft PA, and the commenters further suggest that the lack of consensus from the CASAC on the appropriate level for the primary annual $PM_{2.5}$ standard show that the research is unclear. The commenters contend that there is not support in this reconsideration for deviating from the then-Administrator's decision in 2020.

In contrast, other commenters, primarily from public health and environmental organizations, some State and local elected representatives, and some State and local government agencies agree with the EPA's proposed decision that the primary annual $PM_{2.5}$ standard is not adequate. These commenters support revising the level of the primary annual $PM_{2.5}$ standard and emphasize that the available scientific evidence, in particular epidemiologic studies, along with the CASAC's advice in their review for the 2021 draft PA, provide strong support for the proposed decision. In particular, these commenters agree with the EPA's conclusions about the strength of the scientific evidence, including uncertainties, and they emphasize that the CASAC reached consensus in their review of the 2021 draft PA that the current primary annual $PM_{2.5}$ standard is not adequate. Some of these commenters also note that a revised primary annual $PM_{2.5}$ standard would result in significant public health benefits by reducing morbidity and mortality associated with $PM_{2.5}$ exposure, especially for at-risk populations.

The EPA agrees with commenters that the primary annual $PM_{2.5}$ standard is not adequate. The EPA recognizes the longstanding body of health evidence supporting relationships between $PM_{2.5}$ exposures (short- and long-term) and both mortality and serious morbidity effects. The evidence available in this reconsideration (*i.e.,* the studies

assessed in the 2019 ISA and ISA Supplement summarized above in section II.A.2.a) reaffirms, and in some cases strengthens, the conclusions from the 2009 ISA regarding the health effects of $PM_{2.5}$ exposures. As noted above, epidemiologic studies demonstrate generally positive and often statistically significant associations between $PM_{2.5}$ exposures and health effects. Such studies report associations between estimated $PM_{2.5}$ exposures and non-accidental, cardiovascular, or respiratory mortality; cardiovascular or respiratory hospitalizations or emergency room visits; and other mortality/morbidity outcomes (*e.g.,* lung cancer mortality or incidence, asthma development). Recent experimental evidence, as well as evidence from epidemiologic panel studies, strengthens support for potential biological pathways through which $PM_{2.5}$ exposures could lead to the serious effects reported in many population-level epidemiologic studies, including support for pathways that could lead to cardiovascular, respiratory, nervous system, and cancer-related effects. Moreover, these recent epidemiologic studies strengthen support for health effect associations at $PM_{2.5}$ concentrations lower than in those evaluated in epidemiologic studies available at the time of previous reviews.

Additionally, as discussed in more detail in section I.C.5.b above, the ISA Supplement focused on studies that were most likely to inform decisions on the appropriate standard, but not to reassess areas that, based on the assessment of available science published since the cutoff date of the 2019 ISA and through 2021, were judged unlikely to have new information that would be useful for the Administrator's decision making. The ISA Supplement included U.S. and Canadian epidemiologic studies for health effect categories where the 2019 ISA concluded a causal relationship (*i.e.,* short- and long-term $PM_{2.5}$ exposure and cardiovascular effects and mortality), as well as U.S. and Canadian epidemiologic studies that employed alternative methods for confounder control or conducted accountability analyses (*i.e.,* studies that examined the effect of a policy on reducing $PM_{2.5}$ concentrations). These studies, summarized in section II.A.2.a above, examine both short- and long-term $PM_{2.5}$ exposure and cardiovascular effects and mortality. Additionally, studies that employ alternative methods for confounder control, as described in II.A.2.a above and in Table 3–11 and of the 2022 PA (U.S. EPA, 2022b), use a variety of statistical methods to control for confounding bias. These studies consistently report positive associations, which further supports the broader body of epidemiologic evidence for both cardiovascular effects and mortality.

In addition, there are epidemiologic studies that provide supplemental information for consideration in reaching conclusions that the current suite of $PM_{2.5}$ standards is not adequate. These studies include analyses that restrict annual average $PM_{2.5}$ concentrations to concentrations below 12 $\mu g/m^3$ and provide support for positive and statistically significant associations with mortality and cardiovascular morbidity at mean $PM_{2.5}$ concentrations below the current level of the primary annual $PM_{2.5}$ standard (described above in section II.A.2.c.ii and in Table 3–10 of the 2022 PA (U.S. EPA, 2022b)). Recent accountability studies that have starting annual $PM_{2.5}$ concentrations at or below 12 $\mu g/m^3$ suggest public health improvements may occur at concentrations below 12 $\mu g/m^3$. These studies indicate positive and statistically significant associations with mortality and morbidity (*e.g.,* cardiovascular hospital admissions) and reductions in $PM_{2.5}$ concentrations in ambient air (described above in section II.A.2.c.ii and in Table 3–12 of the 2022 PA (U.S. EPA, 2022b)).

Thus, in considering the available scientific evidence to inform conclusions on the adequacy of the primary $PM_{2.5}$ standards, the Administrator recognizes that the 2019 ISA and the ISA Supplement together provides a strong scientific foundation for concluding that the current primary $PM_{2.5}$ standards are not adequate.

In addition to the scientific evidence above, the risk assessment estimates that the current primary annual $PM_{2.5}$ standard could allow a substantial number of deaths in the U.S. Although the Administrator recognizes that while the risk estimates can help to place the evidence for specific health effects into a broader public health context, they should be considered along with the inherent uncertainties and limitations of such analyses when informing judgments about the potential for additional public health protection associated with $PM_{2.5}$ exposures and related health effects. The Administrator takes into consideration these uncertainties, which are described in more detail in section II.A.3.b above, but notes that the general magnitude of risk estimates supports the potential for significant public health impacts, particularly for lower alternative annual standard levels.

In the CASAC's review of the 2019 draft PA, the CASAC did not reach consensus on whether the current annual standard is adequate, with the majority of the CASAC recommending that the annual standard be retained and the minority of the CASAC recommending that the standard be revised. In their review of the 2021 draft PA, the CASAC unanimously recommended that the current annual standard is not sufficiently protective of public health (Sheppard, 2022a, p. 2 of consensus letter).

The EPA disagrees with the commenters who state that the available scientific and quantitative information available in this reconsideration does not provide support for the current Administrator to reach a different decision than the then-Administrator reached in the 2020 final action. The EPA agrees with these commenters that there are uncertainties associated with the currently available scientific evidence. The EPA has considered these uncertainties extensively both in reaching conclusions in the 2022 PA (U.S. EPA, 2022b, sections 3.4.3, 3.6.1, and 4.6.3) and in the proposal (88 FR 5604, 5609, January 27, 2023), and the EPA addresses more detailed public comments about these uncertainties, including those related to copollutant confounding, unmeasured confounding, and temporal and spatiotemporal confounding, in the Response to Comments document. However, we disagree with the commenters that the evidence does not provide support for the Administrator's conclusion that the current primary annual $PM_{2.5}$ standard is not adequate to protect public health with an adequate margin of safety, and should be revised. As described above, epidemiologic studies in the 2019 ISA and the ISA Supplement support and extend the evidence evaluated in the 2009 ISA, through studies conducted in diverse populations and geographic locations, using various statistical models and approaches to control for potential confounders, and using a variety of exposure assessment methodologies. Therefore, the consistent, positive associations reported across studies (U.S. EPA, 2019a, Figures 11–1 and 11–18; U.S. EPA, 2022a) are unlikely to be to be the result of unmeasured confounding and other biases are unlikely to account for the consistent positive associations observed across epidemiologic studies.

Additionally, this reconsideration includes epidemiologic studies that were not before the then-Administrator for consideration in reaching his final decisions at the time of the 2020 decision and that specifically evaluate

confounding using alternative methods for confounder control). These recent epidemiologic studies provide support for the current Administrator's conclusion that the suite of primary $PM_{2.5}$ standards are not adequate. While confounding was an uncertainty noted by the then-Administrator in the 2020 decision, he recognized ''that methodological study designs to address confounding, such as causal inference methods, are an emerging field of study'' (85 FR 82710, December 18, 2020). The ISA Supplement considered studies that employed statistical approaches that attempt to more extensively account for confounders and are more robust to model misspecification (*i.e.,* used alternative methods for confounder control),[92] given that such studies were highlighted by the CASAC in their review of the 2019 draft PA and identified in public comments on the 2020 proposal. Since the literature cutoff date for the 2019 ISA, multiple studies that employ alternative methods for confounder control have become available for consideration in the ISA Supplement and, subsequently, in this reconsideration. For example, one study before the Administrator in this reconsideration that was not available in the 2019 ISA is Schwartz et al. (2021), which used a causal modeling approach focused on exposure changes and controls for measured confounders by design in order to evaluate the association between long-term $PM_{2.5}$ exposure and mortality in the Medicare population. The study authors found significant associations of $PM_{2.5}$ with increased mortality rates using a causal modeling approach robust to omitted confounding. The results of this study and other studies in the ISA Supplement that employ alternative methods to control for confounders lend support to the robustness of positive associations between $PM_{2.5}$ exposure and multiple morbidity and mortality endpoints exhibited across epidemiologic studies, and also indicate that unmeasured confounding and other biases are unlikely to account for the consistent positive associations observed across epidemiologic studies (U.S. EPA, 2022b, sections 3.1.1.3, 3.1.2.3, 3.2.1.3, and 3.2.2.3).

Further, the EPA disagrees with the commenters who argue that the Administrator did not appropriately consider the strengths and limitations of the health evidence in reaching his decision to revise the current primary annual $PM_{2.5}$ standard in this reconsideration. In reaching his proposed decision, the Administrator considered the entire body of evidence and how to appropriately weigh the uncertainties associated with the health evidence (88 FR 5617, January 27, 2023). Such an approach is consistent with setting standards that are neither more nor less stringent than necessary, recognizing that ''Congress provided that the Administrator is to use his judgment in setting air quality standards precisely to permit him to act in the face of uncertainty,'' the Administrator must set standards on ''the frontiers of scientific and medical knowledge'' and ''Congress directed the Administrator to err on the side of caution in making the necessary decisions.'' *Lead Indus. Ass'n, Inc.* v. *EPA,* 647 F.2d 1130, 1155 & n.50 (D.C. Cir. 1980) (quoting H.R. Rep. No. 95–294, at 50). As such, a determination of identifying a specific level at which the standard should be set necessarily requires the Administrator's judgement (*e.g.,* weighing the uncertainties and margin of safety).

Additionally, the EPA disagrees with the commenters that contend that there is no basis in this reconsideration for deviating from the previous Administrator's decision in 2020. It is well-established that in CAA section 109 Congress specifically left the determination of the requisite NAAQS to the judgment of the Administrator and, moreover, that ''decisions about the appropriate NAAQS level must 'necessarily . . . rest largely on policy judgments.' '' *Mississippi* v. *EPA,* 744 F.3d 1344, 1357 (D.C. Cir. 2013) (quoting *Lead Industries Ass'n* v. *EPA,* 647 F.2d 1130, 1147 (D.C. Cir. 1980)). As the Court of Appeals for the D.C. Circuit has noted, ''Every time EPA reviews a NAAQS, it (presumably) does so against contemporary policy judgments and the existing corpus of scientific knowledge.'' *Id.,* at 1343.

In this reconsideration, both the existing corpus of scientific knowledge as well as the Administrator's policy judgments about how to interpret and weigh that evidence to protect public health with an adequate margin of safety have changed. The expansion of the air quality criteria to encompass additional studies, information and analyses in the ISA Supplement and 2022 PA, as well as the additional consideration of the scientific record by the CASAC and the public provided the Administrator with significant additional information on which to base his decision.[93] In addition, in this reconsideration, the Administrator is reaching different judgments about how to weigh the epidemiologic evidence, including the uncertainties in the scientific evidence, and how to ensure an adequate margin of safety to protect against uncertain harms, compared to the approach in the 2020 final decision. For example, as discussed in greater detail above in section II.A.1 and in the 2020 notice of final rulemaking (85 FR 82717, December 18, 2020), in considering the epidemiologic evidence as part of his decision to retain the current primary annual $PM_{2.5}$ standard in the 2020 decision, the then-Administrator placed weight on the mean of the study-reported means (or medians) (*i.e.,* 13.5 $\mu g/m^3$) from key U.S. epidemiologic studies that are monitor-based being above the level of the current primary annual $PM_{2.5}$ standard of 12.0 $\mu g/m^3$. By contrast, in this reconsideration, the current Administrator has taken an approach more similar to how the EPA has considered study-reported mean $PM_{2.5}$ concentrations relative to the level of the primary annual $PM_{2.5}$ standard in other recent PM NAAQS reviews. In so doing, in reaching his decision to revise the level of the primary annual $PM_{2.5}$ standard to 9.0 $\mu g/m^3$, he is using an approach that places weight on selecting a level for the standard that is below the study-reported mean $PM_{2.5}$ concentrations reported in key U.S. epidemiologic studies, including recent epidemiologic studies that use hybrid model-based methods, as well as being near or below the 25th percentile $PM_{2.5}$ concentrations in those key U.S. epidemiologic studies that report these concentrations.

As such and further detailed in section II.B.4 below, in considering the adequacy of the current primary PM standards in this reconsideration, the Administrator has carefully considered the: (1) Policy-relevant evidence and conclusions contained in the 2019 ISA and 2022 ISA Supplement; (2) the quantitative information presented and

[92] As noted in the ISA Supplement: ''In the peer-reviewed literature, these epidemiologic studies are often referred to as causal inference studies or studies that used causal modeling methods. For the purposes of this Supplement, this terminology is not used to prevent confusion with the main scientific conclusions (*i.e.,* the causality determinations) presented within an ISA. In addition, as is consistent with the weight-of-evidence framework used within ISAs and discussed in the Preamble to the Integrated Science Assessments, an individual study on its own cannot inform causality, but instead represents a piece of the overall body of evidence'' (U.S. EPA, 2022a, p. 1–3).

[93] The EPA notes that, in considering the additional scientific evidence available in this reconsideration, one member of the CASAC who reviewed both the 2019 draft PA and the 2021 draft PA found that the available scientific and quantitative information available in this reconsideration supported revising the level of the primary annual $PM_{2.5}$ standard, whereas he recommended retaining the standard during the review of the 2019 draft PA.

assessed in the 2022 PA; (3) the evaluation of this evidence, the quantitative information, and the rationale and conclusions presented in the 2022 PA; (4) the advice and recommendations from the CASAC; and (5) public comments. The Administrator concludes that the current suite of primary $PM_{2.5}$ standards are not adequate to protect public health with an adequate margin of safety.

The four basic elements of the NAAQS (indicator, averaging time, form, and level) are considered collectively in evaluating the health protection afforded by a standard. The EPA received relatively few comments on the averaging time and form for the primary $PM_{2.5}$ standards, but those who did provide comments on these elements were primarily from public health and environmental organizations, State and local elected representatives, and State and local government agencies. Some commenters assert that the current 24-hour averaging time for the primary 24-hour $PM_{2.5}$ standard does not adequately protect against short-term peaks. These commenters further state that the 24-hour averaging time protects against chronic exposures but does not adequately protect against serious acute risks from certain sources such as prescribed burning. Also, a few commenters explicitly recommend that a subdaily averaging time would be more appropriate, although none of the commenters recommended a specific averaging time for consideration. Additionally, some commenters cite to the CASAC's advice in their review of the 2021 draft PA that future reviews of the PM NAAQS should include evaluation of alternative forms and averaging times of the current primary 24-hour $PM_{2.5}$ standard.

The EPA disagrees with commenters that the current primary 24-hour $PM_{2.5}$ standard, with its 24-hour averaging time, does not adequately protect against short-term peaks and disagrees that that there is sufficient information to conclude that a subdaily averaging time would be more appropriate than a 24-hour averaging time. The EPA has reviewed the currently available scientific evidence and finds that it does not indicate that alternative averaging times would be more appropriate for the primary $PM_{2.5}$ standards. Accordingly, the EPA concludes that it is appropriate to retain both the annual and 24-hour averaging times for standards meant to protect against long- and short-term $PM_{2.5}$.

As noted in the proposal, the 2019 ISA and ISA Supplement found that the scientific evidence continues to provide strong support for health effect associations with both long-term (*e.g.,* annual or multi-year) and short-term (*e.g.,* mostly 24-hour) exposures to $PM_{2.5}$. Epidemiologic studies continue to provide strong support for health effects associated with short-term $PM_{2.5}$ exposures based on 24-hour $PM_{2.5}$ averaging periods, and we note that subdaily effect estimates are less consistent and, in some cases, smaller in magnitude (88 FR 5618, January 27, 2023). Controlled human exposure and panel-based studies of subdaily exposures typically examine subclinical effects rather than the more serious population-level effects that have been reported to be associated with 24-hour exposures (*e.g.,* mortality, hospitalizations). Collectively, the 2019 ISA concludes that epidemiologic studies do not indicate that subdaily averaging periods are more closely associated with health effects than the 24-hour average exposure metric (U.S. EPA, 2019a, section 1.5.2.1). Additionally, the EPA notes that while recent controlled human exposure studies provide consistent evidence for cardiovascular effects following $PM_{2.5}$ exposures for less than 24 hours (*i.e.,* <30 minutes to 5 hours), exposure concentrations in these studies are well-above the ambient concentrations typically measured in locations meeting the current standards (U.S. EPA, 2022a, section 3.3.3.1). Therefore, this information does not indicate that a revision to the averaging time is needed to provide additional protection against subdaily $PM_{2.5}$ exposures, beyond that provided by the current primary standards. This conclusion is also supported by the advice given to EPA by the CASAC in their review of the 2021 draft PA, which reached consensus that averaging times for the standards should be retained, without revision (Sheppard, 2022a, p. 2 of consensus letter).[94] For all of these reasons, the Administrator concludes that the currently available evidence does not support considering alternatives to the annual and 24-hour averaging times for standards meant to protect against long- and short-term $PM_{2.5}$ exposures.

Multiple commenters, primarily from public health and environmental organizations, recommend revising the form of the primary 24-hour $PM_{2.5}$ standard to a 99th percentile to provide increased public health protection against peak $PM_{2.5}$ exposures, particularly for at-risk populations. These commenters express concern that the current 98th percentile form allows 7 exceedances per year and contend that a 99th percentile form that would allow half that number is more appropriate. Commenters also cite to the CASAC's advice in their review of the 2021 draft PA, which recommended that the EPA consider alternative percentiles for the form of the primary 24-hour $PM_{2.5}$ standard in the future.

The EPA disagrees that the current 98th percentile form does not provide the requisite public health protection against peak $PM_{2.5}$ exposures and concludes that the 98th percentile, averaged over three years, remains appropriate for the primary 24-hour $PM_{2.5}$ standard. As noted in previous reviews and in the proposal, the EPA has set both an annual standard and a 24-hour standard to provide protection from health effects associated with both long- and short-term exposures to $PM_{2.5}$ (62 FR 38667, July 18, 1997; 88 FR 5620, January 27, 2023). With respect to the form of the 24-hour standard, as described just above, the epidemiologic studies continue to provide strong support for health effect associations with short-term (*e.g.,* mostly 24-hour) $PM_{2.5}$ exposures and controlled human exposure studies provide evidence for health effects following single short-term ''peak'' $PM_{2.5}$ exposures (88 FR 5619, January 27, 2023). Both the 98th and the 99th percentile form provide a very high degree of control of peak concentrations. As the commenters point out, a 99th percentile would reduce the number of allowable exceedances to four days per year. The EPA anticipates, however, that such a revision to the form would make the attainment status of an area more subject to change from unpredictable nonanthropogenic factors, such as meteorological events. The EPA has often noted that frequent shifts in attainment status that are unrelated to long-term air quality trends is inconsistent with providing a stable target for air quality planning and risk management programs, which in turn provides for the most effective public health protection in the long run (78 FR 3127, January 15, 2013; 80 FR 65351, October 26, 2015). Thus, the EPA's interest in an appropriate degree of stability is to ensure that the State air quality programs are effective in controlling pollution and that the public health protections of the standard are achieved. As discussed above, while recent controlled human exposure studies provide consistent evidence for cardiovascular effects following $PM_{2.5}$

[94] In providing advice on the 2019 draft PA, the CASAC did not weigh in specifically on the averaging time of the primary 24-hour $PM_{2.5}$ standard but did recommend that the standard be retained because the available evidence does not call into question its adequacy (Cox, 2019b, p. 3 of consensus letter).

exposures for less than 24 hours (*i.e.,* < 30 minutes to 5 hours), exposure concentrations in these studies are well-above the ambient concentrations typically measured in locations meeting the current standards (U.S. EPA, 2022a, section 3.3.3.1), and the 98th percentile form is very effective at limiting occurrences of exposures of concern. Taking into consideration the available scientific information and quantitative information, the EPA therefore concludes that the 98th percentile form provides an appropriate balance between limiting the occurrence of peak 24-hour $PM_{2.5}$ concentrations and identifying a stable target for risk management programs. This conclusion is also supported by the advice given to the EPA by the CASAC in their review of the 2021 draft PA, where they reached consensus that the form for the standards should be retained, without revision (Sheppard, 2022a, p. 2 of consensus letter).[95]

Additionally, the EPA recognizes the CASAC's advice in their review of the 2021 draft PA, where they recommended ''that in future reviews, the EPA provide a more comprehensive assessment of the 24-hour standard that includes the form as well as the level'' (Sheppard, 2022a, p. 4 of consensus letter). This advice is reflected in the proposal by the EPA, which noted ''that it would be appropriate to gather additional air quality and scientific information and further consider these issues in future reviews'' (88 FR 5619, January 27, 2023). The EPA will consider the information provided by the commenters regarding the form of the 24-hour $PM_{2.5}$ standard in the next review of the PM NAAQS.

A number of commenters who support revising the level of the primary annual $PM_{2.5}$ standard, particularly those who support a revised level of 8 $\mu g/m^3$, disagree with how the EPA has emphasized the mean $PM_{2.5}$ concentrations reported in key epidemiologic studies to inform conclusions on the level of the primary $PM_{2.5}$ standard. These commenters argue that, in this reconsideration, the EPA is arbitrarily emphasizing uncertainties in key epidemiologic studies in the focus on mean concentrations. Many of these commenters recommend that the EPA consider the full distribution of $PM_{2.5}$ concentrations from the key epidemiologic studies in reaching conclusions on the appropriate level for the primary annual $PM_{2.5}$ standards, in particular concentrations below the mean, such as the 25th percentile. In supporting this view, commenters point to the CASAC's advice in their review of the 2021 draft PA, where the majority of the CASAC stated that the ''use of the mean to define where the data provide the most evidence is conservative since robust data clearly indicate effects below the mean in concentration-response functions'' (Sheppard, 2022a, p. 16 of consensus responses), and that ''[e]pidemiologic studies require consideration of distribution around the mean of exposure to identify effects and thus lower levels than the mean must be considered as part of the range where the data provide higher confidence'' (Sheppard, 2022a, p. 13 of consensus responses).

As an initial matter, consistent with some previous approaches and as detailed by the Administrator in reaching conclusions on the level of the primary annual $PM_{2.5}$ standard in section II.B.4 below, the EPA considers the long-term study-reported mean $PM_{2.5}$ concentrations from key epidemiologic studies and sets the level of the standard to somewhat below the lowest long-term mean $PM_{2.5}$ concentration. Additionally, as discussed further below, the EPA also considers the available information from a subset of epidemiologic studies that report exposure estimates or health events at the 25th and 10th percentiles of $PM_{2.5}$ concentrations. The Administrator gives some weight to the 25th percentile data, although he recognizes that his confidence in the magnitude and significance in the reported concentrations, and their ability to inform decisions on the appropriate level of the annual standard, decreases with reduced data (below the mean) and diminishes further at percentiles that are even further below the mean and the 25th percentile. Therefore, the Administrator places weight on the reported 25th percentiles concentrations, rather than the reported 10th percentile concentrations, for the subset of studies that report lower percentile $PM_{2.5}$ concentrations in reaching his conclusions regarding the appropriate level for the primary annual $PM_{2.5}$ standard.

In considering the available scientific evidence to reach decisions on the adequacy of the suite of primary $PM_{2.5}$ standards, the EPA notes that in previous PM NAAQS reviews (including the 1997, 2006 and 2012 reviews), evidence-based approaches were used that focused on identifying standard levels near or somewhat below long-term mean concentrations reported in key epidemiologic studies. These approaches were supported by the CASAC in previous reviews and were supported in this reconsideration by the CASAC in their review of the 2021 draft PA.[96]

In considering the available scientific evidence, the EPA notes the strength of the epidemiologic evidence which includes multiple studies that consistently report positive associations for short- and long-term $PM_{2.5}$ exposures and mortality and cardiovascular effects. Some available studies also use a variety of statistical methods to control for confounding bias and report similar associations, which further supports the broader body of epidemiologic evidence for both mortality and cardiovascular effects. Additionally, the EPA notes that recent epidemiologic studies strengthen support for health effect associations at $PM_{2.5}$ concentrations lower than in those evaluated in epidemiologic studies available at the time of previous reviews.

While these epidemiologic studies evaluate associations between distributions of ambient $PM_{2.5}$ concentrations and health outcomes, they do not identify the specific exposures that led to the reported effects. As such, there is no specific point in the air quality distribution of any epidemiologic study that represents a ''bright line'' at and above which effects have been observed and below which effects have not been observed.

Studies of daily $PM_{2.5}$ exposures examine associations between day-to-day variation in $PM_{2.5}$ concentrations and health outcomes, often over several years. While there can be considerable variability in daily exposures over a multi-year study period, most of the estimated exposures reflect days with

[95] The CASAC did not provide advice or recommendations regarding the forms of the primary $PM_{2.5}$ standards in their review of the 2019 draft PA (Cox, 2019b).

[96] The Administrator notes that, in their review of the 2021 draft PA, a majority of members of the CASAC noted that there are some limitations for this approach ''for the purpose of informing the adequacy of the standards'' (Sheppard, 2022a, p. 8 of consensus responses) and advised that future reviews should include evaluation of other metrics, including the distribution of concentrations reported in epidemiologic studies and in analyses restricting concentrations to below the current standard level. The Administrator also notes that, in their review of the 2019 draft PA, the CASAC lacked consensus on the inferences to be drawn from the epidemiologic evidence, with a majority of CASAC having concerns about confounding, error and bias and concluding that newer studies did not provide a basis for revising the current standards, while a minority concluded that the evidence, including more recent studies showing associations in areas with average long-term $PM_{2.5}$ concentrations below the current annual standard, supported their conclusion that the current standards are inadequate (Cox, 2019b, pp. 8–9 of consensus responses).

ambient $PM_{2.5}$ concentrations around the middle of the air quality distributions examined (*i.e.,* ''typical'' days rather than days with extremely high or extremely low concentrations). Similarly, for studies of annual $PM_{2.5}$ exposures, most of the health events occur at estimated exposures that reflect annual average $PM_{2.5}$ concentrations around the middle of the air quality distributions examined. In both cases, epidemiologic studies provide the strongest support for reported health effect associations for this middle portion of the $PM_{2.5}$ air quality distribution, which corresponds to the bulk of the underlying data, rather than the extreme upper or lower ends of the distribution. Therefore, in the absence of discernible thresholds, long-term study-reported means—that is, the study-reported ambient $PM_{2.5}$ concentrations in the epidemiologic studies that reflect estimated exposures with a focus around the middle portion of the $PM_{2.5}$ air quality distribution where the bulk of the observed data reside—provide the strongest support for reported health effect associations in epidemiologic studies.

Based on the air quality criteria for this reconsideration, as described in the 2019 ISA, ISA Supplement, 2022 PA and the proposal, the EPA believes it is appropriate to continue to use the mean $PM_{2.5}$ concentrations from the key epidemiologic studies to inform conclusions regarding the appropriate level for the primary annual $PM_{2.5}$ standard.

There are a large number of key epidemiologic studies available in this reconsideration to inform conclusions regarding the level of the primary annual $PM_{2.5}$ standard. For the key U.S. epidemiologic studies, the study-reported mean $PM_{2.5}$ concentrations range from 9.9–16.5 $\mu g/m^3$ for monitor-based studies (Figure 1 above) and range from 9.3–12.2 $\mu g/m^3$ for hybrid modeling-based studies (Figure 2 above).

In addition to the study-reported mean $PM_{2.5}$ concentrations, the EPA agrees with the CASAC's advice in their review of the 2021 draft PA and public comments that information on other percentiles below the mean can also be informative, and the EPA notes that the CASAC advised that for the purpose of informing the adequacy of the standards, future reviews should include an evaluation of other metrics, including the distribution of concentrations reported in epidemiologic studies (Sheppard, 2022a, p. 9 of consensus responses). As such, in reaching conclusions in this reconsideration, the EPA takes note of the additional study-reported $PM_{2.5}$ concentrations below the means (*e.g.,* 25th and 10th percentiles) that are available from a limited subset of key U.S. epidemiologic studies. As shown in Figures 1 and 2 above, six key U.S. epidemiologic studies report information on other percentiles (*e.g.,* 10th and 25th percentiles of $PM_{2.5}$ concentrations or 10th and 25th percentiles of $PM_{2.5}$ concentrations associated with health events) that are below the mean.[97] Three of the studies are monitor-based and three are hybrid model-based.

The key U.S. epidemiologic studies that report percentiles below the mean that are monitor based are older studies. These studies included smaller numbers of people than the newer hybrid model-based studies. For the three older, monitor-based studies, because the cohorts were smaller in size, a relatively smaller portion of the health events were observed in the lower part of the air quality distribution. As such, our confidence in the magnitude and significance of the associations begins to decrease in the lower part of the air quality distribution of those older, monitor-based studies.

The three newer, hybrid model-based studies have larger cohort sizes than the older, monitor-based studies and, as noted by commenters, have more health events in the lower part of the air quality distribution. For these reasons, the EPA notes that we have more confidence in the reported association at concentrations lower than the reported mean in these more recent hybrid model-based studies, particularly at the 25th percentile compared to the 10th percentile. While the cohort sizes in the more recent, hybrid model-based studies are larger than the older, monitor-based studies, the EPA notes that the 10th percentiles are well below the middle portion of the air quality distribution for which we have the greatest confidence, and as noted above, our confidence in the magnitude and significance of associations in the lower parts of the air quality distribution begins to decrease. While we have more confidence in the lower percentiles because of the larger cohort sizes in the more recent hybrid model-based studies, we also have more confidence in the 25th percentiles than in the 10th percentiles, which are further from the means and closer to the lower end of the air quality distribution.

In considering how the six studies that report percentiles lower than the mean can be used to inform conclusions regarding the level of the primary annual $PM_{2.5}$ standard, the EPA first notes that the three monitor-based epidemiologic studies (Bell et al., 2008; Franklin et al., 2007; Zanobetti and Schwartz, 2009) report 25th percentile concentrations that are at or above 11.5 $\mu g/m^3$. For two of the more recent hybrid model-based studies (Di et al., 2017b; Wang et al., 2017), the 25th percentile of estimated $PM_{2.5}$ concentrations are just above 9 $\mu g/m^3$, while one study (Di et al., 2017a) reports a $PM_{2.5}$ concentrations corresponding to 25th percentiles of health events of just below 7 $\mu g/m^3$. For the Di et al. (2017a) study, the 25th percentile $PM_{2.5}$ concentration (6.7 $\mu g/m^3$) is based on the $PM_{2.5}$ concentration at which the 25th percentile of deaths occur in the study, while the reported mean (11.6 $\mu g/m^3$) is based on estimated $PM_{2.5}$ exposure concentrations. Additionally, the 25th percentiles of the other two recently available hybrid model-based studies (Di et al., 2017b; Wang et al., 2017) are based on estimated $PM_{2.5}$ concentrations. As such, the $PM_{2.5}$ concentration at which the 25th percentile of health events occur may be different from the estimated 25th percentile $PM_{2.5}$ concentration in this study (Di et al., 2017a), creating an uncertain basis for comparison with the studies by Di et al. (2017b) and Wang et al. (2017). The 25th percentiles from these studies, in particular those that are more recently available, help to inform the Administrator's judgments regarding the appropriate level for the primary annual $PM_{2.5}$ standard.

Some commenters disagree with the EPA's consideration of the relationship between mean $PM_{2.5}$ concentrations reported in the key epidemiologic studies and design values to inform conclusions on the appropriate level for the primary annual $PM_{2.5}$ standards. Commenters contend that setting the level of the primary annual standard below the design values in the epidemiologic studies, rather than below the study-reported mean concentrations, might keep overall mean $PM_{2.5}$ concentrations throughout an area below the study-reported means but allow $PM_{2.5}$ concentrations in some parts of the area, including near the ''design value monitor'' to remain above the study-reported mean $PM_{2.5}$ concentrations, which are the concentrations where the evidence of health effects is strongest. Commenters contend that such a decision framework would not result in a standard that would provide requisite protection with an adequate margin of safety,

[97] The Wang et al. (2017) study only reports the 25th percentile of the estimated $PM_{2.5}$ concentrations, not the 10th percentile.

particularly for at-risk populations. These commenters further support this view by citing the CASAC's advice in their review of the 2021 draft PA, where the majority of CASAC stated that ''even if a design value is somewhat higher than the area average, it reflects actual exposure levels and thus any portion of the population living near the design value monitor does experience exposures at that level and consequent health effects of exposure to that higher concentration'' (Sheppard, 2022a, p. 14 of consensus responses). Additionally, these commenters suggest that the EPA should not deviate from the approach taken in the 2012 review, which was to set the standard at a level ''somewhat below'' the lowest mean $PM_{2.5}$ concentration in the key epidemiologic studies.

To the extent that commenters are suggesting that the EPA is setting the level of the primary annual $PM_{2.5}$ standard below the design values in the epidemiologic studies, rather than below the study-reported mean $PM_{2.5}$ concentrations, we disagree with the commenters. In reaching conclusions on the level of the primary annual $PM_{2.5}$ standard, the EPA considers the long-term study-reported mean $PM_{2.5}$ concentrations from key epidemiologic studies and sets the level of the standard to somewhat below the lowest long-term mean $PM_{2.5}$ concentration, not below the design values in the epidemiologic studies. Additionally, the EPA also considers the available information from a subset of epidemiologic studies that report exposure estimates or health events at the 25th and 10th percentiles of $PM_{2.5}$ concentrations. The EPA particularly considers the 25th percentile data, while recognizing that our confidence in the magnitude and significance in the reported concentrations, and the ability of the lower percentile $PM_{2.5}$ concentrations to inform decisions on the appropriate level of the annual standard, decreases with reduced data (below the mean) and diminishes further at percentiles that are even further below the mean and the 25th percentile.

However, the EPA notes that it is important to understand, and to not ignore, the relationship between the study-reported mean $PM_{2.5}$ concentrations reported in key epidemiologic studies and the area design value. As an initial matter, the NAAQS consists of all four elements of the standard (indicator, averaging time, form, and level) and setting a standard that is requisite to protect public health includes consideration of all four elements together. Following implementation of the NAAQS, the design value is the metric used to determine compliance with the standard and is the statistic that describes the air quality status of a given location relative to the level of the primary annual $PM_{2.5}$ NAAQS. The design value is different from the study-reported mean $PM_{2.5}$ concentrations. This is because the study-reported mean $PM_{2.5}$ concentrations are an annual average $PM_{2.5}$ concentration, similar to the level of the standard, but the epidemiologic studies do not report statistics that take into account the other elements of the standard (*i.e.,* averaging time and form). Therefore, when considering the appropriate revisions to the annual $PM_{2.5}$ standard, the EPA must consider the protection provided by a revised standard taking into account all of the elements of the standard, not just the annual average $PM_{2.5}$ concentration alone.

In considering the annual standard, and in assessing the range of study-reported exposure concentrations for which we have the strongest support for adverse health effects observed in epidemiologic studies, the EPA focuses on whether the current primary annual $PM_{2.5}$ standard provides adequate protection against these exposure concentrations or if the level of the standard should be revised to provide the appropriate public health protection. This means that, as in some previous reviews, it is important to consider how the study means were computed and how these concentrations compare to the annual standard metric (including the level, averaging time and form) which must be met at the monitor with the highest $PM_{2.5}$ design value in an area for compliance with the NAAQS. This approach is based on the application of a decision framework based on assessing means (as well as the lower distribution of reported $PM_{2.5}$ concentration, as noted above) reported in key epidemiologic studies. In the 2012 review, the available key epidemiologic studies computed the mean $PM_{2.5}$ concentrations using an average across monitor-based $PM_{2.5}$ concentrations. As such, at that time, the decision framework used an approach based on maximum monitor concentrations to determine compliance with the standard, while selecting the standard level based on consideration of composite monitor concentrations (*i.e.,* selecting the standard level of 12.0 μg/m^3 was just below the long-term study-reported mean $PM_{2.5}$ concentrations in key epidemiologic studies). Further, the EPA conducted analyses that examined the differences in these two metrics (*i.e.,* maximum monitor concentrations, which is how compliance with the standard is assessed and composite monitor concentrations, which is how key epidemiologic studies report their mean concentrations) across the U.S. and in areas included in the key epidemiologic studies and found that the maximum design value in an area was generally higher than the monitor average across that area, with the amount of difference between the two metrics varying based on location and concentration (Hassett-Sipple et al., 2010; Frank, 2012). This information was taken into account by the then-Administrator's final decision in selecting a level of 12.0 μg/m^3 for the primary annual $PM_{2.5}$ standard in the 2012 review and discussed more specifically in her considerations on adequate margin of safety.

The relationship between the mean $PM_{2.5}$ concentrations and the area design value continues to be an important consideration in evaluating the adequacy of the current or potential alternative annual standard levels in this reconsideration. Again, in a given area, the area design value is based on the monitor in an area with the highest $PM_{2.5}$ concentrations and is used to determine compliance with the standard, including the averaging time and form of the standard (*i.e.,* an annual average over 3-years must not exceed the level of the of the annual $PM_{2.5}$ standard). The highest $PM_{2.5}$ concentrations spatially distributed in the area would generally occur at or near the area design value monitor and the distribution of $PM_{2.5}$ concentrations would generally be lower in other locations and at monitors in that area. As such, when an area is meeting a specific annual standard level (*e.g.,* 9.0 μg/m^3), we would expect the annual average exposures (*i.e.,* a metric similar to the study-reported mean values) in that area to be at concentrations lower than that level (*e.g.,* lower than 9.0 μg/m^3).

However, as described in section II.A.2.c.ii, we note that there are a substantial number of different types of epidemiologic studies available since the 2012 review, as assessed in both the 2019 ISA and the ISA Supplement, that make understanding the relationship between the mean $PM_{2.5}$ concentrations and the area design value an even more important consideration in this reconsideration (U.S. EPA, 2019a; U.S. EPA, 2022a). While the key epidemiologic studies in the 2012 review were all monitor-based studies, the recent epidemiologic studies in this reconsideration include hybrid modeling approaches that have emerged in the epidemiologic literature as an

alternative to approaches that only use ground-based monitors to estimate $PM_{2.5}$ exposure. As assessed in the 2019 ISA and ISA Supplement, a substantial number of epidemiologic studies used hybrid model-based methods in evaluating associations between $PM_{2.5}$ exposure and health effects. Hybrid model-based studies employ various fusion techniques that combine ground-based monitored data with air quality modeled estimates and/or information from satellites to estimate $PM_{2.5}$ exposures. While these studies provide a broader estimation of $PM_{2.5}$ exposures compared to monitor-based studies (*i.e.,* $PM_{2.5}$ concentrations are estimated in areas without monitors), the hybrid modeling approaches result in study-reported means that are more difficult to relate to the annual standard metric and to the maximum monitor design values used to assess compliance. In addition, to further complicate the comparison, when looking across these studies, we find variations in how exposure is estimated between such studies, and thus, how the study means are calculated. Two important variations across studies include: (1) Variability in spatial scale used (*i.e.,* averages computed across the national (or large portions of the country) versus a focus on only CBSAs); and (2) variability in exposure assignment methods (*i.e.,* averaging across all grid cells, averaging across a scaled-up area like a ZIP code, and population weighting). The differences in these approaches can result in studies reporting different study means, even though the association between $PM_{2.5}$ exposure and health effects outcomes are similar.

To emphasize the importance of the differences between the studies, we revisit the simplified example in the State of Georgia from the 2022 PA that evaluates monitors and hybrid modeling approaches, noting that this example is useful to exhibit how the differences in the methods used to estimate exposure can lead to differences in the reported mean concentrations (U.S. EPA, 2022b, p. 3–71). In this example, for all monitors within the Atlanta-Sandy Springs-Roswell CBSA, the average $PM_{2.5}$ concentration is 9.3 $\mu g/m^3$, while the area design value (based on the highest monitored $PM_{2.5}$ concentration in the area) is 10.4 $\mu g/m^3$. This comparison helps to illustrate the fact that composite monitor values tend to be somewhat lower than the highest area monitor values, consistent with the key points made in the 2012 review. This example also illustrates how monitors are sited to represent the higher concentrations within the area and that the area's annual design value, which is used for compliance with the standard, is calculated based on the highest monitor in the area. Next, in this example, mean $PM_{2.5}$ concentrations were calculated using similar approaches to those used in hybrid modeling-based epidemiologic studies to compute study-reported means, including (1) the average concentration across the entire State of Georgia; (2) the population-weighted average across the entire State; (3) the average concentration across the Atlanta-Sandy Springs-Roswell CBSA; and (4) the population-weighted average across the Atlanta-Sandy Springs-Roswell CBSA. At the urban level (*e.g.,* Atlanta-Sandy Springs-Roswell CBSA), the average $PM_{2.5}$ concentration when taking the mean of all grid cells is 9.2 $\mu g/m^3$, whereas the population-weighted mean is 9.6 $\mu g/m^3$. Across Georgia, the average $PM_{2.5}$ concentration using the hybrid approach and averaged across each grid cell is 8.3 $\mu g/m^3$, which is lower than the population-weighted statewide average of 9.1 $\mu g/m^3$. While this is a simple example completed in one State and one CBSA, it suggests that the lowest mean values tend to result from the approaches that use concentrations from all or most grid cells (*e.g.,* did not apply population weighting), both urban and rural, across the study area to compute the mean. Higher mean values are observed when the approach focuses on the urban areas alone or when the approach incorporates population weighting. Overall, this example suggests that the means from studies using hybrid modeling approaches are generally lower than the means from monitor-based approaches, and means from both approaches are lower than the annual design values for the same area. Population weighting tends to increase the calculated mean concentration, likely because more densely populated areas also tend to have higher $PM_{2.5}$ concentrations. In other words, this simplified example exhibits how not all reported mean $PM_{2.5}$ concentrations from key epidemiologic studies are the same; some reported means are from monitored studies and some reported means are from hybrid modeling studies, while some reported means include only urban areas, and other reported means include both urban and rural areas, and some reported means include aspects of population weighting while others do not.

As detailed above in section I.D.5, in the air quality analyses comparing composite monitored $PM_{2.5}$ concentrations with annual $PM_{2.5}$ design values in U.S. CBSAs, maximum annual $PM_{2.5}$ design values were approximately 10% to 20% higher than annual average composite monitor concentrations (*i.e.,* averaged across multiple monitors in the same CBSA). Based on these results, this analysis suggests that there will be a distribution of concentrations and the maximum annual average monitored concentration in an area (at the design value monitor, used for compliance with the standard), will generally be 10–20% higher than the average across the other monitors in the area. Thus, in considering how the annual standard levels would relate to the study-reported means from monitor-based studies, we can generally conclude that an annual standard level that is no more than 10–20% higher than monitor-based study-reported mean $PM_{2.5}$ concentrations would generally maintain air quality exposures to be below those associated with the study-reported mean $PM_{2.5}$ concentrations, exposures for which we have the strongest support for adverse health effects occurring.

Air quality analyses described in section I.D.5 above also consider information from the epidemiologic studies that utilized the hybrid modeling approaches. Analyses show that average maximum annual design values are 40–50% higher when compared to annual average $PM_{2.5}$ concentrations estimated without population weighting and are 15–18% higher when compared to average annual $PM_{2.5}$ concentrations with population weighting applied. Given these results, it is worth noting that for the studies using the hybrid modeling approaches, the choice of methodology employed in calculating the study-reported means (*i.e.,* using population weighting versus not applying aspects of population weighting), and not a difference in estimates of exposure in the study itself, can produce substantially different study-reported mean values, with the approach that does not employ population weighting producing a much lower reported mean $PM_{2.5}$ concentration. Therefore, the impact of the differences in methods is an important consideration when comparing mean concentrations across studies.

Because of the differences in the methods employed by the key epidemiologic studies, and as demonstrated by the example and air quality analyses above, the application of any decision framework that considers the study-reported mean $PM_{2.5}$ concentrations, and evaluates whether the current annual standard provides adequate protection against these reported exposure concentrations, is more complicated than the

approaches used in past reviews. As such, the EPA disagrees with commenters who argue that the EPA's consideration of the relationship between mean $PM_{2.5}$ concentrations reported in key epidemiologic studies and design values is not appropriate and should be ignored.

In considering the information from the epidemiologic studies, while the EPA does not dispute the reported associations of epidemiologic studies in hybrid modeling studies that report long-term mean concentrations and do not apply aspects of population weighting, using the reported long-term mean concentration from these studies in informing an appropriate level of the annual $PM_{2.5}$ standard is more uncertain. Given this, hybrid modeling studies that do not apply aspects of population weighting provide less information on conclusions regarding the appropriate level of the primary annual $PM_{2.5}$ standard. In support of this, some commenters also noted this consideration and suggested that the Administrator place lower weight on U.S. studies that did not use population weighting.

In considering the relationship between study-reported mean $PM_{2.5}$ concentrations and the design values, the EPA agrees with commenters that setting the level of the primary annual standard below the design values, rather than below the study-reported mean concentrations, might allow $PM_{2.5}$ concentrations in some part of the area near the design value monitor to remain above the study-reported mean $PM_{2.5}$concentration, where evidence of health effects is strongest. As discussed in the proposal and in section II.B.4 below, the Administrator specifically notes that that the highest $PM_{2.5}$ concentrations spatially distributed in the area would generally occur at or near the area design value monitor and that $PM_{2.5}$ concentrations will be equal to or lower at other monitors in the area. Furthermore, since monitoring strategies aim to site monitors in areas with higher $PM_{2.5}$ concentrations, monitored areas will generally have higher concentrations compared to areas without monitors. Therefore, by setting the level of the standard to 9.0 $\mu g/m^3$ and just below the lowest study-reported mean $PM_{2.5}$ concentration (*e.g.,* 9.3 $\mu g/m^3$), the highest possible design value in a given area would be just below the study-reported mean $PM_{2.5}$ concentration, the concentration where we have the most confidence in the reported health effect association, and we anticipate that, based on our assessment of air quality data, the distribution of $PM_{2.5}$ concentrations would decrease even further with distance from the highest monitor (*i.e.,* the ''design value monitor'') (see, for example, U.S. EPA, 2022a, section 2.3.3.2.4 and pp. 3–71 to 3–77). The Administrator further notes that when an epidemiologic study reports a mean $PM_{2.5}$ concentration that reflects the average of annual average monitor-based concentrations across an area, the area design value will generally be higher than the study-reported mean. Similarly, he observes that when a study reports a mean that reflects the average of annual average concentrations estimated at across an area using a hybrid modeling approach, the area design value will generally be higher. As such, by evaluating the difference between the study-reported mean $PM_{2.5}$ concentrations and design values, the Administrator seeks to set the level of the standard below the lowest study-reported mean, while ensuring that the primary annual $PM_{2.5}$ standard, including its averaging time and form, provides protection against the exposures associated with health effects observed in the key epidemiologic studies.

Additionally, the EPA disagrees with commenters who contend that the approach taken may allow $PM_{2.5}$ near the design value monitor to remain above the study-reported mean $PM_{2.5}$ concentrations. In following this approach of setting the annual standard level somewhat below the lowest reported mean $PM_{2.5}$ concentration, setting a standard level that requires the design value monitor (which is the highest monitor in an area) to be just below the lowest study-reported mean across key studies will generally result in distributions of even lower concentrations of $PM_{2.5}$ across the entire area, such that even those people living near an area design value monitor (where $PM_{2.5}$ concentrations are generally highest) will be exposed to $PM_{2.5}$ concentrations below the $PM_{2.5}$ concentrations reported in the epidemiologic studies where there is the highest confidence of an association. In their review of the 2021 draft PA, the majority of the CASAC had some concerns about the approach for comparing study means and design values, questioning whether such an approach would provide adequate protection for people who live in areas with higher concentrations, such as those living in areas with higher concentrations (*e.g.,* near the design value monitor) (Sheppard, 2022a, p. 8 of consensus responses). The minority of the CASAC, in considering the relationship between the study-reported mean $PM_{2.5}$ concentration and design values, stated that ''the form of the standard and the way attainment with the standard is determined (*i.e.,* highest design value in the CBSA) are important factors when determining the appropriate level for the standard'' and noted that that design values are generally higher than area average exposure levels (Sheppard, 2022a, p. 17 of consensus responses). For all of the reasons discussed above, and consistent with the minority of the CASAC's advice in their review of the 2021 draft PA, we disagree with the commenters that areas near the design value monitors would be expected to experience $PM_{2.5}$ concentrations above the study-reported mean concentrations.

Several commenters assert that epidemiologic studies that restrict $PM_{2.5}$ concentration to below 12 $\mu g/m^3$ provide additional support for revising the level of the primary annual $PM_{2.5}$ standard to 8 $\mu g/m^3$. Some commenters disagree with the EPA's assertion that the studies that employ restricted analyses do not provide enough information to understand how the studies were restricted to certain $PM_{2.5}$ concentrations, with commenters providing additional information on the methods for restricted analyses. The commenters state that for the long-term studies at issue here, the study authors simply examined their database that linked subjects to long-term $PM_{2.5}$ concentrations above 12 $\mu g/m^3$, removed those data from the analysis, and reran the analysis. Additionally, one commenter provided an explanation of how the restricted analyses were conducted in studies for which he was an author. The commenter notes that for each year a subject was in the study, annual $PM_{2.5}$ concentrations were assigned at the ZIP code level. If they moved, they were assigned the ZIP code level $PM_{2.5}$ concentration for the new ZIP code. The commenter notes that these restricted analyses only included subjects whose annual $PM_{2.5}$ exposure never exceeded that restricted concentration for any year of follow-up in the study. The commenter suggested that the EPA may be concerned as to how $PM_{2.5}$ concentrations in restricted analyses related to a design value since these are exposures for individuals who may have relocated during the study but argue that that is not the point. The commenters assert that while the analyses were restricted to people never exposed above certain concentrations over longer periods of time, the actual $PM_{2.5}$ exposure was one year of exposure in most of these studies. Commenters also suggest that, since the

EPA has deviated from its approach from the 2012 review for considering study-reported mean $PM_{2.5}$ concentrations, the EPA should dismiss its concerns regarding being able to relate the mean $PM_{2.5}$ concentrations from these studies to design values.

First, the EPA agrees with commenters that studies that employ restricted analyses can be used for informing conclusions regarding the appropriate level of the primary annual $PM_{2.5}$ standard. However, the EPA disagrees that the information provided by the commenters provides a sufficient basis for an annual standard level of 8 $\mu g/m^3$. Restricted analyses provide additional support for effects at lower concentrations, exhibiting associations for mean concentrations presumably below the mean concentrations for the main analyses. However, even though commenters note that any individual with exposures over the restricted analyses is excluded from restricted analyses, uncertainties remain with regard to how the mean $PM_{2.5}$ concentrations in restricted analyses compare to design values, particularly in light of the removal of entire ZIP codes from analyses. Design values are calculated based on all measured $PM_{2.5}$ concentrations. When an analysis is restricted below a certain level, some parts of the air quality distribution are removed, but comparing the restricted mean to a design value is not possible because these are two different metrics. For example, in a study that restricts concentrations below 12 $\mu g/m^3$, that represents only part of the air quality distribution, whereas a design value for that study area would include all $PM_{2.5}$ concentrations, not just the ones below 12 $\mu g/m^3$. Therefore, in contrast to means from the main (unrestricted) analysis, it is not possible to compare mean concentrations from restricted analyses to design values. Further, it is unclear how one could evaluate such a relationship between design values and mean $PM_{2.5}$ concentrations from studies that use restricted analyses because the standard is set based on all of its elements (indicator, averaging time, form, and level) and removing $PM_{2.5}$ concentrations from the calculation of the design value for such a comparison would result in a metric that is no longer a design value that would provide the intended protection of the standard. This leads to greater uncertainty in how to use the mean $PM_{2.5}$ concentrations from these studies that use restricted analyses in a similar decision framework as the epidemiologic studies that report long-term mean $PM_{2.5}$ concentrations for health effect associations for the full distribution of $PM_{2.5}$ concentrations.

As described in reaching his conclusions in the section below, the Administrator judges that, despite these uncertainties and limitations, studies that use restricted analyses can provide supplemental information for consideration in reaching conclusions regarding both the adequacy and level of the standard. He notes two studies (Di et al., 2017b and Dominici et al., 2019) are available in this reconsideration that report means in their restricted analyses (restricting annual average $PM_{2.5}$ exposure below 12 $\mu g/m^3$) and used population-weighted approaches to estimate $PM_{2.5}$ exposures and these studies report mean $PM_{2.5}$ concentrations of 9.6 $\mu g/m^3$. He recognizes that these studies are just one line of evidence for consideration and that along with the broader evidence base, including the key epidemiologic studies, these studies provide support that the level of the primary annual $PM_{2.5}$ standard should be set below 10 $\mu g/m^3$.

We disagree with the commenters that concerns about relating the mean $PM_{2.5}$ concentrations from restricted analyses to design values are not valid. As an initial matter, restricted analyses were not available and did not inform the 2012 decision to revise the annual $PM_{2.5}$ standard level to 12.0 $\mu g/m^3$. The approach in 2012 in revising the annual standard was to set the level to somewhat below the mean of key epidemiologic studies. As noted above, while the EPA believes that restricted analyses can help inform conclusions regarding the adequacy and the level of the primary annual $PM_{2.5}$ standard, in the context of placing the studies in a decision framework to inform the appropriate level of the annual $PM_{2.5}$ standard, the EPA has not deviated from its approach from the 2012 review. Given that restricted analyses are new since the 2012 review, the EPA disagrees with commenters that uncertainties associated with these studies should not be considered, and that these studies should be used in a similar manner to their main analyses in taking an approach to set a level of the standard somewhat below the lowest long-term reported mean $PM_{2.5}$ concentration. Specifically, as detailed above there are uncertainties and limitations associated with relating the mean $PM_{2.5}$ concentrations from these studies to design values for studies that use restricted analyses, and many of these studies did not expressly report a mean $PM_{2.5}$ concentration for the restricted analysis which makes it impossible to make such a comparison.

Several commenters contend that in considering the accountability studies, the EPA inappropriately reached conclusions regarding the level of the primary annual $PM_{2.5}$ standard based on the starting $PM_{2.5}$ concentrations of these studies, rather than the ending concentrations (*i.e.,* concentrations after a policy was implemented). The commenters assert that these studies provide support for revising the level of the primary annual $PM_{2.5}$ standard to below the proposed range of 9–10 $\mu g/m^3$ to protect public health with an adequate margin of safety.

Accountability studies examine the effect of a policy on reducing $PM_{2.5}$ concentrations in ambient air and evaluate whether such reductions were observed to also lead to reductions in $PM_{2.5}$- associated health outcomes (*e.g.,* mortality). Additionally, accountability studies can reduce uncertainties related to residual confounding of temporal and spatial factors (U.S. EPA, 2022a, p. 3–25). Prior to implementation of the policies, three accountability studies newly available in this reconsideration and assessed in the ISA Supplement, report mean $PM_{2.5}$ concentrations below the level of the current annual standard level (12.0 $\mu g/m^3$) and ranged from 10.0 $\mu g/m^3$ to 11.1 $\mu g/m^3$ (Sanders et al., 2020b; Corrigan et al., 2018; and Henneman et al., 2019). These studies suggest that public health improvements may occur following the implementation of a policy that reduces annual average $PM_{2.5}$ concentrations below the level of the current standard of 12.0 $\mu g/m^3$, and potentially below the lowest ''starting'' concentrations in these studies of 10.0 $\mu g/m^3$. However, while the small number of studies may provide limited information related to informing the adequacy and level of the annual $PM_{2.5}$ standard, we note that accountability studies are only one line of evidence, and that these studies provide supplemental information for consideration in addition to the full body of evidence. Further, the EPA does not believe it would be appropriate to determine the level of the standard by reference to ending concentrations in accountability studies. Accountability studies are most informative in demonstrating that public health improvements may occur following the implementation of a policy that reduces annual average $PM_{2.5}$ concentrations below the level of the current standard of 12.0 $\mu g/m^3$, and potentially below the lowest ''starting'' concentrations in these studies of 10.0 $\mu g/m^3$. However, the EPA finds the available information from accountability studies is too limited to support a conclusion that the

appropriate level at which to set the primary annual $PM_{2.5}$ standard would be equal to the ending concentrations of those studies, as the commenters suggest. These studies demonstrate that there are reductions in health outcomes when $PM_{2.5}$ concentrations are reduced in these studies from the starting concentration to the ending concentration, but do not provide support for health effect associations at or below the ending concentrations that would warrant a more stringent standard.

Commenters disagree with the Administrator placing less weight on the epidemiologic studies conducted in Canada when reaching conclusions regarding the level of the primary annual $PM_{2.5}$ standard. These commenters argue that the Canadian epidemiologic studies provide support for setting the level at the lowest end of the proposed range (*i.e.,* 8 $\mu g/m^3$) because they report mean $PM_{2.5}$ concentrations, in some cases, below 8 $\mu g/m^3$. Commenters disagree with the EPA's reasoning for placing less weight on the Canadian epidemiologic studies, suggesting it conflicts with the approaches in previous PM NAAQS reviews and arguing that the findings of the Canadian epidemiologic studies can be directly translated into a primary annual $PM_{2.5}$ standard. Additionally, while the commenters disagree with the EPA's approach for considering the study-reported mean $PM_{2.5}$ concentrations and design values in general, they note that the CASAC, in their review of the 2021 PA, noted that ''while there may be no design value in Canada, there are data that indicate what a U.S. design value would be if an area average like that found in the Canadian studies were to occur in the U.S.'' (Sheppard, 2022a, p. 13 of consensus responses). The commenters contend that the EPA failed to acknowledge this advice from the CASAC, specifically noting that the majority of the CASAC highlighted Canadian epidemiologic studies as a part of their rationale for revising the level of the primary annual $PM_{2.5}$ standard to within the range of 8–10 $\mu g/m^3$.

In considering the information from the epidemiologic studies in reaching his conclusions, the Administrator considered the full body of evidence, including studies conducted in the U.S. and Canada. However, as described in the proposal and in section II.B.4 below, the Administrator also recognizes that the exposure environments in the U.S. are different from those in Canada. In particular, the U.S. population density is approximately 43 people per square kilometer in the contiguous U.S.[98] compared to Canada, which has one of the lowest population densities on the Earth with 4.2 people per square kilometer (Statistics Canada, 2023). This difference in population density between the U.S. and Canada was not as apparent, and did not need to be highlighted, in the 2012 review given that the available Canadian epidemiologic studies used population-weighting and focused on urban areas where monitors were available and population densities were more comparable with those in the U.S. Given this, the study-reported mean concentrations from U.S. and Canadian studies in the 2012 review were very similar. The recent epidemiologic evidence available in this reconsideration, however, includes studies that utilize approaches that highlight the importance of considering the differences between the two exposure environments in the U.S. versus Canada. When focusing on the recently available Canadian monitor-based epidemiologic studies in this reconsideration, the information indicates that these studies, unlike the studies available in the 2012 review, do not apply population weighting (*e.g.,* Lavigne et al., 2018; Liu et al., 2019). As noted in responding to other public comments above, the absence of population weighting is an important consideration that limits the utility of these studies in informing the appropriate level of the primary annual $PM_{2.5}$ standard. In addition, there are recently available studies in the 2019 ISA and ISA Supplement that expand the geographical extent of the epidemiologic study areas by estimating exposure concentrations in areas where there are no monitors. To do this, these studies use either a statistical extrapolation of monitored values or use air quality modeling and other forms of data (*e.g.,* hybrid model-based approaches). For these Canadian studies, the EPA notes two important considerations in using the information to directly translate to policy decisions regarding the level of the annual standard in the U.S. The first is that in incorporating a larger portion of Canada into these recent studies, more rural areas are included, and as such, the population densities and exposure environment differences become more important. The second is that in analyses that evaluate and validate hybrid models, there is less certainty in $PM_{2.5}$ exposure estimates in more rural areas, which are further from air quality monitors and where $PM_{2.5}$ concentrations in the ambient air tend to be lower (U.S. EPA, 2022b, pp. 2–51 and 2–63). Additionally, it is unclear what portion of the $PM_{2.5}$ concentrations from rural areas are contributing to the study reported mean. Given this, studies that incorporate more rural areas into the epidemiologic studies highlight the importance of considering the differences between the population exposures in the studies themselves and in the U.S. versus Canadian study areas, as well as the influence these differences have on the interpretation of the epidemiologic study results. For these reasons, while the Canadian epidemiologic studies provide additional support for associations between $PM_{2.5}$ concentrations and health effects, the long-term means from Canadian epidemiologic studies are a less certain basis for informing the EPA's selection of the annual standard level, given that it is a U.S.-based standard.

With respect to the CASAC's advice in their review of the 2021 draft PA, the EPA recognizes that the majority of the CASAC pointed to the Canadian studies as supporting their recommendation to revise the annual standard level to within the range of 8–10 $\mu g/m^3$. However, the EPA also notes that the CASAC did not advise the EPA to revise the annual standard to a level that was below the study-reported means in the key Canadian epidemiologic studies. Indeed, the CASAC noted that some of the Canadian studies showed associations below 8 $\mu g/m^3$, but did not recommend that the Administrator consider levels below 8 $\mu g/m^3$ for the annual standard. Further, based on the CASAC's advice, the Administrator is not excluding Canadian studies from his consideration in this reconsideration, but he is considering them in light of the limitations and challenges presented and in the context of the full body of available scientific evidence.

Lastly, the EPA disagrees with commenters that the findings of the Canadian epidemiologic studies can be directly translated into a primary annual $PM_{2.5}$ standard based on the evaluation of the relationship between U.S. study-reported mean $PM_{2.5}$ concentrations and U.S. design values. It is unclear whether the relationship between U.S. study-reported mean $PM_{2.5}$ concentrations and U.S. design values (which, in the case of U.S. hybrid model-based studies, indicates that design values are 15–18% greater than area mean $PM_{2.5}$ concentrations) would apply to the Canadian epidemiologic studies and their reported mean $PM_{2.5}$

[98] All of the key U.S. epidemiologic studies considered in this reconsideration focus on all or subsections of the continental U.S.

concentrations, given that these studies generally report lower $PM_{2.5}$ concentrations than the U.S.-based studies. As such, interpreting the study-reported mean concentrations from the Canadian studies in the context of a U.S.-based standard may present challenges in directly and quantitatively informing decisions regarding potential alternative levels of the annual standard, particularly noting the different in exposure relationships in the U.S. versus Canada given the large difference in population densities between the two countries. Further, as mentioned above, while the CASAC advised the EPA to consider the Canadian studies as relevant evidence and found that placing weight on the Canadian studies supported their recommendation to revise the annual standard level to within the range of 8–10 μg/m³, the lower end of their recommended range for the level of the annual standard did not extend below the lower study-reported means from those studies.

Commenters who supported retaining and revising the primary annual $PM_{2.5}$ standard both raised concerns regarding how the EPA used the scientific evidence and quantitative risk assessment related to disparities in $PM_{2.5}$ exposure and risk in informing conclusions on the standard. Commenters who supported retaining the standard assert that the available scientific evidence that demonstrates disparities for minority populations do not support revising the standard, noting that these studies are in areas that tend to have large minority populations and more sources of PM. These commenters contend that because the studies conclude that minority populations experience more effects than others living in the same area that something other than $PM_{2.5}$ concentrations in ambient air is causing the disproportionate impact on minority populations, providing proximity to a source as an example. The commenters note that it is unclear how a national standard will reduce exposure disparities for population groups living in the same area, and further assert that studies of exposure disparities among minority populations were considered in reaching the 2020 final decision to retain the standards.

Conversely, commenters who support revising the standard assert that the at-risk analyses conducted in the 2022 PA provide support for revising the primary annual $PM_{2.5}$ standard to a level of 8 μg/m³. In particular, these commenters state that the at-risk analysis demonstrated that while disparities in mortality risk remain at a standard level of 9.0 μg/m³, disparities in exposure are significantly reduced for an alternative standard level of 8.0 μg/m³ (U.S. EPA, 2022b, p. 3–162).

As discussed in section I above, the primary (health-based) NAAQS are established at a level that is requisite to protect public health, including the health of sensitive or at-risk groups, with an adequate margin of safety.[99] In so doing, decisions on the NAAQS are based on an explicit and comprehensive assessment of the current scientific evidence and associated risk analyses. More specifically, the EPA expressly considers the available information regarding health effects among at-risk populations in decisions on the primary NAAQS. Where populations with disparities in exposure and risk are among the at-risk populations, the decision on the standards is based on providing requisite protection for these and other at-risk populations and lifestages.

The Administrator expressly considered the available information regarding health effects among at-risk populations in reaching the proposed decisions that the current primary annual $PM_{2.5}$ standard is not requisite to protect public health with an adequate margin of safety, and should be revised. The 2019 ISA and ISA Supplement identified children, older adults, people with pre-existing diseases (cardiovascular disease and respiratory disease), minority populations, and low SES populations as at-risk populations. The Administrator is thus, in his final decision, establishing primary $PM_{2.5}$ standards which, in his judgment, will provide protection for these at-risk populations, including minority populations, with an adequate margin of safety.

With respect to the risk assessment, while the EPA notes that the analyses support the conclusion that the primary $PM_{2.5}$ standards are not adequate, as detailed further in the proposal and above in section II.A.3, the EPA also cautions against an over-interpretation of the absolute results. The quantitative risk assessment provides estimates of $PM_{2.5}$-attributable mortality based on input data that include C–R functions from epidemiologic studies that do not quantitatively account for uncertainties in associations between $PM_{2.5}$ exposure and health effects at lower concentrations and are based on an air quality adjustment approach that incorporates proportional decreases in $PM_{2.5}$ concentrations to meet lower alternative standard levels. As a result, simulated air quality improvements used in the risk assessment will always lead to proportional decreases in risk (*i.e.,* each additional μg/m³ reduction produces additional benefits with no clear stopping point), without considering the substantially greater uncertainties associated with the relationship between $PM_{2.5}$ exposures and health effects at lower concentrations.

The same is true for the new at-risk analysis in the risk assessment presented in the 2022 PA that is based on a recent epidemiologic study that is available in this reconsideration that provides mortality risk coefficients for older adults (*i.e.,* 65 years and older) based on $PM_{2.5}$ exposure and stratified by racial and ethnic demographics. Generally, the results of at-risk analyses can vary greatly depending on the inputs to the analyses, including the representativeness of the populations and demographics captured by the study areas that are a part of the analyses, as well as the available C–R functions from epidemiologic studies that stratify by race and ethnicity and the air quality adjustment approaches that are used to simulate air quality at different standard levels. In fact, for this at-risk analysis, the results are even more uncertain than similar estimates from the overall risk assessment due to additional sources of uncertainty specific to the at-risk analysis, such as using C–R functions derived from smaller epidemiologic sample sizes along with the sources of uncertainty that apply to the overall risk assessment (U.S. EPA, 2022b, section 3.4.1.8). Additionally, in characterizing at-risk populations, the at-risk analysis only used one of the air quality adjustment approaches used in the overall risk assessment, which decreases the potential representativeness of the $PM_{2.5}$ concentrations across the study areas (U.S. EPA, 2022b, section 3.4.1.8). Lastly, this at-risk analysis relies on the stratified risk coefficients from only one epidemiologic study.[100] For these reasons, the Administrator places little

[99] The legislative history of section 109 indicates that a primary standard is to be set at ''the maximum permissible ambient air level . . . which will protect the health of any [sensitive] group of the population,'' and that for this purpose ''reference should be made to a representative sample of persons comprising the sensitive group rather than to a single person in such a group.'' S. Rep. No. 91–1196, 91st Cong., 2d Sess. 10 (1970); see also, *e.g.,* Am. Lung Ass'n v. EPA, 134 F.3d 388, 389 (D.C. Cir. 1998) (''If a pollutant adversely affects the health of these sensitive individuals, EPA must strengthen the entire national standard'').

[100] Additional information on all available at-risk epidemiologic studies in this reconsideration are available in section 3.4 and Appendix C of the 2022 PA (U.S. EPA, 2022b, section 3.4, Figure 3–17, and Appendix C, section C.3.2).

weight on the absolute results of the risk assessment, including the at-risk analysis, for purposes of selecting the level of the annual standard that is requisite.

While there are substantial uncertainties in the absolute results of the quantitative risk assessment, the EPA also notes that recent scientific evidence evaluated in the ISA Supplement, which built upon the 2019 PM ISA conclusions, found that the evidence ''[c]ontinue[s] to support disparities in $PM_{2.5}$ exposure and health risks by race and ethnicity'' while studies of SES ''provide additional support indicating there may be disparities in $PM_{2.5}$ exposure and health risk by SES'' (U.S. EPA, 2022a, p. 5–4). Thus, in light of the statutory requirement to provide protection for at-risk populations, it is not surprising that the stratified population results of the risk assessment suggest that meeting a revised standard would result in higher risk reductions for minority and low SES populations.

In conclusion, the EPA recognizes that the at-risk analysis was based on one epidemiologic study that stratified by race/ethnicity for older adults (*e.g.,* 65+ years old) and that there is increasing uncertainty in quantitative estimates of stratified risk estimates at the lower end of the range of standard levels assessed. Moreover, the EPA finds that the goal of the NAAQS is to provide the requisite protection to at-risk groups, and where minority populations are included among the at-risk groups, providing requisite protection to minority populations will also result in protecting the public health of other populations. Thus, in setting the NAAQS to protect the health of at-risk groups with an adequate margin of safety, the Administrator is selecting the standard that will provide requisite protection, including for minority populations and other at-risk populations, which also generally results in protecting the public health of other populations and reducing risk disparities.

A number of commenters, primarily from industries and industry groups and some States, support the EPA's proposed decision to retain the primary 24-hour $PM_{2.5}$ standard. Many of these commenters contend that the available scientific evidence and quantitative information has not significantly changed since the 2020 final decision and note that important uncertainties remain. The commenters agree with the EPA's conclusions regarding the controlled human exposure studies and their relationship to short-term peak $PM_{2.5}$ concentrations in ambient air. These commenters also noted the primary annual and 24-hour $PM_{2.5}$ standards work together to provide public health protection, with the 98th percentile form of the 24-hour standard effectively limiting peak daily concentrations. The commenters agree with the EPA that the current suite of standards maintain subdaily concentrations below the higher concentrations in controlled human exposure studies where more consistent health effects are observed. Commenters also agree with the EPA's conclusions that the epidemiologic studies are not useful for informing decisions on the level of the primary 24-hour $PM_{2.5}$ standard because the standard focuses on reducing peak exposures with its 98th percentile form, while the epidemiologic studies often focus on the mean or median as the percentile for which associations with short-term exposures are observed. These commenters also agree with the EPA's focus on U.S.-based studies because of differences compared to Canadian studies. The commenters also generally agree with the Administrator's judgment that it was appropriate to place less weight on the risk assessment, noting that the annual standard is controlling in most areas of the country and revising the annual standard would have the most potential to reduce risk related to $PM_{2.5}$ exposures and would reduce both average (annual) and peak (daily) $PM_{2.5}$ concentrations. Finally, these commenters note that the CASAC did not reach consensus on whether the current primary 24-hour $PM_{2.5}$ standard should be revised, and they agree with the minority of the CASAC's recommendation in their review of the 2021 draft PA that the primary 24-hour primary $PM_{2.5}$ standard should be retained. These commenters also note the CASAC's support in their review of the 2019 draft PA for retaining the primary 24-hour $PM_{2.5}$ standard.

A number of commenters, primarily from public health and environmental organizations and some States, oppose the EPA's proposed decision to retain the primary 24-hour $PM_{2.5}$ standard. These commenters support revising the level of the primary 24-hour $PM_{2.5}$ standard, contending that a more stringent standard is necessary to provide requisite public health protection with an adequate margin of safety, particularly for at-risk groups. In so doing, these commenters place weight on the same aspects of the available scientific evidence as the majority of the CASAC in their review of the 2021 draft PA, and generally advocate for revising the level of the standard to within the range of 25–30 $\mu g/m^3$ as recommended by the majority of the CASAC. Some of these commenters support a level no higher than 25 $\mu g/m^3$ and others support a level of 20 $\mu g/m^3$. These commenters generally cite to the available scientific evidence, including evidence of disproportionate exposures and risks for certain at-risk groups, and the CASAC's advice in support for their recommendation. Some of these commenters also suggest that decisions regarding the primary 24-hour $PM_{2.5}$ standard should not be related to decisions on the primary annual $PM_{2.5}$ standard.

As an initial matter, the EPA disagrees with commenters who suggest that decisions regarding the primary 24-hour $PM_{2.5}$ standard should not be related to decisions on the primary annual $PM_{2.5}$ standard. In reviewing the adequacy of the public health protection afforded by the primary $PM_{2.5}$ standards, the Administrator's consistent past practice has been to evaluate the combination of the annual and 24-hour standards together. In 2012, the then-Administrator concluded that the most effective and efficient way to reduce total population risk associated with both long- and short-term $PM_{2.5}$ exposures was to set a generally controlling annual standard, and to provide supplemental protection by means of a 24-hour standard set at the appropriate level. In so doing, the then-Administrator explicitly recognized that potential air quality changes associated with meeting a revised annual standard (with a level of 12 $\mu g/m^3$) would result in lowering risks associated with both long- and short-term $PM_{2.5}$ exposures by lowering the overall distribution of air quality concentrations, and that retaining a 24-hour standard at the appropriate level would ensure an adequate margin of safety against short-term effects in areas with high peak-to-mean ratios (78 FR 3163, January 15, 2013). In this reconsideration, also, the Administrator considers it appropriate to rely on the annual standard (arithmetic mean, averaged over three years) for targeting protection against both long- and short-term $PM_{2.5}$ exposures, noting that the annual standard is typically controlling, while the 24-hour standard (98th percentile, averaged over three years) can provide supplemental protection against the occurrence of peak 24-hour $PM_{2.5}$ concentrations (U.S. EPA, 2022b, section 3.6.3). Further, the Administrator notes that, as in the 2012 review, changes in $PM_{2.5}$ air quality to meet a revised annual standard would

affect the entire distribution of long- and short-term concentrations, thus likely resulting not only in lower short- and long-term $PM_{2.5}$ concentrations near the middle of the air quality distribution, but also in fewer and lower short-term peak $PM_{2.5}$ concentrations.[101] Thus, the Administrator continues to conclude it is appropriate to consider whether the annual and 24-hour standards together provide requisite protection of public health, rather than considering each standard in isolation.

Regarding the appropriate basis for determining the level of the 24-hour standard, a number of commenters who support revising the primary 24-hour $PM_{2.5}$ standard to a lower level contend that the EPA should not rely on the controlled human exposure studies in evaluating the adequacy of the public health protection afforded by the primary 24-hour $PM_{2.5}$ standard. These commenters support this view by citing the CASAC comments in their review of the 2019 draft PA which advised that controlled human exposure studies have limitations that may impact their ability to inform conclusions on the adequacy of the public health protection afforded by the primary 24-hour $PM_{2.5}$ standard. Commenters noted that these studies do not include the most vulnerable populations and often involve exposure to only one pollutant to elicit a response, and therefore are not representative of real-world exposures.

Other commenters support the EPA's use of the controlled human exposure studies to inform the adequacy of the public health protection and note that the 24-hour standard must at least provide protection against the health effects observed in controlled human exposure studies. Some of the commenters cite the Wyatt et al. (2020) study that demonstrated cardiovascular effects following 2-hour exposures to 120 $\mu g/m^3$ and 4-hour exposures to 37.8 $\mu g/m^3$. Some of these commenters contend that the current primary 24-hour $PM_{2.5}$ standard allows $PM_{2.5}$ exposures comparable to those observed to elicit effects in the controlled human exposure studies, and therefore, the EPA must revise the level of the current standard to protect public health. To support this view, some commenters submitted an analysis of monitoring data from 2017–2020, which compares the number of days per year where maximum daily $PM_{2.5}$ concentrations exceed 120 $\mu g/m^3$ and 37.8 $\mu g/m^3$.

Additionally, other commenters assert that the EPA should focus less on peak $PM_{2.5}$ concentrations ''typically measured'' in areas meeting the current primary $PM_{2.5}$ standards even if they do not exceed the concentrations in the controlled human exposure studies because, in their view, the standard needs to protect against atypical exposures to atypical peak $PM_{2.5}$ concentrations. These commenters conclude that, when considered together, the controlled human exposure studies and the epidemiologic studies warrant strengthening the level of the primary 24-hour $PM_{2.5}$ standard.

The EPA generally disagrees with commenters who contend that it is inappropriate to rely on the controlled human exposures studies in evaluating the adequacy of the public health protection afforded by the primary 24-hour $PM_{2.5}$ standard. The Agency considers these studies informative both for establishing biological plausibility and for determining an appropriate level for the 24-hour standard. When looking to the experimental studies, the EPA finds that the 2019 ISA and ISA Supplement included controlled human exposure studies that report statistically significant effects on one or more indicators of cardiovascular function following 2-hour exposures to $PM_{2.5}$ concentrations at and above 120 $\mu g/m^3$ (and at and above 149 $\mu g/m^3$ for vascular impairment, the effect shown to be most consistent across studies). As noted in the 2019 ISA, these studies are important in establishing biological plausibility for $PM_{2.5}$ exposures causing more serious health effects, such as those seen in short-term exposure epidemiologic studies, and they provide support that more adverse effects may be experienced following longer exposure durations and/or exposure to higher concentrations. Additionally, one controlled human exposure study assessed in the ISA Supplement reports evidence of some effects for cardiovascular markers at lower $PM_{2.5}$ concentrations, 4-hour exposures to 37.8 $\mu g/m^3$ (Wyatt et al., 2020). However, there is inconsistent evidence for inflammation in other controlled human exposure studies evaluated in the 2019 ISA. The EPA notes that although the controlled human exposure studies do not provide a threshold below which no effects occur, the observed effects in these controlled human exposures studies are ones that signal an intermediate effect in the body, likely due to short-term exposure to $PM_{2.5}$, and typically would not, by themselves, be judged as adverse (88 FR 5620, January 27, 2023) [102] [103]

The EPA notes that the majority of the CASAC, in their review of the 2021 draft PA, commented that these controlled human exposure studies generally do not include populations with substantially increased risk from exposure to $PM_{2.5}$, such as children, older adults, or those with more severe underlying illness, and often involve exposure to only one pollutant to elicit a response. However, both the majority and the minority of the CASAC explained that, even taking into consideration their limitations, the controlled human exposure studies provide some support for assessing the adequacy of the 24-hour standard.[104]

The EPA agrees with the CASAC that the controlled human exposure studies generally do not include populations with substantially increased risk from exposure to $PM_{2.5}$, like children, older adults, or those with pre-existing severe illness, like cardiovascular effects. As such, and as an initial note, these

[101] Similarly, the Administrator recognizes that changes in air quality to meet a 24-hour standard, would result not only in fewer and lower peak 24-hour $PM_{2.5}$ concentrations, but also in lower annual average $PM_{2.5}$ concentrations. However, as noted in 2012, an approach that relied on setting the level of the 24-hour standard such that the 24-hour standard was generally controlling would be less effective and result in less uniform protection across the U.S. than an approach that focuses on setting a generally controlling annual standard (78 FR 3163, January 15, 2013).

[102] Judgments regarding adversity or health significance of measurable physiological responses to air pollutants have been informed by guidance, criteria or interpretative statements developed within the public health community, including the American Thoracic Society (ATS) and the European Respiratory Society (ERS), which cooperatively updated the ATS 2000 statement *What Constitutes an Adverse Health Effect of Air Pollution* (ATS, 2000) with new scientific findings, including the evidence related to air pollution and the cardiovascular system (Thurston et al., 2017).

[103] The ATS/ERS described its 2017 statement as one ''intended to provide guidance to policymakers, clinicians and public health professionals, as well as others who interpret the scientific evidence on the health effects of air pollution for risk management purposes'' and further notes that ''considerations as to what constitutes an adverse health effect, in order to provide guidance to researchers and policymakers when new health effects markers or health outcome associations might be reported in future.'' The most recent policy statement by the ATS, which once again broadens its discussion of effects, responses and biomarkers to reflect the expansion of scientific research in these areas, reiterates that concept, conveying that it does not offer ''strict rules or numerical criteria, but rather proposes considerations to be weighed in setting boundaries between adverse and nonadverse health effects,'' providing a general framework for interpreting evidence that proposes a ''set of considerations that can be applied in forming judgments'' for this context (Thurston et al., 2017).

[104] In their review of the 2021 draft PA, the majority of the CASAC advised that ''evidence of effects from controlled human exposure studies with exposures close to the current standard support epidemiologic evidence for lowering the standard'' (Sheppard, 2022a, p. 4 of consensus letter). The minority of the CASAC also advised that it was appropriate to place ''more emphasis on the controlled human exposure studies, showing effects at $PM_{2.5}$ concentrations well above those typically measured in areas meeting the current standards'' (Sheppard, 2022a, p. 4 of consensus letter), in evaluating adequacy of the 24-hour standard.

studies are therefore somewhat limited in their ability to inform at what concentrations effects may be elicited in at-risk populations. In spite of this limitation, the EPA also agrees with the CASAC, that even taking into consideration the limitations of the controlled human exposure studies, these studies can provide some support for evaluating the adequacy of the 24-hour standard. However, the EPA further notes that while the controlled human exposure studies are important in establishing biological plausibility, the health outcomes observed in these controlled human exposure studies are often ''intermediate'' outcomes (*i.e.,* not always clearly adverse) and therefore it is unclear how the importance of the effects observed in the studies should be interpreted with respect to adversity to public health. The EPA finds that it is appropriate to consider these study limitations in assessing the information provided by controlled human exposure studies in evaluating the adequacy of the primary 24-hour $PM_{2.5}$ standard.

The EPA agrees with commenters that the primary 24-hour $PM_{2.5}$ standard must at least provide protection against the health effects consistently observed in controlled human exposure studies. As discussed in the proposal, the EPA looks at whether the exposures that elicit a response following exposure to $PM_{2.5}$ in the controlled human exposure studies occur under recent air quality conditions in areas meeting the current standards. Based on these air quality analyses, the EPA concludes that these types of exposures very rarely occur when the current standards are being met.

The EPA did receive multiple comments questioning these results and the approach in the EPA's analyses. For example, some commenters submitted an analysis of monitoring data from 2017–2020, which compares the number of days per year where maximum daily $PM_{2.5}$ concentrations exceed 120 $\mu g/m^3$ and 37.8 $\mu g/m^3$ and evaluate the number of days subset by groups of monitors with 4-year average $PM_{2.5}$ concentrations close to the levels of combinations of current and proposed annual (+/− 0.2 $\mu g/m^3$) and 24-hour (+/−2 $\mu g/m^3$) $PM_{2.5}$ standards. To support their view that the primary $PM_{2.5}$ standards should be revised, the commenters describe decreases in days per monitor per year with 2-hour maximum concentrations greater than 120 $\mu g/m^3$ and 4-hour maximum concentrations greater than 37.8 $\mu g/m^3$ when comparing monitors that achieve close to 10 and 30 $\mu g/m^3$ versus monitors that meet close to 8 $\mu g/m^3$ and 25 $\mu g/m^3$. The commenters noted decreases in the number of days per monitor per year with 2-hour maximum concentrations over 120 $\mu g/m^3$ and 4-hour max concentration over 37.8 $\mu g/m^3$ were also seen when comparing monitors close to achieving 24-hour standards with levels of 35 $\mu g/m^3$ versus 25 $\mu g/m^3$.

First, the EPA notes that this analysis submitted by commenters was limited to a very small number of monitors and did not include a national perspective. Second, the EPA notes that this analysis focused on number of days (rather than the number of times) where there was a 2-hour maximum concentration over 120 $\mu g/m^3$ or a 4-hour max concentration over 37.8 $\mu g/m^3$. In order to evaluate the protection provided by the current 24-hour standard against peak exposures, including exposures with 2-hour concentrations greater than 120 $\mu g/m^3$ and 4-hour concentrations greater than 37.8 $\mu g/m^3$, the EPA considers it more informative and appropriate from a public health perspective to assess the number of times a subdaily exposure of concern occurs in a year, rather than the number of days on which they occur because the former identifies more potential exposures of concern and provides more information about the scale and scope of the occurrences of those exposures. Lastly, the analyses allowed monitors somewhat above the standards to be included. Therefore, it is unclear whether the exceedances of the 2-hour or 4-hour benchmarks would still have occurred if the area had actually been meeting the current primary $PM_{2.5}$ standards. However, in considering the analyses submitted by the commenters, the EPA conducted new analyses [105] that looked at all individual monitors across the U.S. and evaluated the percentage of times the monitors experienced a 2-hour maximum concentration over 120 $\mu g/m^3$ or a 4-hour max concentration over 37.8 $\mu g/m^3$ when that monitor was meeting the current standards. Further, given that the Administrator concludes that the level of the current primary annual $PM_{2.5}$ is not adequate and that it should be revised to 9.0 $\mu g/m^3$, the new analysis evaluates the percentage of times during a recent 3-year period (*i.e.* 2019–2021) that individual monitors experienced a 2-hour maximum concentration over 120 $\mu g/m^3$ or a 4-hour max concentration over 37.8 $\mu g/m^3$ when that monitor was meeting the current primary 24-hour $PM_{2.5}$ standard with its level of 35 $\mu g/m^3$ and a revised primary annual $PM_{2.5}$ standard of 9.0 $\mu g/m^3$.

In evaluating the results from the new analyses, it is important to keep in mind that the 2019 ISA and ISA Supplement concluded that the most consistent evidence from the controlled human exposures studies is for impaired vascular function following 2-hour exposures to average $PM_{2.5}$ concentrations at and above about 120 $\mu g/m^3$, with less consistent evidence for effects following exposures to concentrations lower than 120 $\mu g/m^3$. The new analyses show that across all monitors, on average, only 0.029 percent of 2-hour observations reach $PM_{2.5}$ concentrations higher than 120 $\mu g/m^3$ in areas meeting the current 24-hour standard and a revised annual standard of 9.0 $\mu g/m^3$. Further, recognizing that one purpose of the 24-hour standard is to protect against exposure in areas with high peak-to-mean ratios, when assessing the monitors individually across the U.S. under these same conditions, the monitors reporting the highest $PM_{2.5}$ concentrations have only 0.47 percent of 2-hour observations reach $PM_{2.5}$ concentrations higher than 120 $\mu g/m^3$.

Additionally, the analyses also evaluated the frequency of reporting a 4-hour maximum concentration over 37.8 $\mu g/m^3$ when monitors were meeting the current 24-hour standard and a revised annual standard of 9.0 $\mu g/m^3$. For this part of the analysis, the EPA finds that across all monitors, on average, only 0.41 percent of 4-hour observations reach $PM_{2.5}$ concentrations higher than 37.8 $\mu g/m^3$ in areas meeting the current 24-hour standard and a revised annual standard of 9.0 $\mu g/m^3$. Further, when assessing the monitors individually across the U.S. under these same conditions, the monitors reporting the highest $PM_{2.5}$ concentrations have only 2.6 percent of 4-hour observations reach $PM_{2.5}$ concentrations higher than 37.8 $\mu g/m^3$. Thus, the EPA disagrees with commenters that the current primary 24-hour $PM_{2.5}$ standard typically allows $PM_{2.5}$ exposures at or above those observed to cause health effects in controlled human exposure studies. Furthermore, the EPA notes that in light of the small number of occurrences and the intermediate nature of the effects observed in Wyatt et al. (2020) at concentrations of 37.8 $\mu g/m^3$ (*i.e.,* effects that typically would not, by themselves, be judged as adverse), there is substantial basis to doubt whether further improvements in public health

[105] Jones et al. (2023). Comparison of Occurrence of Scientifically Relevant Air Quality Observations Between Design Value Groups. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

would be achieved by further reducing these exposures. In drawing this conclusion, the EPA notes the lack of evidence of effects from controlled human exposure studies at levels below the current 24-hour standard and the fact that the results of Wyatt et al. (2020) are inconsistent with other currently available studies, and this study only observes intermediate effects.

In response to commenters that cited the majority of the CASAC's view that, in general, ''[t]here is . . . less confidence that the annual standard could adequately protect against health effects of short-term exposures'' (Sheppard, 2022a, p. 4 of consensus letter), the EPA disagrees with the majority of CASAC, noting that the results of the EPA's analysis suggest that high peak concentrations are extremely infrequent in areas meeting an annual standard of 9.0 μg/m^3, occurring less than 0.029–0.41 percent of the time (for 2-hour concentrations >120 μg/m^3 and 4-hour concentrations >37.8 μg/m^3, respectively). This suggests that in most locations, even the upper tail of the distribution would be controlled quite well under a revised annual standard. With regard to the likelihood that the current standards would allow peak concentrations that are clearly of concern from a health perspective, therefore, the EPA concludes that such occurrences are extremely infrequent—and will be even less frequent under the improved air quality conditions associated with meeting a revised annual $PM_{2.5}$ standard of 9.0 μg/m^3.

A number of commenters who support revising the primary 24-hour $PM_{2.5}$ standard to a lower level suggest that the available epidemiologic evidence provides support for such a revision. To support their view, the commenters note that the currently available evidence, including a number of epidemiologic studies that demonstrate associations between short-term $PM_{2.5}$ exposures and health effects, provides support for causal relationships for short-term $PM_{2.5}$ exposures and health effects as described in the 2019 ISA and ISA Supplement. The commenters further note that the available epidemiologic studies include diverse populations that are broadly representative of the U.S. population, including at-risk populations, which they assert is an advantage over the controlled human exposure studies and the risk assessment, which are not as broadly representative.

These commenters highlight a number of specific epidemiologic studies that they suggest provide support for revising the level of the 24-hour standard. Additionally, commenters contend that there are epidemiologic studies using restricted analyses that show that positive and statistically significant associations between short-term $PM_{2.5}$ exposure and mortality persist at daily mean concentrations below 25 μg/m^3. The commenters also cite several studies that provide no evidence of a threshold. These commenters also point to the CASAC advice in their review of the 2021 draft PA, where the majority of the CASAC cited epidemiologic studies using restricted analyses as offering support for revision. The commenters argue that the EPA cannot base discretion on uncertainties related to the methods used in restricted analyses in the epidemiologic studies. In so doing, these commenters disagree with the EPA that it is important to take into consideration that these studies do not consider the form or averaging time of the 24-hour standard. Finally, the commenters claim that while the EPA stated that the study-reported means from epidemiologic studies that use restricted analyses are more useful for identifying impacts from typical 24-hour exposures than for peak 24-hour exposures, the commenters assert that the studies also indicate that there are health risks at relatively high concentrations below the current level of the primary 24-hour $PM_{2.5}$ standard that must be addressed.

As noted by the commenters, epidemiologic studies that show positive and statistically significant associations between short-term $PM_{2.5}$ exposure and mortality provide support for the causal determination in the 2019 ISA. The EPA also agrees that the available epidemiologic studies include diverse populations that are broadly representative of the U.S. population, including at-risk populations. Further, the EPA agrees that studies evaluated in the 2019 ISA and the ISA Supplement continue to provide evidence of linear, no-threshold concentration-response relationships, but with less certainty in the shape of the curve at lower concentrations (*i.e.,* below about 8 μg/m^3), with some recent studies providing evidence for either a sublinear, linear, or supralinear relationship at these lower concentrations (U.S. EPA, 2019a, section 11.2.4; U.S. EPA, 2022a, section 2.2.3.2).

However, findings of positive, significant associations in short-term epidemiologic studies do not directly indicate that short-term effects would occur in areas meeting the 24-hour standard and therefore, do not directly address the question of whether the current 24-hour standard is adequate. While short-term epidemiologic studies evaluate associations between distributions of ambient $PM_{2.5}$ and health outcomes, they do not identify the specific exposures (*i.e.,* a specific 24-hour concentration) that can lead to the reported effects. Short-term epidemiologic studies evaluate the association between day-to-day variation in daily (24-hour) $PM_{2.5}$ exposure and health endpoints (*e.g.,* mortality) to understand how these changes in air pollution concentrations are associated with changes in health outcomes. But these studies do not report daily concentrations; rather, they report the long-term mean concentration of the 24-hour $PM_{2.5}$ concentrations over the entire multi-year period of the study, and typically report their results as a relative risk (*e.g.,* for each 10 μg/m^3 increase in $PM_{2.5}$, the risk of mortality or cardiovascular hospital admissions increases by a certain percentage, across the full range of the 24-hour $PM_{2.5}$ concentrations in the study). This means that there is no specific point in the air quality distribution of any epidemiologic study that represents a ''bright line'' at and above which effects have been observed and below which effects have not been observed. Nor, as noted above, do these studies allow for any direct inferences about health impacts associated with the short-term ''peak'' exposures that the primary 24-hour standard is designed to protect against. While there can be considerable variability in daily exposures over a multi-year study period, most of the estimated exposures in these epidemiologic studies reflect days with ambient $PM_{2.5}$ concentrations around the mean or middle of the air quality distributions examined (*i.e.,* ''typical'' days rather than days with extremely high or extremely low concentrations). This is true of long-term epidemiologic studies as well. The difference between epidemiologic studies examining associations with long-term exposures and short-term exposures is comparing different levels of exposure over different exposure durations (*i.e.,* long-term studies exposures are defined as those that are annual or multi-year, while short-term exposures are defined as those that are mostly 24-hour) (U.S. EPA, 2019a, section P.3.1). Thus, in both cases, and in the absence of a discernible threshold, epidemiologic studies of short-term and long-term exposures provide the strongest support and confidence for reported health effect associations around the middle portion of the $PM_{2.5}$ air quality distribution (*e.g.,* the study-reported mean $PM_{2.5}$

concentration), which corresponds to the bulk of the underlying data, rather than at the extreme upper or lower ends of the distribution. However, the difference between the annual standard and the 24-hour standard, aside from averaging times, is that the form of the annual standard is a mean $PM_{2.5}$ concentration, which is based on the bulk of the air quality data, while the form of the 24-hour standard is a 98th percentile form, which is based on peak concentrations. Both long-term and short-term epidemiologic studies are informative for determining the appropriate level of the annual $PM_{2.5}$ standard, which is designed to control ''typical'' daily exposures and risks, because these studies most often report long-term mean (or median) $PM_{2.5}$ concentrations that are representative of ''typical'' exposures that are associated with health effects. In contrast, while the short-term epidemiologic studies examine health effects associated with shorter exposure durations (*e.g.,* mostly 24-hour exposures), these studies are less informative for determining the appropriate level of the 24-hour $PM_{2.5}$ standard because these studies do not report the 98th percentile $PM_{2.5}$ concentrations,[106] which is more directly comparable to the form of the 24-hour standard. Additionally, if the 98th percentile of data were reported, the EPA would consider the peak concentrations observed in these studies (which by definition rarely occur) in conjunction with other supporting evidence. However, as already noted, there is an absence of new information in this reconsideration (either from controlled human exposure studies or epidemiologic studies) suggesting that peak concentrations just below the level of the current 24-hour standard (with its level of 35 $\mu g/m^3$) are associated with adverse effects. Instead, the evidence links risk to more typical daily exposures near the middle of the air quality distribution—exposures most effectively controlled through a strengthening of the annual standard. As noted in the 2012 final rule, ''reducing the annual standard is the most efficient way to reduce the risks from short-term exposures . . . as the bulk of the risk comes from the large number of days across the bulk of the air quality distribution, not the relatively small number of days with peak concentrations'' (78 FR 3156, January 15, 2013).

As noted above, in evaluating the adequacy of the current standards, the EPA has consistently considered the annual standard (based on arithmetic mean concentrations) and 24-hour standard (based on 98th percentile concentrations) together in evaluating the public health protection provided by the standards against the full distribution of short- and long-term $PM_{2.5}$ exposures. Moreover, the EPA has previously noted that the annual standard is generally controlling in most parts of the country, providing an effective and efficient way to reduce total population risk to both long- and short-term $PM_{2.5}$ exposures, while the 24-hour standard, with its 98th percentile form, provides supplemental protection, particularly for areas with high peak-to-mean ratios of 24-hour $PM_{2.5}$ concentrations (78 FR 3158, January 15, 2013). In such areas, annual average $PM_{2.5}$ concentrations could be quite low, and the 24-hour standard provides a means of ensuring control of episodic peaks possibly associated with strong local or seasonal sources, or $PM_{2.5}$-related effects that may be associated with shorter-than daily exposure periods. The approach taken in evaluating the adequacy and alternative levels of the annual standard has been to evaluate the long-term mean $PM_{2.5}$ concentrations of both long-term and short-term key epidemiologic studies, where we have the most confidence in the reported health effects association, while also giving some consideration to lower percentiles of the air quality distribution (*e.g.,* 25th percentiles). However, using a similar approach to evaluate the adequacy of the current and any potential alternative levels of the 24-hour standard with short-term epidemiologic studies, as the majority of CASAC and some commenters are suggesting, presents challenges.

Short-term epidemiologic studies, including those that use restricted analyses, often report metrics that include mean $PM_{2.5}$ concentrations, with some studies also reporting lower percentiles, such as the 25th percentile. As previously noted above, for studies of daily $PM_{2.5}$ exposure, which examine associations between day-to-day variation in $PM_{2.5}$ concentrations and health outcomes, often over several years, most of the estimated exposures reflect days with ambient $PM_{2.5}$ concentrations around the middle of the air quality distributions examined (*i.e.,* the mean or median). However, there is not a metric or statistic reported in short-term epidemiologic studies that allows for a direct comparison to the current 24-hour $PM_{2.5}$ standard and its 98th percentile form. While a 98th percentile of $PM_{2.5}$ concentrations is a metric that might be more closely compared to the 24-hour standard level, 98th percentile $PM_{2.5}$ concentrations were not reported in key epidemiologic studies. Consistent with the Administrator's final decision in 2012, the EPA notes that even if 98th percentile values were reported, it would be inappropriate to focus on these concentrations without also considering the impact of a revised annual standard on short-term concentrations, since many areas would be expected to experience decreasing short- and long-term $PM_{2.5}$ concentrations in response to a revised annual standard (78 FR 3156, January 15, 2013). Furthermore, in light of the scarcity of days at the very upper end of the distribution, and to avoid placing undue reliance on the peak concentrations observed in these studies (which by definition rarely occur), the EPA finds that such values would need to be considered in conjunction with other supporting evidence. In addition, as described above, the other lines of evidence available for consideration by the EPA do not indicate that the current primary 24-hour standard requires revision to protect public health with an adequate margin of safety. The EPA notes again the lack of corroborating evidence from controlled human exposure studies. While the EPA agrees with the CASAC that the controlled human exposure studies are limited in their ability to speak to the concentrations at which effects may be elicited in at-risk populations, as discussed above the lowest concentration associated with effects is 37.8 $\mu g/m^3$ and the effects observed were ''intermediate'' outcomes that are not by themselves considered adverse. We also note that, as detailed in section II.A.2.a above, the study that observed intermediate effects at concentrations of 37.8 $\mu g/m^3$ was evaluated in the ISA Supplement and the results of this study were inconsistent with the controlled human exposure studies evaluated in the 2019 ISA. Additionally, as noted above, the EPA finds that across all monitors, on average, only 0.41 percent of 4-hour observations reach $PM_{2.5}$ concentrations higher than 38 $\mu g/m^3$ in areas meeting the current 24-hour

[106] In the 2022 PA, the EPA has identified a number of key areas for additional research and data collection for $PM_{2.5}$, based on the uncertainties and limitations that remain in the scientific evidence and technical information. In addition to research and data collection, the EPA specifically highlights additional information that could be reported in the epidemiologic studies that may help inform future reviews of the primary $PM_{2.5}$ standards, including additional descriptive statistics in the upper percentiles of the air quality distribution (*i.e.,* from the 95th to the 99th percentile), as well as the number of days of concentrations and/or health events within each of these percentiles (U.S. EPA, 2022a, section 3.7).

standard and a revised annual standard of 9.0 μg/m³. Given the rarity of these occurrences and the fact that the effects associated with exposures to this $PM_{2.5}$ concentration have not been found to be adverse in and of themselves, the EPA finds it reasonable to conclude that this pattern of air quality will protect at-risk populations, even though such populations were not in the study groups. The EPA concludes that further evidence would be needed at specific short-term (*i.e.,* hourly or daily) concentrations below the level of the current 24-hour standard to support any revision to the current 24-hour standard.

With regard to the data that are available from the short-term epidemiologic studies (which, as noted, do not include 98th percentile values), the EPA considers it inappropriate to utilize the study-reported means from the short-term epidemiologic evidence to assess the adequacy of the 24-hour standard, with its 98th percentile form, considering that the study-reported mean concentrations do not provide meaningful insight regarding the frequency or health significance of peak concentrations occurring during the study period. As indicated in the 2022 PA, the study-reported means of short-term epidemiologic studies do not serve a purpose in determining a level at which we can confidently attribute effects to the impact of ''peak'' exposures. The 24-hour standard is intended to provide supplemental protection against short-term peak exposures and while there is a general relationship between mean concentrations and 98th percentile concentrations in individual locations, such relationships vary by location and there is not an established relationship that can be relied upon to predict 98th percentile concentrations based on mean $PM_{2.5}$ concentrations reported in multi-city epidemiologic studies. Instead, mean concentrations from short-term epidemiologic studies are more useful in addressing questions regarding the effects of ''typical'' or average 24-hour exposures, which are addressed through the annual standard. For this reason, the EPA does consider the mean concentrations of short-term studies (as well as the means from the long-term studies) in evaluating the level of the annual standard, which the EPA recognizes as the generally controlling standard for both long- and short-term exposures. However, the EPA does not agree with commenters that it is appropriate to use means from short-term epidemiologic studies as the basis for a decision-making framework to determine the adequacy of the current 24-hour standard, with its 98th percentile form.

As described in the proposal (88 FR 5613, January 27, 2023), the 2022 PA also noted the epidemiologic studies that restrict 24-hour average $PM_{2.5}$ concentrations to values of less than 35 μg/m³, and in some cases less than 25 μg/m³, and annual average $PM_{2.5}$ concentrations less than 12 μg/m³. Restricted analyses use a subset of data from their main analyses and conduct an epidemiologic study with health events that occur at concentrations below a certain concentration (*e.g.,* 25 μg/m³). While some of these studies do not report the mean $PM_{2.5}$ concentration for the restricted analysis, the mean of the restricted analysis is presumably less than the mean $PM_{2.5}$ concentration in the main analysis. Restricted analyses from long-term and short-term exposure epidemiologic studies are informative in providing support that the health effects associations are not driven by just the upper peaks of the $PM_{2.5}$ air quality distributions and provide support for revision to the level of the annual $PM_{2.5}$ standard. Short-term restricted analyses also report positive associations between short-term $PM_{2.5}$ exposure and morbidity and mortality. As an example, in a restricted analysis evaluating the association between short-term exposures and $PM_{2.5}$ concentrations less than 25 μg/m³, Di et al. (2017a) removed 6.3 percent of the data from their main analyses, (*i.e.,* all $PM_{2.5}$ concentrations greater than 25 μg/m³), and still found a positive and significant association between short-term $PM_{2.5}$ exposure and mortality. This study provides additional support that the association between short-term exposure to $PM_{2.5}$ and mortality in the main epidemiologic analysis is not driven by the upper peaks of the $PM_{2.5}$ air quality distribution, which in turn supports the conclusion that lowering the entire distribution of air quality concentrations through a revised annual standard is an appropriate means of protecting against adverse effects from short-term exposure, as discussed further below.

In their review of the 2021 draft PA, the majority of the CASAC highlighted three U.S.-based epidemiologic studies that restricted 24-hour average $PM_{2.5}$ concentrations below 25 μg/m³ as a part of their rationale for recommending that the EPA revise the level of the primary 24-hour $PM_{2.5}$ standard. Similarly, in evaluating positive associations in restricted analyses, some commenters also suggest that because an association exists at 24-hour concentrations below 25 μg/m³, the 24-hour standard level should be set at the concentration at which the analysis was restricted (*e.g.,* 25 μg/m³). However, the EPA notes that neither the CASAC nor public commenters provided any detail regarding, how, in their view, these studies demonstrate that the level of the current 24-hour standard is not adequate, and/or how these studies demonstrate what revised level of the 24-hour standard would provide requisite public health protection with an adequate margin of safety. The EPA considers that such an approach would have several important limitations. First, the approach assumes that a specific point on the air quality distribution (*e.g.,* the point at which the analysis was restricted) is where health effects are exhibited and where we have the most confidence in the reported association. However, in addition to the limitations associated with the short-term epidemiologic studies outlined above, the EPA does not agree that it would be appropriate to identify the requisite level of the primary 24-hour $PM_{2.5}$ standard based on the specific concentration at which the analyses restrict their studies. The choice to restrict the data at a particular concentration is in effect arbitrary, and does not establish that any particular effects are attributable to that concentration as opposed to other concentrations within the restricted analysis.

Further, these restricted analyses do not report the $PM_{2.5}$ concentration at the 98th percentile of data or other metrics relating to the upper end of the distribution that could provide information about health risks associated with peak exposures. For example, the CASAC does not provide a discussion of what the comparable 98th percentile concentration is in the distribution of remaining 24-hour $PM_{2.5}$ concentrations of restricted analyses (because such data is not reported by the study authors) and what degree of confidence the Administrator should place on those upper percentile values (*e.g.,* 98th percentile values). In order to identify a level of the 24-hour standard based on associations between the ''upper end'' of exposures, either in the unrestricted or the restricted analyses, and adverse health effects, it would be necessary to have both greater detail on the distribution of air quality in the study and greater confidence in the reported association at the peak concentrations such as the 98th percentile—in other words, a better understanding of how specific 24-hour concentrations correspond to the frequency and total number of observed health events in the study.

Further, the EPA notes that when resulting analyses based on the

restricted dataset continue to find positive associations between the remaining air quality distribution and health effects, it suggests that the relationship was in fact not driven primarily by the upper tail (now removed from the dataset) but rather by lower portions of the distribution of air quality. In other words, we have no confidence that the remaining upper end of the air quality distribution is driving the remaining associations reported in the restricted analyses, as opposed to the vast array of health events at and around the mean $PM_{2.5}$ concentration. In fact, it is reasonable to conclude that to effectively address the health effects observed in the study, it is necessary to control not just the peak concentrations but to reduce the bulk of the exposures (occurring near the mean), a task more effectively achieved, as noted above through a tightening of the annual standard, which has the effect of shifting the entire distribution of $PM_{2.5}$ concentrations downward (both peaks and means). Therefore, while the EPA agrees that both short- and long-term epidemiologic studies that completed restricted analyses and reported the resulting study means could be used to inform conclusions regarding the adequacy of the annual standard, given that the resulting study means (when reported) could be evaluated in the context of the decision framework described above for informing decisions on the level of the annual standard, the EPA considers that current short-term epidemiologic studies that restrict analyses are subject to the same limitations outlined above for current short-term epidemiologic studies in how they can be used in a decision-making framework to inform the adequacy and alternative level of the primary 24-hour $PM_{2.5}$ standard. As such, while the available short-term epidemiologic studies that restrict their analyses are useful for informing conclusions regarding the strength of the associations for health outcomes, they are not, as currently designed, as useful for informing conclusions regarding the adequacy of the current primary 24-hour $PM_{2.5}$ standard. In reaching this conclusion, the EPA notes that the majority of the CASAC did not address the limitations of these studies outlined in the 2021 draft PA, particularly in the context of the 24-hour standard with its 98th percentile form. Among the future research needs identified by the EPA in the 2022 final PA, the Agency noted a number of gaps in the currently available information reported in the epidemiologic studies of short-term exposure, including ''descriptive statistics of $PM_{2.5}$ concentrations at individual percentiles from the 95th percentile to the 99th percentile, as well as the number of days of concentrations and/or health events within each of these percentiles'' and other descriptive statistics and details regarding analytical design in studies employing restricted analyses (U.S. EPA, 2022b, pp. 3–225 to 3–226). Such information could significantly improve the EPA's ability to draw conclusions from these studies with regard to the adequacy of the current primary 24-hour $PM_{2.5}$ standard.

Due to the limitations and uncertainties outlined above, in reaching his decision on the primary 24-hour $PM_{2.5}$ standard, the Administrator judges that the information from currently available short-term epidemiologic studies, including those that use restricted analyses, is inadequate to inform decisions regarding the adequacy of the current 24-hour standard. Additionally, consistent with the final decision in 2012, the EPA continues to view an approach that focuses on setting a generally controlling annual standard as the most effective and efficient way to reduce total population risk associated with both long- and short-term $PM_{2.5}$ exposures. Potential air quality changes associated with meeting an annual standard level of 9.0 $\mu g/m^3$ will result in lowering risk associated with both long- and short-term $PM_{2.5}$ exposure by lowering the overall air quality distribution. As discussed above, reducing the annual standard is the most efficient way to reduce the risks from short-term exposures identified in the epidemiologic studies, as the available evidence suggests the bulk of the risk comes from the large number of days across the bulk of the air quality distribution, not the relatively small number of days with peak concentrations. However, as in the 2012 review, the Administrator recognizes that an annual standard alone would not be expected to offer sufficient protection with an adequate margin of safety against the effects of short-term $PM_{2.5}$ exposures in all parts of the country, particularly in areas with high peak-to-mean ratios, and concludes that it is appropriate to continue to provide supplemental protection by means of a 24-hour standard. In so doing, the Administrator concludes that retaining the level of the primary 24-hour $PM_{2.5}$ standard of 35 $\mu g/m^3$ will provide requisite protection against short-term peak $PM_{2.5}$ concentrations, in conjunction with a revised annual standard level of 9.0 $\mu g/m^3$.

4. Administrator's Conclusions

This section summarizes the Administrator's considerations and conclusions related to the adequacy of the current primary $PM_{2.5}$ standards and presents his decision to revise the primary annual $PM_{2.5}$ standard to a level of 9.0 $\mu g/m^3$ and retain the primary 24-hour $PM_{2.5}$ standard. In establishing primary standards under the Act that are ''requisite'' to protect public health with an adequate margin of safety, the Administrator is seeking to establish standards that are neither more nor less stringent than necessary for this purpose. He recognizes that the requirement to provide an adequate margin of safety was intended to address uncertainties associated with inconclusive scientific and technical information and to provide a reasonable degree of protection against hazards that research has not yet identified. However, the Act does not require that primary standards be set at a zero-risk level; rather, the NAAQS must be sufficiently protective, but not more stringent than necessary.

Given these requirements, the Administrator's final decision in this reconsideration is a public health policy judgment drawing upon scientific and technical information examining the health effects of $PM_{2.5}$ exposures, including how to consider the range and magnitude of uncertainties inherent in that information. This public health policy judgment is based on an interpretation of the scientific and technical information that neither overstates nor understates its strengths and limitations, nor the appropriate inferences to be drawn, and is informed by the Administrator's consideration of advice from the CASAC and public comments received on the proposal.

The initial issue to be addressed in the reconsideration of the primary $PM_{2.5}$ standards is whether, in view of the advances in scientific knowledge and other information reflected in the 2019 ISA, ISA Supplement, and 2022 PA, the current standards are requisite to protect public health with an adequate margin of safety. In considering the adequacy of the current suite of primary $PM_{2.5}$ standards, the Administrator has considered the large body of evidence presented and assessed in the 2019 ISA and ISA Supplement, the conclusions presented in the 2022 PA, the views expressed by the CASAC, and public comments. The Administrator has taken into account both evidence- and risk-based considerations in developing final conclusions on the adequacy of the current primary $PM_{2.5}$ standards. The Administrator has additionally

considered the associated public health policy judgments and judgments about the uncertainties inherent in the scientific evidence and quantitative analyses that are integral to the conclusions on the adequacy of the current primary $PM_{2.5}$ standards.

In evaluating the adequacy of the current standards, the Administrator first recognizes the longstanding body of health evidence supporting relationships between $PM_{2.5}$ exposures (short- and long-term) and mortality and serious morbidity effects. The evidence available in this reconsideration (*i.e.,* that assessed in the 2019 ISA and ISA Supplement) and summarized above in section II.A.2.a reaffirms, and in some cases strengthens, the conclusions from the 2009 ISA regarding the health effects of $PM_{2.5}$ exposures. Recent epidemiologic studies demonstrate generally positive and often statistically significant associations between $PM_{2.5}$ exposures and a number of health effects, including non-accidental, cardiovascular, or respiratory mortality; cardiovascular or respiratory hospitalizations or emergency room visits; and other mortality/morbidity outcomes (*e.g.,* lung cancer mortality or incidence, asthma development). Recent controlled human exposure and animal toxicological studies, as well as evidence from epidemiologic panel studies, strengthens support for potential biological pathways through which $PM_{2.5}$ exposures could lead to the serious effects reported in many population-level epidemiologic studies, including support for pathways that could lead to cardiovascular, respiratory, nervous system, and cancer-related effects. In considering the available scientific evidence, and consistent with approaches employed in past NAAQS reviews, the Administrator places the most weight on evidence supporting ''causal'' or ''likely to be causal'' relationship with long or short-term $PM_{2.5}$ exposures. In addition, the Administrator also takes note of those populations identified to be at greater risk of $PM_{2.5}$-related health effects, as characterized in the 2019 ISA and ISA Supplement, and the potential public health implications.

In evaluating what existing or revised standards may be requisite to protect public health, as described above in section II.A.2, the Administrator's approach recognizes that the current annual standard (based on arithmetic mean concentrations) and 24-hour standard (based on 98th percentile concentrations), together, are intended to provide public health protection against the full distribution of short- and long-term $PM_{2.5}$ exposures. This approach recognizes that changes in $PM_{2.5}$ air quality designed to meet either the annual or the 24-hour standard would likely result in changes to both long-term average and short-term peak $PM_{2.5}$ concentrations.

Further, consistent with the approach adopted in 2012, the Administrator concludes that the most effective and efficient way to reduce total population risk associated with both long- and short-term $PM_{2.5}$ exposures is to set a generally controlling annual standard, and to provide supplemental protection against the occurrence of peak 24-hour $PM_{2.5}$ concentrations by means of a 24-hour standard set at the appropriate level. In reaching this conclusion, the Administrator explicitly recognizes that air quality changes associated with meeting a revised annual standard would result in lowering risks associated with both long- and short-term $PM_{2.5}$ exposures by lowering the overall distribution of air quality concentrations, leading to not only in lower short- and long-term $PM_{2.5}$ concentrations near the middle of the air quality distribution, but also in fewer and lower short-term peak $PM_{2.5}$ concentrations. Similarly, the Administrator recognizes that changes in air quality to meet a 24-hour standard, would result not only in fewer and lower peak 24-hour $PM_{2.5}$ concentrations, but also in lower annual average $PM_{2.5}$ concentrations. However, as noted in 2012, he also recognizes that an approach that relies on setting the level of the 24-hour standard such that the 24-hour standard is generally controlling would be less effective and result in less uniform protection across the U.S. than an approach that focuses on setting a generally controlling annual standard. Thus, he concludes that relying on a revised annual standard as the controlling standard will reduce aggregate risks associated with both long- and short-term exposures more consistently than a generally controlling 24-hour standard. He further concludes that retaining a 24-hour standard at the appropriate level will ensure an adequate margin of safety against short-term effects in areas with high peak-to-mean ratios.

In light of his focus on the annual standard as the generally controlling standard, in considering whether the primary $PM_{2.5}$ standards are adequate, the Administrator first considers information available to inform his final conclusions regarding the primary annual $PM_{2.5}$ standard. In so doing, he notes that in this reconsideration, a large number of key U.S. epidemiologic studies report positive and statistically significant associations for air quality distributions with overall mean $PM_{2.5}$ concentrations that are well below the current level of the annual standard of 12.0 $\mu g/m^3$. He further recognizes that there is additional scientific evidence assessed in the 2019 ISA and newly assessed in this reconsideration in the ISA Supplement that can provide supplemental information to inform his decisions. In addition to the key U.S. epidemiologic studies, the Administrator also recognizes that key Canadian epidemiologic studies also demonstrate positive and statistically significant associations at concentrations below 12 $\mu g/m^3$. He also recognizes that epidemiologic studies that restrict annual average $PM_{2.5}$ concentrations to below 12 $\mu g/m^3$ also provide support for positive and statistically significant associations at lower mean $PM_{2.5}$ concentrations, as do accountability studies that also suggest public health improvements may occur at concentrations below 12 $\mu g/m^3$.

With regard to the available scientific evidence to inform his final decisions on the adequacy of the current 24-hour standard, the Administrator finds that there is less information available to support decisions on the 24-hour standard than that summarized above for the annual standard. The Administrator first notes that controlled human exposure studies, including those newly available in this reconsideration, demonstrate effects following short-term $PM_{2.5}$ exposures at concentrations higher than the current 24-hour standard. The Administrator also considers air quality analyses conducted in the 2022 PA and in responding to public comments, as described above in section II.B.3, that evaluate $PM_{2.5}$ concentrations in ambient air for similar durations to the controlled human exposure studies. As noted above, these air quality analyses indicate that the current 24-hour standard, particularly in conjunction with the revised level of the annual standard, provides a high degree of protection against subdaily $PM_{2.5}$ concentrations that have been shown to elicit effects in controlled human exposure studies. The Administrator considers a limited number of available epidemiologic studies that report associations with health effects when the analyses are restricted to daily $PM_{2.5}$ concentrations below 35 $\mu g/m^3$. As described above, although these studies are useful in demonstrating that health effects are associated with exposure to daily $PM_{2.5}$ concentrations in the lower part of the air quality distribution, they do not provide information about health effects associated with the short-term

''peak'' exposures that the 24-hour standard is designed to protect against. Accordingly, these studies have limited relevance in informing a decision about the appropriate level of the 24-hour standard.

In addition to the scientific evidence, the Administrator also considers the information from the risk assessment. In so doing, he notes that the risk assessment estimates that the current primary annual $PM_{2.5}$ standard could allow a substantial number of deaths in the U.S. With respect to the 24-hour standard, the Administrator recognizes that there are only a small number of study areas where the 24-hour standard is controlling and changes in the 24-hour standard level are estimated to have a much smaller impact on public health. The Administrator recognizes that while the risk estimates can help to place the evidence for specific health effects into a broader public health context, they should be considered along with the inherent uncertainties and limitations of such analyses when informing judgments about the potential for additional public health protection associated with $PM_{2.5}$ exposure and related health effects. While the Administrator recognizes that these uncertainties are important, he also notes that the general magnitude of the risk estimates provide support for significant public health impacts, particularly for lower alternative annual standard levels.

In reaching his final conclusions regarding the adequacy of the primary $PM_{2.5}$ standards, the Administrator also considers the CASAC's advice and recommendations, as well as public comments. With respect to the CASAC's advice, the Administrator recognizes that, in their review of the 2021 draft PA, the CASAC reached consensus that the current primary annual $PM_{2.5}$ standard is not adequate and that it is not sufficiently protective of public health. The Administrator also takes note of the CASAC's advice in their review of the 2019 draft PA, where the CASAC did not reach consensus on the adequacy of the primary annual $PM_{2.5}$ standard, with the minority recommending revision and the majority recommending the standard be retained. Furthermore, he recognizes that in reviewing the 2019 draft PA, the CASAC reached consensus regarding the adequacy of the primary 24-hour $PM_{2.5}$ standard, concluding that the standard should be retained. Conversely, in their review of the 2021 draft PA, the majority of the CASAC advised that the current primary 24-hour $PM_{2.5}$ standard is not adequate and recommended revising the level of the standard, while the minority of the CASAC concluded that the standard was adequate and should be retained. However, in considering the advice of the CASAC collectively in the context of this reconsideration, the Administrator recognizes that the 2021 draft PA included scientific evidence and quantitative risk information that was not available in the 2019 draft PA, and therefore, the advice and recommendations of the CASAC in their review of the 2021 draft PA are based on consideration of the full body of scientific evidence available in this reconsideration, including the evidence evaluated in the 2019 ISA and the ISA Supplement.

The Administrator recognizes that much of the scientific evidence available in this reconsideration was also available in the 2019 ISA and was considered by the then-Administrator when he decided that the current primary $PM_{2.5}$ standards are requisite to protect public health with an adequate margin of safety. However, as described in section I.C.5.b above, in reaching his decision to reconsider the 2020 final decision, the Administrator also recognized that there were a number of studies published since the literature cutoff date of the 2019 ISA that were raised by some members of the CASAC in their review of the 2019 draft PA, in public comments on the 2020 proposal, and in the petitions for reconsideration. As such, the expansion of the air quality criteria in this reconsideration to encompass both the 2019 ISA and the additional scientific evidence evaluated in the ISA Supplement, along with evidence and updated quantitative analyses in the 2022 PA also provided an expanded record for the CASAC's review and public comments as a part of this reconsideration. Taken together, the 2019 ISA, ISA Supplement, and 2022 PA, along with the CASAC's advice and recommendations and public comments, provide the Administrator with additional information for consideration in reaching his final conclusions in this reconsideration. As a result, the record before him notably expands upon and strengthens the basis for the conclusions of the 2019 ISA while reducing some uncertainties that were identified in the 2020 final action.

In considering the available information in this reconsideration, the current Administrator reached different conclusions regarding the appropriate weight to place on certain aspects of the evidence than the then-Administrator in the 2020 final decision. For example, in reaching his conclusions on the primary annual $PM_{2.5}$ standard in 2020, the then-Administrator concluded that it was appropriate to place more weight on epidemiologic studies that used ground-based monitors and to place less weight on the studies that used hybrid model-based approaches, citing to increased uncertainties associated with this new and emerging approach to estimating exposure. In placing more weight on the key U.S. monitor-based studies, the then-Administrator noted that the majority of these studies had mean concentrations at or above the level of the annual standard (12.0 $\mu g/m^3$). However, unlike the approach for considering such studies in the 2012 review, the then-Administrator concluded that it was appropriate to consider the study-reported means collectively, and in so doing, he placed weight on the average of the study-reported means (or medians) across the U.S. monitor-based studies of 13.5 $\mu g/m^3$, and noted that this concentration was above the level of the standard (85 FR 82717, December 18, 2020). In contrast, in this reconsideration, the current Administrator judges that it is appropriate to consider the individual study-reported mean $PM_{2.5}$ concentrations from not only the U.S. monitor-based epidemiologic studies, but also the U.S. hybrid model-based epidemiologic studies, which are an advancement in the available science since the completion of the 2009 ISA. The current Administrator also adopts an approach similar to some previous approaches for the PM NAAQS in which he judges it most appropriate to set the level of the standard to somewhat below the lowest long-term study-reported mean $PM_{2.5}$ concentration reported in key U.S. epidemiologic studies, which is 9.3 $\mu g/m^3$. The study that reports the long-term mean $PM_{2.5}$ concentration of 9.3 $\mu g/m^3$ is newly available in this reconsideration and is evaluated in the ISA Supplement. In the 2019 ISA, the lowest long-term study-reported mean $PM_{2.5}$ concentrations for U.S.-based studies that use ground-based monitors and hybrid model-based approaches are 9.9 $\mu g/m^3$ and 10.7 $\mu g/m^3$, respectively. In judging that it is appropriate to consider both monitor- and hybrid model-based epidemiologic studies and that it is appropriate to adopt an approach to set the level of the standard to somewhat below the lowest long-term mean $PM_{2.5}$ concentration, the current Administrator judges that the available scientific evidence—evaluated in both the 2019 ISA and in the ISA Supplement—provide support for his conclusion that that current primary

$PM_{2.5}$ standard is not adequate and should be revised.

In addition to adopting a different approach than the previous Administrator for considering the long-term mean $PM_{2.5}$ concentrations from key U.S. epidemiologic studies (one more consistent with the approach of the EPA in other prior reviews), the current Administrator both has information newly available in this reconsideration before him and is reaching different conclusions about how to weigh the evidence before him in reaching his final conclusions. For example, in reaching his final decision in 2020, the then-Administrator was concerned about placing too much weight on epidemiologic studies to inform his conclusions on the adequacy of the primary $PM_{2.5}$ standards, noting that the epidemiologic studies do not identify particular $PM_{2.5}$ concentrations that cause effects and cannot alone identify a specific level at which to set the standard. In so doing, the then-Administrator placed greater weight on the uncertainties and limitations associated with the epidemiologic studies, including exposure measurement error, potential confounding by copollutants, increased uncertainty of associations at lower $PM_{2.5}$ concentrations, and heterogeneity of effects across different cities or regions (85 FR 82716, December 18, 2020). The Administrator recognizes that in reaching these judgments, the then-Administrator took into consideration the views of some members of the CASAC, who, in their advice on the 2019 draft PA, expressed the view that the current PM NAAQS should be retained because reported associations between short- and long-term $PM_{2.5}$ exposures and adverse health outcomes ''can reasonably be explained in light of uncontrolled confounding and other potential sources of error and bias'' (Cox, 2019b, p. 8 of consensus responses).

In this reconsideration, the current Administrator notes that the ISA Supplement evaluates additional studies that employed statistical approaches that attempted to more extensively account for confounders and are more robust to model misspecification (*i.e.,* used alternative methods for confounder control, which are sometimes referred to as causal modeling or causal inference methods) that build upon those studies available and evaluated in the 2019 ISA (U.S. EPA, 2019, sections 11.1.2.1 and 11.2.2.4). These studies report consistent positive associations between long-term and short-term $PM_{2.5}$ exposure and total mortality and cardiovascular effects (U.S. EPA, 2022a, section 3.2.2.3). In considering the epidemiologic evidence evaluated in the 2019 ISA, along with the newly available studies evaluated in the ISA Supplement, the current Administrator also recognizes that there are uncertainties and limitations associated with the epidemiologic studies, but judges that it is appropriate to place less weight on these uncertainties than the then-Administrator placed on them in reaching his final decision in 2020, given the strength of the longstanding large body of epidemiologic evidence, employing a variety of study designs, that demonstrates associations between long- and short-term $PM_{2.5}$ exposures and health effects across multiple U.S. cities and in diverse populations, including in studies examining populations and lifestages that may be at comparatively higher risk of experiencing a $PM_{2.5}$-related health effect (*e.g.,* older adults, children).

In reaching this final decision, the Administrator recognizes he is differing not only with the prior Administrator but also with the advice some members of the CASAC provided during their review of the 2019 draft PA. Specifically, taking into consideration the strength of the evidence providing support for causality determinations, the advice of other members of the CASAC and the need to protect public health with an adequate margin of safety, the current Administrator disagrees with these members of CASAC regarding the weight to be given to epidemiologic evidence ''based on its methodological limitations'' (Cox, 2019b, p. 8 of consensus responses), such as the possibility ''that such associations could reasonably be explained by uncontrolled confounding and other potential sources of error and bias'' (Cox, 2019b, p. 8 of consensus responses).

As another example of information that was not available to the CASAC in providing advice to the Administrator in reaching his final decision in 2020, the then-Administrator noted in his final decision that, while some members of the CASAC and public commenters highlighted a number of accountability studies that examined past reductions in ambient $PM_{2.5}$ concentrations and the degree to which those reductions have resulted in public health improvements, the small number of available accountability studies did not examine air quality with starting concentrations meeting the primary annual $PM_{2.5}$ standard of 12.0 $\mu g/m^3$. The then-Administrator took into consideration the absence of such accountability studies, as part of his consideration of the full body of scientific evidence, in reaching his judgment that there was considerable uncertainty in the potential for increased public health protection from further reductions in ambient $PM_{2.5}$ concentrations beyond those achieved under the existing primary $PM_{2.5}$ NAAQS (85 FR 82717, December 18, 2020). However, there are several accountability studies available since the literature cutoff date of the 2019 ISA and evaluated in the ISA Supplement in this reconsideration that have starting concentrations (or concentrations prior to the policy or intervention) below 12.0 $\mu g/m^3$ (Corrigan et al, 2018; Henneman et al., 2019; Sanders et al., 2020a). The current Administrator concludes that, while the number of available accountability studies is limited, he recognizes that these studies provide supplemental information for consideration for informing decisions on the appropriate level of the primary annual $PM_{2.5}$ standard along with the full body of evidence.

As EPA has frequently noted throughout this document, the extent to which the current primary $PM_{2.5}$ standards are judged to be adequate depends in part on science policy and public health policy judgments to be made by the Administrator on the strength and uncertainties of the scientific evidence, such as how to consider epidemiologic evidence and the need for an adequate margin of safety in setting the standards. Thus, it would be pure speculation to guess whether the then-Administrator would have reached the same or different conclusions in the 2020 final decision had the record before him included the newly available information in this reconsideration.[107] However, the current Administrator concludes that, for the reasons explained herein that, in his judgment, based on the record before him in this reconsideration, it is necessary and appropriate to revise the primary annual $PM_{2.5}$ NAAQS to provide requisite protection of public health with an adequate margin of safety.

Based on the available scientific evidence and quantitative information, as well as consideration of the CASAC's advice and public comments, the Administrator concludes that the

[107] The EPA notes that, in considering the additional scientific evidence available in this reconsideration, one member of the CASAC who reviewed both the 2019 draft PA and the 2021 draft PA found that the available scientific and quantitative information available in this reconsideration supported revising the level of the primary annual $PM_{2.5}$ standard to within the range of 10–11 $\mu g/m^3$, whereas he recommended retaining the standard during the review of the 2019 draft PA.

current primary annual $PM_{2.5}$ standard is not adequate to protect public health with an adequate margin of safety. In addition, he finds the available information insufficient to call into question the adequacy of the public health protection afforded by the current primary 24-hour $PM_{2.5}$ standard.

In considering how to revise the current suite of primary $PM_{2.5}$ standards in order to achieve the requisite protection for public health, with an adequate margin of safety, against long- and short-term $PM_{2.5}$ exposures the Administrator considers the four basic elements of the NAAQS (indicator, averaging time, form, and level) collectively. With respect to indicator, the Administrator recognizes that the scientific evidence in this reconsideration, as in previous reviews, continues to provide strong support for health effects associated with $PM_{2.5}$ mass. He notes the 2022 PA conclusion that the available information continues to support the $PM_{2.5}$ mass-based indicator and remains too limited to support a distinct standard for any specific $PM_{2.5}$ component or group of components, and too limited to support a distinct standard for the ultrafine fraction of PM (U.S. EPA, 2022b, section 3.6.3.2.1). In its advice on the adequacy of the current primary $PM_{2.5}$ standards in their review of the 2021 draft PA, the CASAC reached consensus that the $PM_{2.5}$ mass-based indicator should be retained, without revision (Sheppard, 2022a, p. 2 of consensus letter).[108] Additionally, there was no information in the public comments that provided a rationale for an alternative indicator. For all of these reasons, the Administrator concludes that it is appropriate to retain $PM_{2.5}$ mass as the indicator for the primary standards for fine particles.

Consistent with his proposed conclusions regarding averaging time, the Administrator notes that the scientific evidence continues to provide strong support for health effect associations with both long- and short-term $PM_{2.5}$ exposures (88 FR 5618, January 27, 2023). Epidemiologic studies continue to provide strong support for health effects associated with short-term $PM_{2.5}$ exposures based on 24-hour averaging periods, and associations in epidemiologic studies with subdaily estimates are less consistent and, in some cases, smaller in magnitude (88 FR 5618, January 27, 2023). Taken together, the 2019 ISA concludes that epidemiologic studies do not indicate that subdaily averaging periods are more closely associated with health effects than the 24-hour average exposure metric (U.S. EPA, 2019a, section 1.5.2.1). In addition, controlled human exposure and panel-based studies of subdaily exposures typically examine subclinical effects rather than the more serious population-level effects that have been reported to be associated with 24-hour exposures (*e.g.,* mortality, hospitalizations). While recent controlled human exposure studies provide consistent evidence for cardiovascular effects following $PM_{2.5}$ exposures for less than 24 hours (*i.e.,* <30 minutes to 5 hours), air quality analyses have shown that the current averaging times can effectively protect against the exposure concentrations in these studies. This information does not indicate that a revision to the averaging time is necessary to provide additional protection against subdaily $PM_{2.5}$ exposures, beyond that provided by the current primary annual and 24-hour $PM_{2.5}$ standards. The Administrator also notes that this conclusion is also support by the CASAC's advice in their review of the 2021 draft PA where they reached consensus that averaging times for the primary $PM_{2.5}$ standards should be retained, without revision (Sheppard, 2022a, p. 2 of consensus letter).[109] The Administrator also considers the relatively few public comments received that support a subdaily averaging time, but concludes that the currently available information does not provide support for an alternate averaging time. Consistent with his proposed decision, the Administrator concludes that it is appropriate to retain the annual and 24-hour averaging times for the primary $PM_{2.5}$ standards to protect against long- and short-term $PM_{2.5}$ exposures.

With regard to form, the Administrator first notes that the EPA has set both an annual standard and a 24-hour standard to provide protection from health effects associated with both long- and short-term exposures to $PM_{2.5}$ (62 FR 38667, July 18, 1997; 88 FR 5620, January 27, 2023). With regard to the form of the annual standard, the Administrator recognizes that a large majority of the recently available epidemiologic studies continue to report associations between health effects and annual average $PM_{2.5}$ concentrations. These studies of annual average $PM_{2.5}$ concentrations provide support for retaining the current form of the annual standard to provide protection against long- and short-term $PM_{2.5}$ exposures. In its review of the 2021 draft PA, the CASAC reached consensus that the form of the annual standard (*i.e.,* annual mean, averaged over 3 years) should be retained, without revision (Sheppard, 2022a, p. 2 of consensus letter).[110] The Administrator also notes that there were no public comments that recommended an alternative form for the primary annual $PM_{2.5}$ standard.

With regard to the form of the 24-hour standard (98th percentile, averaged over three years), epidemiologic studies continue to provide strong support for health effect associations with short-term (*e.g.,* mostly 24-hour) $PM_{2.5}$ exposures, and controlled human exposure studies provide evidence for health effects following single short-term ''peak'' $PM_{2.5}$ exposures (88 FR 5618, January 27, 2023). Therefore, the Administrator concludes that the evidence supports retaining a standard focused on providing supplemental protection against short-term peak exposures and supports a 98th percentile form for a 24-hour standard, in combination with a primary annual $PM_{2.5}$ standard with its annual mean averaged over three years form. As described in the proposal and in responding to comments in section II.B.3 above, the Administrator further notes that the 98th percentile, averaged over three years, form also provides an appropriate balance between limiting the occurrence of peak 24-hour $PM_{2.5}$ concentrations and identifying a stable target for risk management programs (U.S. EPA, 2022b, section 3.6.3.2.3). Furthermore, the Administrator notes that the multi-year percentile form (*i.e.,* averaged over three years) offers greater stability to the air quality management process by reducing the possibility that statistically unusual indicator values will lead to transient violations of the standard. This conclusion is also supported by the CASAC's advice in their review of the 2021 draft PA, where they reached consensus that the form for the primary $PM_{2.5}$ standards should be retained, without revision (Sheppard, 2022a, p. 2 of consensus letter).[111]

The Administrator also recognizes that the CASAC recommended that in future reviews, the EPA also consider alternative forms for the primary 24-hour $PM_{2.5}$ standard (Sheppard, 2022a,

[108] The CASAC did not provide advice or recommendations regarding the indicator of the primary $PM_{2.5}$ standards in their review of the 2019 draft PA (Cox, 2019b).

[109] The CASAC did not provide advice or recommendations regarding the averaging times of the primary $PM_{2.5}$ standards in their review of the 2019 draft PA (Cox, 2019b).

[110] The CASAC did not provide advice or recommendations regarding the forms of the primary $PM_{2.5}$ standards in their review of the 2019 draft PA (Cox, 2019b).

[111] The CASAC did not provide advice or recommendations regarding the forms of the primary $PM_{2.5}$ standards in their review of the 2019 draft PA (Cox, 2019b).

p. 18 of consensus responses). Based on the CASAC's advice, the proposal solicited comment on alternatives to the current form for consideration in future reviews (88 FR 5619, January 27, 2023). The Administrator recognizes that there were a limited number of public comments related to the form of the primary $PM_{2.5}$ standards as discussed in section II.D.3 above and in the Response to Comments document, and notes that, the EPA will consider the information provided by the commenters regarding the form of the 24-hour $PM_{2.5}$ standard in the next review of the PM NAAQS. Consistent with his proposed decision, in considering the information summarized above, the Administrator concludes that it is appropriate to retain the forms of the current annual and 24-hour $PM_{2.5}$ standards.

In considering how to revise the current suite of $PM_{2.5}$ standards to provide the requisite public health protection with an adequate margin of safety, the Administrator next evaluates the appropriate levels of the primary $PM_{2.5}$ standards, beginning with the annual $PM_{2.5}$ standard. In having carefully considered public comments related to the primary annual $PM_{2.5}$ standard, the Administrator believes that the fundamental conclusions regarding the scientific evidence and quantitative information that supported his proposed conclusions (as described in the 2019 ISA, ISA Supplement, 2022 PA, and the proposal) remain valid. In considering the level at which the primary annual $PM_{2.5}$ standard should be set, the Administrator considers the entire body of evidence and information, giving appropriate weight to each part of that body of evidence and information. He continues to place the greatest weight in this reconsideration on the available scientific evidence that provides support for associations between health effects and long- and short-term $PM_{2.5}$ exposures. In conjunction with his decisions to retain the current indicator, averaging time, and form as described above, the Administrator is revising the level of the primary annual $PM_{2.5}$ standard to 9.0 $\mu g/m^3$. In so doing, he is selecting a primary annual $PM_{2.5}$ standard that, together with the primary 24-hour $PM_{2.5}$ standard, provides requisite public health protection with an adequate margin of safety, based on his judgments about and interpretation of the scientific evidence and quantitative risk information.

The Administrator's decision to revise the level of the primary annual $PM_{2.5}$ standard to 9.0 $\mu g/m^3$ builds upon his conclusion that the overall body of scientific evidence and quantitative risk information calls into question the adequacy of public health protection afforded by the current standard, particularly for at-risk populations. Consistent with his consideration of the available information in reaching his proposed decisions, the Administrator's final decision on the level of the primary annual $PM_{2.5}$ standard places the greatest emphasis on key U.S. epidemiologic studies that report associations between long- and short-term $PM_{2.5}$ exposures and mortality and morbidity. As in the proposal, and as discussed further below, he views additional epidemiologic studies (*i.e.,* studies that employ alternative methods for confounding control, studies that employ restricted analyses, and accountability studies), the controlled human exposure studies, and the risk assessment as providing supplemental information in support of his decision to revise the current annual standard, but recognizes that some of these lines of evidence and information provide a more limited basis for selecting a particular standard level among a range of options. See *Mississippi,* 744 F. 3d at 1351–52 (studies can legitimately support a decision to revise the standard, but not provide sufficient information to justify their use in setting the level of a revised standard).

Given his consideration of the scientific evidence, quantitative risk information, advice from the CASAC, and public comments, the Administrator judges that a primary annual $PM_{2.5}$ standard with a level of 9.0 $\mu g/m^3$ is requisite to protect public health with an adequate margin of safety. He notes that the determination of what constitutes an adequate margin of safety is expressly left to the judgment of the EPA Administrator. See *Lead Industries Association* v. *EPA,* 647 F.2d at 1161–62; *Mississippi,* 744 F.3d at 1353. He further notes that in evaluating how particular standards address the requirement to provide an adequate margin of safety, it is appropriate to consider such factors as the nature and severity of the health effects, the size of the at-risk populations, and the kind and degree of the uncertainties present. In considering the need for an adequate margin of safety, the Administrator notes that a primary annual $PM_{2.5}$ standard with a level of 9.0 $\mu g/m^3$ would be expected to provide substantial improvements in public health compared to the current annual standard, including for at-risk groups such as children, older adults, people with preexisting conditions, minority populations, and low SES populations.

Consistent with his conclusions on the need for revision of the current annual standard, in reaching a decision on level, the Administrator places the most weight on information from epidemiologic studies. In so doing, the Administrator notes that these studies provide consistent evidence of positive and statistically significant associations between long- and short-term exposure to $PM_{2.5}$ and mortality and morbidity (88 FR 5624, January 27, 2023). The Administrator recognizes that placing weight on the information from the epidemiologic studies allows for examination of the entire population, including those that may be at comparatively higher risk of experiencing a $PM_{2.5}$-related health effects (*e.g.,* children, older adults, minority populations) (88 FR 5624, January 27, 2023). The Administrator also recognizes that recent epidemiologic studies continue to support a no-threshold relationship, meaning that there is no ''bright line'' below which no effects have been found. These studies also support a linear relationship between health effects and $PM_{2.5}$ exposures at $PM_{2.5}$ concentrations greater than 8 $\mu g/m^3$, though uncertainties remain about the shape of the C–R curve at $PM_{2.5}$ concentrations less than 8 $\mu g/m^3$, with some recent studies providing evidence for either a sublinear, linear, or supralinear relationship at these lower concentrations (U.S. EPA, 2019a, section 11.2.4; U.S. EPA, 2022a, section 2.2.3.2; 88 FR 5625, January 27, 2023).

As at the time of proposal, the Administrator notes that some recent epidemiologic studies have adopted a broad range of approaches to examine confounding and the results of those examinations support the robustness of reported associations seen in epidemiologic studies. These include studies that employ alternative methods for confounder control and studies that evaluate the uncertainty related to exposure measurement error, both of which continue to support associations between $PM_{2.5}$ exposures and health effects while taking approaches to address uncertainties.

In considering the epidemiologic evidence, the Administrator judges that, in reaching his decision on an appropriate level for the annual standard that will protect public health with an adequate margin of safety, in the absence of any discernible population-level thresholds, and in recognizing the need to weigh uncertainties associated with the epidemiologic evidence, it is most appropriate to examine where the evidence of associations observed in the

epidemiologic studies is strongest and, conversely, to place less weight where he has less confidence in the associations observed in the epidemiologic studies. As at the time of proposal, the Administrator notes that in previous reviews, evidence-based approaches noted that the evidence of an association in any epidemiologic study is ''strongest at and around the long-term average where the data in the study are most concentrated'' (78 FR 3140, January 15, 2013). Given this, these approaches focused on identifying standard levels near or somewhat below long-term mean concentrations reported in key epidemiologic studies. These approaches were supported by previous CASAC advice as well as the CASAC's advice in their review of the 2021 draft PA as a part of this reconsideration.

Additionally, the Administrator acknowledges that in the 2020 final action, the then-Administrator decided to retain the standard based in part on concerns about placing reliance on the epidemiologic studies and his judgment that even if he did rely on them, the majority of the studies had means or medians, as well as the mean of all of the key study-reported means or medians, above the level of the current annual standard. However, after considering the evidence, the advice of CASAC, and public comments the Administrator judges that this approach is insufficient to protect public health with an adequate margin of safety. The Administrator's decision to reach a different judgment about the appropriate level of the annual standard reflects the updated and expanded scientific record available to the Administrator in this reconsideration, as well as the additional advice from the CASAC and the public comments based on this newly available information. In addition, the Administrator observes the decision in this action to place weight on the epidemiologic studies, and to revise the annual primary standard to a level below the lowest long-term mean in the U.S.-based epidemiologic studies, is consistent with the EPA's past practice in PM NAAQS reviews.

In this reconsideration, the Administrator is considering the scientific record which has been expanded and updated since the 2020 final action, as well as the additional advice from the CASAC and the public comments that are based on the newly available information that expands upon the information previously available. In addition, the Administrator is exercising his judgment about how to interpret and weigh the expanded evidence in a way that is more consistent with the approaches used in prior PM NAAQS reviews. As a result, the Administrator has concluded on reconsideration that the level of the primary annual standard is not adequate and should be revised to protect public health with an adequate margin of safety.

Consistent with his proposed decisions, in reaching conclusions on the level of the primary annual $PM_{2.5}$ standard, the Administrator considers the long-term [112] study-reported mean $PM_{2.5}$ concentrations from key long- and short-term epidemiologic studies and sets the level of the standard to somewhat below the lowest long-term mean $PM_{2.5}$ concentration.[113] He notes that in previous PM NAAQS reviews (including the 1997, 2006 and 2012 reviews), evidence-based approaches focused on identifying standard levels near or somewhat below long-term mean concentrations reported in key long- and short-term epidemiologic studies. These approaches were supported by the CASAC in previous reviews and were supported in this reconsideration by the CASAC in their review of the 2021 draft PA. In considering the available scientific evidence to inform such an approach, the Administrator notes the strength of the epidemiologic evidence which includes multiple studies that consistently report positive associations for short- and long-term $PM_{2.5}$ exposure and mortality and cardiovascular effects. Some available studies also use a variety of statistical methods to control for confounding bias and report similar associations, which further supports the broader body of epidemiologic evidence for both mortality and cardiovascular effects. Additionally, he notes that recent epidemiologic studies available for consideration in reaching his final decision strengthen support for health effect associations at $PM_{2.5}$ concentrations lower than in those evaluated in epidemiologic studies available at the time of previous reviews. The Administrator does recognize, however, that while these epidemiologic studies evaluate associations between distributions of ambient $PM_{2.5}$ concentrations and health outcomes, they do not identify the specific exposures that led to the reported effects. As such, he notes that there is no specific point in the air quality distribution of any epidemiologic study that represents a ''bright line'' at and above which effects have been observed and below which effects have not been observed. The Administrator further notes that the epidemiologic studies provide the strongest support for reported health effect associations for this middle portion of the $PM_{2.5}$ air quality distribution, which corresponds to the bulk of the underlying data, rather than the extreme upper or lower ends of the distribution, and concludes that the long-term study-reported means from both long- and short-term studies provide the strongest support for reported health effect associations in epidemiologic studies. For these reasons, as described in the proposal and in responding to public comments in section II.B.3 above, the Administrator concludes that it is appropriate to continue to employ an approach that focuses on the mean $PM_{2.5}$ concentrations from the key epidemiologic studies to inform his conclusions regarding the appropriate level for the primary annual $PM_{2.5}$ standard.

In adopting such an approach, the Administrator considers the long-term mean concentrations reported in two types of key epidemiologic studies: (1) Monitor-based studies [114] (epidemiologic studies that used ground-based monitors to estimate exposure, similar to approaches used in past reviews), and (2) hybrid modeling-based studies [115] (epidemiologic studies that used hybrid modeling approaches and apply aspects of population weighting to estimate exposures). In reaching conclusions regarding the level of a standard that would provide requisite protection with an adequate margin of safety, the Administrator recognizes that he must use his judgment regarding the appropriate weight to place on the available evidence and technical information, including uncertainties. As shown in Figures 1 and 2 above, for the key U.S. monitor-based epidemiologic studies,

[112] ''Long-term'' represents $PM_{2.5}$ exposures and concentrations that are annual or multi-year.

[113] As described in section II.A.2.c above, key epidemiologic studies are those that report overall mean (or median) $PM_{2.5}$ concentrations and for which the years of $PM_{2.5}$ air quality data used to estimate exposures overlap entirely with the years during which health events are reported.

[114] Reported mean $PM_{2.5}$ concentrations in monitor-based studies are averaged across monitors in each study area with multiple monitors, referred to as a composite monitor concentration, in contrast to the highest concentration monitored in the study area, referred to as a maximum monitor concentration (*i.e.,* the ''design value'' concentration), which is used to determine whether an area meets a given standard.

[115] Studies that use hybrid modeling approaches employ methods to estimate ambient $PM_{2.5}$ concentrations across large geographical areas, including areas without monitors, and thus, when compared to monitor-based studies, require additional information to inform the relationship between the estimated $PM_{2.5}$ concentrations across an area and the maximum monitor design values used to assess compliance.

the study-reported mean concentrations range from 9.9–16.5 μg/m^3, and for the key U.S. hybrid modeling-based epidemiologic studies, the mean concentrations range from 9.3–12.2 μg/m^3. The Administrator also recognizes that, in their review of the 2021 draft PA, both the majority and minority of the CASAC emphasized the epidemiologic studies in support of their recommendations for the level of the annual standard, but they weighed the studies in different ways (Sheppard, 2022a, p. 16–17 of consensus responses).

Based on this information, and in considering the CASAC's advice in their review of the 2021 draft PA, the Administrator judges that it is appropriate to set the level of the primary $PM_{2.5}$ standard at least as low as the lowest mean $PM_{2.5}$ concentration from these key U.S.-based epidemiologic studies, which is 9.3 μg/m^3. The Administrator additionally notes that setting the annual standard level at 9.0 μg/m^3, which is below the lowest study-reported mean $PM_{2.5}$ concentration of 9.3 μg/m^3, would be expected to shift the distribution of $PM_{2.5}$ concentrations in an area such that the area's highest monitor would generally be at or below 9.0 μg/m^3 annually, when meeting the annual standard. In this situation, the resulting average or mean $PM_{2.5}$ concentration for the entire area (measured across a number of monitors) would be even further below the study-reported means,[116] and will provide adequate protection not only in areas where the highest allowable concentrations would be expected (*i.e.,* near design value monitors) but also in other parts of the area where $PM_{2.5}$ concentrations would be expected to be maintained even lower.

As noted above, however, the Administrator must exercise his judgment regarding the appropriate weight to place on the available scientific evidence and quantitative information, including uncertainties, in determining what level of the annual standard is sufficient to protect public health with an adequate margin of safety. In so doing, he considers other information available in this reconsideration to inform his judgments, including study-reported $PM_{2.5}$ concentrations at lower percentiles in key epidemiologic studies, supplemental information from other types of epidemiologic studies, study-reported $PM_{2.5}$ concentrations from key Canadian epidemiologic studies, and the results from the quantitative risk assessment.

In weighing the evidence in considering the requisite level of the annual standard, the Administrator also takes into account additional information from the key long- and short-term U.S. epidemiologic studies available that provide study-reported $PM_{2.5}$ concentrations below the mean and, in particular, the subset of epidemiologic studies that report 25th and 10th percentile concentrations. Consistent with his proposed conclusions, as well as the CASAC's advice in their review of the 2021 draft PA and public comments, the Administrator judges that it is appropriate to place some weight on these lower percentiles in reaching his conclusions on the level of the primary annual standard. There are six key U.S. epidemiologic studies that report information on other percentiles (*e.g.,* 10th and 25th percentiles of $PM_{2.5}$ concentrations or 10th and 25th percentiles of $PM_{2.5}$ concentrations associated with health events) that are below the mean.[117] In considering the information from these studies, the Administrator first notes that the three older, monitor-based studies that report lower percentiles of $PM_{2.5}$ concentrations have smaller cohort sizes than the three hybrid model-based studies. Thus, the Administrator recognizes that the older, monitor-based studies had a relatively smaller portion of the health events that were observed in the lower part of the air quality distribution because of the generally smaller size of the cohorts. He further notes that the recent hybrid model-based studies have larger cohort sizes than the older, monitor-based studies, and therefore, have more health events in the lower part of the air quality distribution. Because of the larger cohort sizes and having a larger portion of health events that are observed across the air quality distribution, the Administrator has more confidence in the magnitude and significance of the associations in the lower parts of the air quality distribution for the recent, hybrid model-based studies compared to the older, monitor-based studies. Given this, the Administrator judges that it is appropriate to place weight on the 25th percentile concentrations reported in the recently available hybrid model-based studies in reaching his conclusions regarding the appropriate level for the primary annual $PM_{2.5}$ standard. However, the Administrator also recognizes that his confidence in the magnitude and significance in the reported concentrations, and their ability to inform decisions on the appropriate level of the annual standard, starts to diminish at percentiles that are even further below the mean and the 25th percentile. For these reasons, the Administrator places weight on the reported 25th percentiles concentrations in the recent hybrid model-based studies, rather than the reported 10th percentile concentrations, in reaching his conclusions regarding the appropriate level for the primary annual $PM_{2.5}$ standard.

In considering the information from these studies, as described in section II.A.2.c and in responding to public comments in section II.B.3 above, the Administrator notes that there are two hybrid model-based studies with large cohort sizes that apply population weighting and report lower percentile values. These studies are Di et al. (2017b) and Wang et al. (2017) and the reported 25th percentile concentration is 9.1 μg/m^3 for both studies.[118] In considering these studies, the Administrator concludes that it is appropriate to place weight on the 25th percentile concentrations of these newer hybrid model-based studies (of 9.1 μg/m^3) such that setting the level of the standard near these 25th percentile concentrations would provide requisite protection. The Administrator observes that an annual standard level of 9.0 μg/m^3 would be near the reported 25th percentile concentrations in these studies.

As at the time of proposal, the Administrator also takes note of the study-reported long-term mean $PM_{2.5}$ concentrations in long- and short-term Canadian epidemiologic studies, which ranged from 6.9 to 13.3 μg/m^3 for monitor-based studies and 5.9 to 9.8 μg/m^3 for hybrid model-based studies. While the Administrator notes that these studies provide additional support for associations between $PM_{2.5}$ concentrations and health effects, he is also mindful that there are important differences between the exposure environments in the U.S. and Canada and that interpreting the data (*e.g.,* study-reported mean concentrations)

[116] Analyses in the 2022 PA suggest that the highest monitored value would be expected to be greater than the study-reported mean values by 10–20% for monitor-based studies and 15–18% for hybrid modeling studies that apply aspects of population weighting.

[117] The Wang et al. (2017) study only reports the 25th percentile of the estimated $PM_{2.5}$ concentrations, not the 10th percentile.

[118] There is a third hybrid model-based study, as described in the 2022 PA and in section II.B.3 above in responding to public comments, but it is not referenced here because it reports a 25th percentile $PM_{2.5}$ concentration based on the 25th percentile of health events that occur in the study (Di et al., 2017a) rather than report the 25th percentile based on air quality concentrations.

from the Canadian studies in the context of a U.S.-based standard may present challenges in directly and quantitatively informing decisions regarding potential alternative levels of the annual standard. For example, in terms of people per square kilometer, the U.S. population density is nearly 10 times in the contiguous U.S. compared to Canada. As described in more detail in responding to public comments in section II.B.3 above, in this reconsideration, the Administrator recognizes that this difference in population density between the U.S. and Canada is more apparent than in previous reviews because the studies available in this reconsideration use different approaches than those previously available. In the 2012 review, the available Canadian epidemiologic studies used population-weighting and focused on urban areas where monitors were available and population densities were more comparable with those in the U.S., and at that time, the U.S. and Canadian studies reported similar mean $PM_{2.5}$ concentrations. However, in this reconsideration, the Administrator takes note that for the new Canadian epidemiologic studies: (1) The Canadian monitor-based studies available in this reconsideration do not apply population weighting as the previously available studies did; and (2) some of the studies now use hybrid modeling approaches for estimating exposure. The Administrator recognizes that these differences are important to consider in reaching conclusions on how these Canadian epidemiologic studies should be interpreted regarding decisions on the requisite level of the primary annual $PM_{2.5}$ standard. Specifically, the Administrator notes that the more recent Canadian studies that use hybrid modeling incorporate larger portions of the country, and therefore include more rural areas. The more rural areas that are included in the study using the hybrid modeling approaches, the more important it is to consider how the population densities and exposure environments differ between the U.S. and Canada. Additionally, the Administrator notes that for hybrid modeling-based studies there is less certainty in $PM_{2.5}$ exposure estimates in more rural areas, which are further from air quality monitors and where $PM_{2.5}$ concentrations in the ambient air tend to be lower. For these hybrid model-based studies, the portion of the rural areas that are contributing to the study-reported mean $PM_{2.5}$ concentrations in these studies is unclear. For these reasons, the Administrator concludes that it is important to consider the differences between the population exposures in the U.S. and Canadian study areas and how these differences influence the interpretation of the epidemiologic study results.

Thus, the Administrator considers the Canadian studies to inform his judgments on what level for the annual standard is requisite in light of the limitations and challenges presented. The Administrator also recognizes that the majority of the CASAC in their review of the 2021 draft PA, as well as a number of public commenters, place weight on the Canadian epidemiologic studies in recommending that the level of the primary annual $PM_{2.5}$ standard be revised to 8–10 $\mu g/m^3$. The Administrator further notes while the majority of the CASAC advised the EPA to consider the Canadian studies in revising the annual standard level to within the range of 8.0–10.0 $\mu g/m^3$, they did not advise the EPA to set the annual standard level below the study-reported means from those studies. Given these considerations, the Administrator judges that it is appropriate to set the level of annual standard within the range of 8–10 $\mu g/m^3$ to be consistent with the majority of the CASAC's advice in their consideration of these studies.

The Administrator also recognizes that information from epidemiologic studies that included analyses that restrict annual average $PM_{2.5}$ concentrations to concentrations below the level of the current annual standard can be useful for informing conclusions regarding the appropriate level of the primary annual $PM_{2.5}$ standard. In so doing, he particularly notes the two key U.S. epidemiologic studies (Di et al., 2017b and Dominici et al., 2019) that restrict annual average $PM_{2.5}$ concentrations to less than 12 $\mu g/m^3$ and report positive and statistically significant associations with all-cause mortality and mean $PM_{2.5}$ concentrations of 9.6 $\mu g/m^3$. He also considers these results along with the uncertainties and limitations associated with studies that restricted analyses below certain $PM_{2.5}$ concentrations. As described in responding to comments in section II.B.3 above, uncertainties associated with how the studies exclude $PM_{2.5}$ concentrations from the analyses (*e.g.,* at what spatial resolution are concentrations being excluded), make it difficult to understand how to interpret the results of the restricted analyses in the context of the approach employed in this reconsideration, which takes into consideration the relationship between mean $PM_{2.5}$ concentrations and design values.

The Administrator also recognizes that, in their review of the 2021 draft PA, the CASAC noted that epidemiologic studies that restrict analyses below certain $PM_{2.5}$ concentrations represent one area for which the evidence has expanded in this reconsideration, stating that these studies provide support for mortality effects at concentrations below the current PM NAAQS (Sheppard, 2022a, p. 5 of consensus responses). In their recommendations on alternative levels for the primary annual $PM_{2.5}$ standard, the majority of the CASAC cited to studies that restrict $PM_{2.5}$ concentrations to below 12 $\mu g/m^3$ as a part of their rationale for supporting a level within the range of 8–10 $\mu g/m^3$ (Sheppard, 2022a p. 16 of consensus responses). Additionally, the Administrator notes that some members of the CASAC, in their review of the 2019 draft PA, concluded that the epidemiologic studies that restrict analyses below 12 $\mu g/m^3$ and show positive associations with health effects, along with other aspects of the scientific evidence, provide support for their conclusion that the primary annual $PM_{2.5}$ standard is not adequate (Cox, 2019b, p. 9 of consensus responses). Furthermore, the Administrator takes note of public commenters who also noted that the epidemiologic studies that restrict $PM_{2.5}$ concentrations to below the current standard provide support, along with the other available information, for lowering the level of the primary annual $PM_{2.5}$ standard. In considering the studies that include restricted analyses, along with the CASAC's advice and public comments on these types of studies, the Administrator concludes that, although there are inherent uncertainties associated with this limited body of evidence, these studies that apply restricted analyses provide support for serious effects (*e.g.,* mortality) at concentrations below 10.0 $\mu g/m^3$. Given this, the Administrator concludes that it is appropriate to place some weight on these studies, and in doing so, notes that a standard level of 9.0 $\mu g/m^3$ would be below the reported mean $PM_{2.5}$ concentrations of 9.6 $\mu g/m^3$ in these studies and would, thus, be expected to provide protection against exposures related to these reported mean concentrations.

The Administrator also takes into consideration recent U.S. accountability studies, which assess the health effects associated with actions that improve air quality (*e.g.,* air quality policies or implementation of an intervention). These types of studies can also reduce uncertainties related to residual confounding of temporal and spatial factors (U.S. EPA, 2022a, p. 3–25). The

Administrator notes that in the 2020 review, the available accountability studies had ''starting'' annual average $PM_{2.5}$ concentrations (*i.e.,* mean concentration prior to reductions being evaluated) from 13.2–31.5 μg/m³, and the then-Administrator cited the lack of accountability studies in areas where the ''starting'' concentration met the current primary $PM_{2.5}$ standards as part of his rationale for retaining the standards. As at the time of proposal, the current Administrator notes that in three studies newly available in this reconsideration and assessed in the ISA Supplement, prior to implementation of the policies, mean $PM_{2.5}$ concentrations in these studies were below the level of the current annual standard level (12.0 μg/m³) and ranged from 10.0 μg/m³ to 11.1 μg/m³. These studies report positive and significant associations between mortality and cardiovascular morbidity and reductions in ambient $PM_{2.5}$ following the implementation of a policy (Henneman et al., 2019; Corrigan et al., 2018; Sanders et al., 2020a; 88 FR 5627, January 27, 2023). These studies suggest that public health improvements may occur following the implementation of a policy that reduces annual average $PM_{2.5}$ concentrations below the level of the current standard of 12.0 μg/m³. The Administrator recognizes that in their review of the 2021 draft PA, the CASAC noted that the availability of recent accountability studies was one area where the evidence had been strengthened and that the studies assessed in the ISA Supplement provide evidence of mortality effects at annual average $PM_{2.5}$ concentrations below the current NAAQS (Sheppard, 2022a, p. 5 of consensus responses). The Administrator recognizes that the CASAC also concluded that, along with other lines of evidence, the accountability studies with starting concentrations below the levels of the current standards are appropriate to consider for informing conclusions on alternative standard levels (Sheppard, 2022a, p. 13 of consensus responses). The Administrator also notes the advice of the CASAC in their review of the 2019 draft ISA, where they suggested that accountability studies be taken into account and such studies provide potentially crucial information about whether and how much decreasing $PM_{2.5}$ causes decreases in future health effects, which reflects the primary purpose of the NAAQS (Cox, 2019b, p. 8 and 10 of consensus responses). The Administrator also notes that in their review of the 2019 draft ISA, some members of the CASAC cautioned against placing more weight on the data from accountability studies based on the methodological limitations of the studies (Cox, 2019b, p. 8 of consensus responses). The Administrator notes that the CASAC did not explicitly cite to accountability studies in their reviews of the 2019 draft PA or 2021 draft PA as support for their recommendations on the adequacy of the primary annual $PM_{2.5}$ standard or potential alternative standard levels. A number of public commenters who support revising the level of the standard to 8 μg/m³ cite these accountability studies, along with the broader evidence base, as support for a more protective standard. The Administrator, in considering the evidence, the advice from the CASAC, and public comment, first recognizes that accountability studies are just one line of evidence to be considered in the broader evaluations of the information available to inform conclusions on the level of the standard. In so doing, he notes that public health improvements may occur following the implementation of a policy that reduces annual average $PM_{2.5}$ concentrations below the level of the current standard of 12.0 μg/m³, and potentially below the lowest ''starting'' concentrations in these studies of 10.0 μg/m³. However, the Administrator concludes that the limited number of accountability studies provide limited information for informing decisions on the appropriate level of the primary annual $PM_{2.5}$ standard but recognizes that these studies provide supplemental information for consideration along with the full body of evidence. Taken together, the Administrator notes a revised annual standard level of 9.0 μg/m³ is at or below the lowest starting concentration of these accountability studies (*i.e.,* 10.0 μg/m³), and judges that it is appropriate to place some weight on these studies, particularly for informing his public policy judgments regarding an adequate margin of safety.

In addition to his consideration of and conclusions regarding the available scientific evidence, the Administrator also considers the results of the quantitative risk assessment to inform his conclusions regarding the appropriate level for the primary annual $PM_{2.5}$ standard. The Administrator recognizes that the risk estimates can help to place the evidence for specific health effects into a broader public health context, but should be considered along with the inherent uncertainties and limitations of such analyses when informing judgments about the potential for additional public health protection associated with $PM_{2.5}$ exposure and related health effects. The Administrator recognizes that the overall risk assessment estimates suggest that the current primary annual $PM_{2.5}$ standard could allow a substantial number of $PM_{2.5}$-associated deaths in the U.S. The Administrator also recognizes that the CASAC concurred with the 2021 draft PA's assessment that meaningful risk reductions will result from lowering the annual $PM_{2.5}$ standard (Sheppard, 2022a, p. 16 of consensus responses).

Additionally, with respect to the results of the quantitative risk assessment, the Administrator recognizes that the 2022 PA also provides information on the distribution of concentrations associated with the estimated mortality risk at each alternative standard level assessed (U.S. EPA, 2022b, sections 3.4.2.2 and 3.6.2.2, Figure 3–18 and 3–19). When meeting an annual standard of 9.0 μg/m³ at the design value monitor, the exposure concentrations within an area are estimated to be below 9 μg/m³, with the majority of those exposures being at concentrations of below 8 μg/m³. The Administrator notes that this range of concentrations is below the lowest means in the key long- and short-term epidemiologic studies (concentrations at which the evidence is the strongest in supporting an association between exposure to $PM_{2.5}$ and adverse health effects observed in the key epidemiologic studies available in this reconsideration). Thus, the Administrator concludes that the results of the quantitative risk assessment suggest that a revised annual standard level of 9.0 μg/m³ is estimated to reduce $PM_{2.5}$ exposures to fall within the range of concentrations in which there is the most confidence in the associations and thus, confidence that estimated risk reductions will actually occur.

The Administrator also notes the information provided by the quantitative risk assessment on the distribution of concentrations associated with the estimated mortality risk for a higher annual standard level of 10.0 μg/m³ and a lower standard level of 8.0 μg/m³ (U.S. EPA, 2022b, sections 3.4.2.2 and 3.6.2.2, Figure 3–18 and 3–19). The Administrator finds that, for an annual standard level of 10.0 μg/m³, the quantitative risk assessment estimates that the standard would allow multiple exposures at concentrations above the lowest means in the key epidemiologic studies, and therefore, calls into question whether a standard level of 10.0 μg/m³ would provide enough public health protection. Additionally, the Administrator also finds that, for a lower annual standard level of 8.0 μg/

m^3, the quantitative risk assessment estimates the exposure concentrations to be below 8 $\mu g/m^3$, with the majority of those exposures being at concentrations of below 7 $\mu g/m^3$. The Administrator observes that the majority of exposure concentrations under this air quality scenario are estimated to fall outside of the range of concentrations in which he has the most confidence in the associations and that the additional risk reductions will actually occur.

Recognizing and building upon the above considerations and judgments, and with consideration of advice from the CASAC and public comment, the Administrator concludes that the current body of scientific evidence and quantitative risk assessment support his judgment that the level of the primary annual $PM_{2.5}$ standard should be revised to a level of 9.0 $\mu g/m^3$. Revising the level of the primary annual $PM_{2.5}$ standard will, in the Administrator's judgment, provide requisite public health protection with an adequate margin of safety.

The Administrator recognizes that placing weight on the information from the epidemiologic studies allows for examination of the entire population, including those that may be at comparatively higher risk of experiencing a $PM_{2.5}$-related health effects (*e.g.,* children, older adults, minority populations) (88 FR 5624, January 27, 2023). In considering the epidemiologic evidence, the Administrator judges that, in reaching his decision on an appropriate level for the annual standard that will protect public health with an adequate margin of safety, in the absence of any discernible population-level thresholds, and in recognizing the need to weigh uncertainties associated with the epidemiologic evidence, it is most appropriate to examine where the evidence of associations observed in the epidemiologic studies is strongest and, conversely, to place less weight where he has less confidence in the associations observed in the epidemiologic studies. The Administrator notes that in previous reviews, evidence-based approaches noted that the evidence of an association in any epidemiologic study is ''strongest at and around the long-term average where the data in the study are most concentrated'' (78 FR 3140, January 15, 2013). These approaches were supported by previous CASAC advice as well as the CASAC's advice in their review of the 2021 draft PA as a part of this reconsideration. Given this, the Administrator notes that in revising the annual $PM_{2.5}$ standard to a level of 9.0 $\mu g/m^3$, he is setting the standard at a level below the long-term mean $PM_{2.5}$ concentrations in the key long- and short-term epidemiologic studies, including the lowest study reported mean of 9.3 $\mu g/m^3$, following an approach that is consistent with previous PM NAAQS reviews. The Administrator additionally notes that air quality analyses in the 2022 PA demonstrate that areas meeting a revised annual standard of 9.0 $\mu g/m^3$ would be expected to shift the distribution of $PM_{2.5}$ exposure concentrations in an area such that the area's highest monitor would generally be at or below 9.0 $\mu g/m^3$ annually, and most of the resulting $PM_{2.5}$ concentrations across the area would be even further below the study-reported means.[119] [120] Thus, a standard level of 9.0 $\mu g/m^3$ is expected to provide sufficient protection not only in areas where the highest allowable concentration would be located (*i.e.,* near design value monitors) but also in other parts of the area where $PM_{2.5}$ concentrations would be expected to be maintained even lower.

Furthermore, the Administrator recognizes the CASAC's advice in their review of the 2021 draft PA, as well as public comments, that weight should be placed on study-reported $PM_{2.5}$ concentrations that are somewhat below the mean, particularly for some of the newer epidemiologic studies with larger cohort sizes. In weighing uncertainties associated with using these data to inform a revised annual standard level, as well as noting the limited studies for which this information is available, the Administrator judges that some weight should be placed on these data, but they should not receive the same weight as the study-reported mean concentrations. Thus, the Administrator concludes that it would be appropriate to set the annual standard level near the 25th percentile $PM_{2.5}$ concentrations in the two newer key epidemiologic studies for which these values were reported. In doing so, the Administrator notes that a decision to revise the annual standard to 9.0 $\mu g/m^3$ would set a level of the standard near and somewhat below the reported 25th percentile $PM_{2.5}$ concentrations of 9.1 $\mu g/m^3$ in these two more recent hybrid model-based studies.

The Administrator also takes note of the study-reported long-term mean $PM_{2.5}$ concentrations in the key Canadian epidemiologic studies. While the Administrator notes that these studies provide additional support for associations between $PM_{2.5}$ concentrations and health effects, he is also mindful that there are important differences between the exposure environments in the U.S. and Canada that affect interpretation of the data in the context of informing decisions regarding potential alternative levels of the annual standard. The Administrator also recognizes that the majority of the CASAC in their review of the 2021 draft PA, as well as a number of public commenters, placed weight on the Canadian epidemiologic studies in recommending that the level of the primary annual $PM_{2.5}$ standard be revised to 8–10 $\mu g/m^3$. The Administrator notes that a decision to revise the annual standard to 9.0 $\mu g/m^3$ would set the level of the standard within the range of levels recommended by the majority of CASAC in their consideration of these studies.

Additionally, the Administrator also considers the information provided by epidemiologic studies that use restricted analyses, as well as accountability studies. With respect to the restricted analyses, the Administrator, in considering the CASAC's advice in their review of the 2021 draft PA and many public comments on these types of studies, concludes that, although there are inherent uncertainties associated with this limited body of evidence, the studies that apply restricted analyses provide support for serious effects (*e.g.,* mortality) at concentrations below 10.0 $\mu g/m^3$. Additionally, in considering accountability studies, the Administrator concludes that while the small number of these studies provide limited information for informing decisions on the appropriate level of the primary annual $PM_{2.5}$ standard, these studies provide supplemental information for consideration along with the full body of evidence. The Administrator further notes that these studies suggest that public health improvements may occur following the implementation of a policy that reduces annual average $PM_{2.5}$ concentrations below the level of the current standard of 12.0 $\mu g/m^3$, and potentially below the lowest ''starting'' concentrations in these studies of 10.0 $\mu g/m^3$. Taken together, the Administrator judges that it is appropriate to place some weight on these types of studies, particularly for informing his public policy judgments regarding an adequate margin

[119] Analyses in the 2022 PA suggest that the highest monitored value would be expected to be greater than the study-reported mean values by 10–20% for monitor-based studies and 15–18% for hybrid modeling studies that apply aspects of population weighting (U.S. EPA, 2022b, section 2.3.3.2.4).

[120] The risk assessment in the 2022 PA used air quality adjustments to simulate just meeting the current primary $PM_{2.5}$ standards, as well as alternative standard levels (U.S. EPA, 2022b, section 3.4.1.4 and Appendix C, section C.1.4).

of safety, and notes that a revised annual standard level of 9.0 μg/m³ is below the lowest starting concentration of the accountability studies (*i.e.,* 10.0 μg/m³), and below the concentration at which studies that apply restricted analyses provide support for serious effects (*i.e.,* 9.6 μg/m³).

The Administrator also judges that the results of the quantitative risk assessment provide support for a primary annual $PM_{2.5}$ standard with a level of 9.0 μg/m³. The results of the risk assessment suggest that when meeting an annual standard of 9.0 μg/m³, $PM_{2.5}$ exposures are maintained below 9 μg/m³ at the design value monitor, with the majority of those exposures being at concentrations below 8 μg/m³. Thus, the Administrator notes that an annual standard level of 9.0 μg/m³ would be expected to provide protection from exposures where he has the greatest confidence in the associations between health effects and $PM_{2.5}$ exposures (*i.e.* the long-term mean $PM_{2.5}$ concentrations in the key U.S. epidemiologic studies, of which the lowest is 9.3 μg/m³) and would provide an adequate margin of safety by maintaining most $PM_{2.5}$ exposures even further below 9.0 μg/m³.

When considering adequate margin of safety, the Administrator notes that in his decision to revise the annual standard level to 9.0 μg/m³, he is placing weight on the information from the epidemiologic studies which allows for examination of the entire population, including those that may be at comparatively higher risk of experiencing a $PM_{2.5}$-related health effects (*e.g.,* children, older adults, minority populations). Additionally, as discussed above, the Administrator also recognizes that setting the annual standard level at 9.0 μg/m³, which is below concentrations at which the evidence is the strongest in supporting an association between exposure to $PM_{2.5}$ and adverse health effects observed in the key epidemiologic studies available in this reconsideration, would be expected to shift the distribution of $PM_{2.5}$ exposure concentrations in an area such that the area's highest monitor would generally be at or below 9.0 μg/m³ annually, and most of the resulting $PM_{2.5}$ concentrations across the area would be even lower. In considering these air quality relationships, the Administrator judges that a revised annual standard level of 9.0 μg/m³ would provide requisite protection with adequate margin of safety, for all populations, including those most at-risk.

In reaching this conclusion, the Administrator recognizes that in establishing primary standards under the Act that are requisite to protect public health with an adequate margin of safety, he is seeking to establish standards that are neither more nor less stringent than necessary for this purpose. The Act does not require that primary standards be set at a zero-risk level or to protect the most sensitive individual, but rather at a level that avoids unacceptable risks to public health. In this context, the Administrator's conclusion is that revised primary annual standard, in conjunction with the 24-hour standard, provides the appropriate degree of protection, and that more or less stringent standards would not be requisite.

In considering the requirement for an adequate margin of safety, the Administrator notes that the determination of what constitutes an adequate margin of safety is expressly left to the judgment of the EPA Administrator. *See Lead Industries Association* v. *EPA,* 647 F.2d at 1161–62; *Mississippi,* 744 F.3d at 1353. He further notes that in evaluating how particular standards address the requirement to provide an adequate margin of safety, it is appropriate to consider such factors as the nature and severity of the health effects, the size of sensitive population(s) at risk, and the kind and degree of the uncertainties present. Consistent with past practice and long-standing judicial precedent, and as described in this section, the Administrator takes the need for an adequate margin of safety into account as an integral part of his decision making on a standard. *See, e.g., NRDC* v. *EPA,* 902 F. 2d 962, 973–74 (D.C. Cir. 1990).

Given all of the evidence and information discussed above, the Administrator judges that a standard with a level of 9.0 μg/m³ is requisite to protect public health with an adequate margin of safety. In so doing, he first recognizes that a less stringent standard would allow the occurrence of higher long- and short-term $PM_{2.5}$ concentrations at a level at or above the mean $PM_{2.5}$ concentrations in key U.S. epidemiologic studies. That is, a less stringent standard would be expected to allow more $PM_{2.5}$ exposures at concentrations at or above which the key U.S. epidemiologic studies have reported associations between mean $PM_{2.5}$ concentrations and serious health effects and would deviate from some past approaches for selecting the appropriate level of the annual standard. A less stringent standard would also not provide requisite protection with an adequate margin of safety against $PM_{2.5}$ exposures in the lower percentiles of the air quality distribution (*i.e.,* 25th percentile) for which associations with health effects have been observed in a limited number of epidemiologic studies. Furthermore, the Administrator notes that the primary annual and 24-hour $PM_{2.5}$ standards, together, are intended to provide public health protection against the full distribution of long- and short-term $PM_{2.5}$ exposures. As noted above, the Administrator recognizes that the changes in $PM_{2.5}$ air quality designed to meet a less stringent annual standard would likely result in higher exposures across the distribution of air quality, including both higher average (or typical) concentrations as well as higher short-term peak $PM_{2.5}$ concentrations. Taking into consideration both the full evidence base for associations of $PM_{2.5}$ with mortality and other adverse health effects, including the reported mean $PM_{2.5}$ concentrations from key long- and short-term U.S. epidemiologic studies, information from epidemiologic studies that report 25th percentile $PM_{2.5}$ concentrations, supplemental information from other epidemiologic studies (*i.e.,* epidemiologic studies that use restricted analyses, accountability studies, and Canadian epidemiologic studies), and the results of the risk assessment, as well as the advice from the CASAC and public comments, the Administrator concludes that a less stringent standard would allow risks of mortality and other adverse health effects that are too great, and thus would not provide sufficient protection for public health as required by the CAA.

Additionally, in considering a less stringent standard, the Administrator recognizes that through its control of long- and short-term $PM_{2.5}$ concentrations, the annual standard provides a margin of safety for less well-studied exposure levels and population groups for which the evidence is limited or lacking. In so doing, he recognizes that our understanding of the relationships between the presence of a pollutant in ambient air and associated health effects is based on a broad body of information encompassing not only more established aspects of the evidence, such as the conclusion that long- and short-term exposures to $PM_{2.5}$ are causally related to mortality and cardiovascular effects and likely to be causally related to respiratory effects, but also aspects with which there may be substantial uncertainty. In particular, the Administrator notes that there are other categories of effects with causality determinations that are suggestive of, but not sufficient to infer, a causal

relationship between $PM_{2.5}$ exposure and health outcomes. These include, but are not limited t,o short-term exposure and nervous system effects, as well as long- and short-term exposure and pregnancy and birth outcomes, where the evidence is less certain but which represent potentially substantial additional risk to public health from exposure to $PM_{2.5}$. He recognizes the CAA requirement that requires primary standards to provide an adequate margin of safety was intended to address uncertainties associated with inconclusive scientific and technical information as well as to provide a reasonable degree of protection against hazards that research has not yet identified and in his judgment, the primary NAAQS must be set at a level that is adequately protective against these and other effects which research has not yet identified. Thus, even if the Administrator had somewhat greater concerns about the possibility of confounding, error and bias in the epidemiologic studies, which reduced his confidence in finding that $PM_{2.5}$ is causally related to mortality and cardiovascular effects, he would still find it appropriate to set the primary NAAQS below the means of key U.S. epidemiologic studies given the strength of the evidence providing support for the association, as well as additional evidence linking $PM_{2.5}$ to other endpoints of substantial public health concern, and the need to protect public health with an adequate margin of safety. In considering the uncertainties in both the epidemiologic evidence and the controlled human exposures studies, the Administrator recognizes that collectively, the health effects evidence generally reflects a continuum, consisting of levels at which scientists generally agree that health effects are likely to occur, through lower levels at which the likelihood and magnitude of the response become increasingly uncertain. In light of these uncertainties, the Administrator recognizes that the CAA requirement that primary standards provide an adequate margin of safety, as summarized in section I.A above, is intended to address uncertainties associated with inconclusive scientific and technical information, as well as to provide a reasonable degree of protection against hazards that research has not yet identified. The Administrator has taken the need to provide for an adequate margin of safety into account as an integral part of his decision-making on the appropriate standards in setting the standard at a level below the level where available epidemiologic studies, which include diverse populations that are broadly representative of the U.S. population including at-risk populations, have provided the strongest evidence supporting effects, and in other ways as well. For example, consideration of a margin of safety is reflected in the approach of setting the level of the annual standard near and somewhat below the 25th percentile $PM_{2.5}$ concentrations from key U.S. epidemiologic studies (*i.e.,* 9.1 $\mu g/m^3$), as well as recognition that attaining a design value will generally result in significantly broader and greater improvements of air quality across an area (including but certainly not limited to areas near the design value monitor) (U.S. EPA, 2022a, sections 2.3.3.2.4 and 3.3.3.2.1, Table 3–5). Based on all of the considerations noted here, and considering the current body of evidence, including the associated limitations and uncertainties, in combination with the exposure/risk information, the Administrator concludes that a less stringent standard than the current standard would not provide the requisite protection of public health, including an adequate margin of safety.

Having concluded that a less stringent standard would not provide the requisite protection of public health, the Administrator next considers whether a more stringent standard would be appropriate. In so doing, he notes that a decision to set the level of the annual standard to below 9.0 $\mu g/m^3$ would place a large amount of the emphasis on potential public health importance of further reducing the occurrence of $PM_{2.5}$ concentrations of concern, though the exposures about which he is most concerned are well controlled with an annual standard level of 9.0 $\mu g/m^3$, as demonstrated by the quantitative risk assessment. Such a decision would also place greater weight on (1) further reducing ambient $PM_{2.5}$ concentrations relative to those observed in long-and short-term epidemiologic studies, including those that he had judged to have significant uncertainties, including Canadian studies, studies using restricted analyses, and accountability studies; (2) shifting the air quality distribution in areas such that the highest exposure concentrations are reduced to below $PM_{2.5}$ concentrations observed in epidemiologic studies to be in the 25th or lower percentile, for which the evidence is limited; and (3) further shifting exposure concentrations to those shown at the lower end of the distribution in the quantitative risk assessment, despite the important uncertainties in the overall risk assessment. As discussed in this section and in responses to significant comments above and in the Response to Comments document, the Administrator has concluded that placing a large emphasis on these factors and revising the standard to a level below 9.0 $\mu g/m^3$ would result in a standard that is more stringent than the evidence indicates to be sufficient to protect public health with an adequate margin of safety. Compared to a primary annual $PM_{2.5}$ standard set at a level of 9.0 $\mu g/m^3$, the Administrator concludes that the extent to which lower standard levels could result in further public health improvements becomes notably less certain.

Thus, having carefully considered the scientific evidence, quantitative information, CASAC advice, and public comments relevant to his decision on the level of the primary annual $PM_{2.5}$ standard, as discussed above and in the Response to Comments document, the Administrator is revising the level of the primary annual $PM_{2.5}$ standard to 9.0 $\mu g/m^3$. In the Administrator's judgment, based on the currently available evidence and information, an annual standard set at this level and using the specified indicator, averaging time, and form, in conjunction with the other primary PM standards, would be requisite to protect public health with an adequate margin of safety. The Administrator judges that such a standard would protect, with an adequate margin of safety, the health of at-risk populations, including children, older adults, those with pre-existing cardiovascular and respiratory diseases, minority populations, and low SES populations. The Administrator believes that a standard set at 9.0 $\mu g/m^3$ would be sufficient to protect public health with a margin of safety, and believes that a lower standard would be more than what is necessary to provide this degree of protection. This judgment by the Administrator appropriately considers the degree of protection that is neither more nor less stringent than necessary for this purpose and recognizes that the CAA does not require that primary standards be set at a zero-risk level, but rather at a level that reduces risk sufficiently so as to protect public health with an adequate margin of safety.

In reaching his conclusions on adequacy of the current suite of primary $PM_{2.5}$ standards, based on consideration of the available scientific evidence and quantitative information, the CASAC's advice and public comments, the Administrator finds that the available information is insufficient to call into question the adequacy of the public

health protection afforded by the current primary 24-hour $PM_{2.5}$ standard. As described earlier in this section, the Administrator concludes that it is appropriate to retain the current indicator ($PM_{2.5}$), averaging time (24-hour), and form (98th percentile, averaged over three years) for the primary 24-hour $PM_{2.5}$ standard and below explains the basis for his final decision that is also appropriate to retain the current level of the primary 24-hour $PM_{2.5}$ standard.

In reaching his conclusion to retain the current primary 24-hour $PM_{2.5}$ standard the Administrator does so in light of the conclusion that the epidemiologic evidence supports associations between short- and long-term $PM_{2.5}$ exposures and adverse health effects, but that the epidemiologic evidence does not identify specific concentrations at which those effects occur and the Administrator has greatest confidence in effects where the bulk of the data is reported (*i.e.,* the mean $PM_{2.5}$ concentration, with some consideration for the 25th percentile of the air quality distribution). Thus, in considering the epidemiologic evidence, the Administrator concludes it is appropriate to focus on setting a generally controlling annual standard as the most effective and efficient way to reduce total population risk associated with both long- and short-term $PM_{2.5}$ exposures, and that it is appropriate to revise the level of the annual standard level to 9.0 $\mu g/m^3$. In addition to the epidemiologic evidence, the Administrator also considers the available controlled human exposure studies, which provide evidence for health effects following single, short-term $PM_{2.5}$ exposures to concentrations that typically correspond to upper end of the $PM_{2.5}$ air quality distribution in the U.S. (*i.e.,* ''peak'' concentrations). In so doing, the Administrator notes that these studies report statistically significant effects on one or more indicators of cardiovascular function following 2-hour exposures to $PM_{2.5}$ concentrations at and above 120 $\mu g/m^3$ and at and above 149 $\mu g/m^3$ for vascular impairment, the effect shown to be most consistent across studies. In particular, the Administrator notes that a single study is assessed in the ISA Supplement that reports effects following 4-hour exposures at 37.8 $\mu g/m^3$, although the results of this study are inconsistent with the results of the controlled human exposure studies assessed in the 2019 ISA. Along with the inconsistent results from the controlled human exposure studies, the Administrator also recognizes that effects observed in these studies are intermediate effects which are not typically considered adverse and that the study participants were healthy individuals. Taking into consideration the available scientific evidence, including the uncertainties and limitations, along with the CASAC's advice, the Administrator concludes that it is appropriate to maintain a primary 24-hour $PM_{2.5}$ standard to protect against peak exposures.

Thus, the Administrator considers what primary 24-hour $PM_{2.5}$ standard is requisite to provide supplemental protection against peak exposures. While having confidence that the revised annual standard will result in lowering risk associated with both long- and short-term $PM_{2.5}$ exposure by lowering the overall air quality distribution, as in the 2012 review, the Administrator recognizes that an annual standard alone would not be expected to offer sufficient protection with an adequate margin of safety against the effects of short-term $PM_{2.5}$ exposures in all parts of the country. Therefore, he continues to conclude that it is appropriate to continue to provide supplemental protection by means of a 24-hour standard, in conjunction with a revised annual standard level of 9.0 $\mu g/m^3$.

In considering the available scientific evidence assessed in the 2019 ISA and ISA Supplement, the Administrator first considers the controlled human exposure studies for informing his decisions on the primary 24-hour $PM_{2.5}$ standard. In so doing, he notes that in their review of the 2021 draft PA, the majority of CASAC members expressed the view that controlled human exposure studies are not the best evidence to use for justifying retaining the 24-hour standard without revision, in part because these studies preferentially recruit less susceptible individuals and have a typical exposure duration much shorter than 24 hours. Thus, in the view of the majority, ''the evidence of effects from controlled human exposure studies with exposures close to the current 24-hour standard supports epidemiological evidence for lowering the standard'' (Sheppard, 2022a, p. 3–4 of consensus letter). In reviewing the controlled human exposure studies, the Administrator agrees with the majority of CASAC that these controlled human exposure studies generally do not include populations with substantially increased risk from exposure to $PM_{2.5}$, such as children, older adults, or those with more severe underlying illness. However, he disagrees with any conclusion that they should not be used to inform a decision about the adequacy of the current standard. The Administrator finds the information available from these studies to be useful, noting that the recently available controlled human exposure studies provide evidence for health effects following single, short-term exposures to $PM_{2.5}$ concentrations that are greater than those allowed under the current standard. The results of the controlled human exposure studies are inconsistent, particularly at lower $PM_{2.5}$ concentrations, but some studies do report statistically significant effects on one or more indicators of cardiovascular function following 2-hour exposures to $PM_{2.5}$ concentrations at and above 120 $\mu g/m^3$ (and at and above 149 $\mu g/m^3$ for vascular impairment, the effect shown to be most consistent across studies). Additionally, one controlled human exposure study assessed in the ISA Supplement reports evidence of some effects for cardiovascular markers following 4-hour exposures to 37.8 $\mu g/m^3$ (Wyatt et al., 2020). However, there is inconsistent evidence for inflammation in other controlled human exposure studies evaluated in the 2019 ISA. The Administrator finds these studies are important in establishing biological plausibility for $PM_{2.5}$ exposures causing more serious health effects, such as those seen in short-term exposure epidemiologic studies, and they provide support that more adverse effects may be experienced following longer exposure durations and/or exposure to higher concentrations. As described in more detail in responding to public comments in section II.B.3 above, he notes that although the controlled human exposure studies do not provide a threshold below which no effects occur, the observed effects in these controlled human exposures studies are ones that signal an intermediate effect in the body, likely due to short-term exposure to $PM_{2.5}$, and typically would not, by themselves, be judged as adverse. As noted in sections II.A.2 and II.B.3 above, associated judgments regarding adversity or health significance of measurable physiological responses to air pollutants in previous NAAQS reviews have been informed by guidance, criteria or interpretative statements developed within the public health community. This type of information on adversity of effects is particularly informative to the Administrator's judgments regarding the adversity of the effects observed in the controlled human exposure studies which are short-term in nature (*i.e.,* generally ranging from 2- to 5-hours), including those studies that are

conducted at near-ambient $PM_{2.5}$ concentrations. Based on the observation that the effects observed in Wyatt et al. (2020) are not by themselves adverse, and the fact that the findings of this study are inconsistent with other currently available evidence regarding the level at which effects are observed, the Administrator disagrees with the view expressed by the majority of CASAC that this study supports epidemiologic evidence for lowering the 24-hour standard.

Consistent with his approach in reaching his proposed decision and taking into consideration these points as well as balancing these limitations (*i.e.,* that the health outcomes observed in these controlled human exposure studies are not clearly adverse and that the studies generally do not include those at increased risk from $PM_{2.5}$ exposure), the Administrator still considers it appropriate to ensure that the 24-hour $PM_{2.5}$ standard provides protection against health effects consistently observed in the controlled human exposure studies. He next examines the air quality analyses, described in more detail in section II.A.c.i above, to assess whether during recent air quality conditions, areas meeting the current standards would experience $PM_{2.5}$ concentrations reported in these controlled human exposure studies. He observes that air quality analyses demonstrate that the $PM_{2.5}$ exposures shown to cause consistent effects in the controlled human exposure studies are well above the ambient concentrations typically measured in locations meeting the current primary standards, and therefore suggest that the current primary $PM_{2.5}$ standards provide protection against these ''peak'' concentrations. In fact, at air quality monitoring sites meeting the current primary $PM_{2.5}$ standards (*i.e.,* the 24-hour standard of 35 $\mu g/m^3$ and the annual standard of 12 $\mu g/m^3$), the 2-hour concentrations generally remain below 10 $\mu g/m^3$, and rarely exceed 30 $\mu g/m^3$. Though two-hour concentrations are higher at monitoring sites violating the current standards, they generally remain below 16 $\mu g/m^3$ and rarely exceed 80 $\mu g/m^3$, still below concentrations in CHE studies where consistent effects are observed (*e.g.,* greater than 120 $\mu g/m^3$) (U.S. EPA, 2022b, section 2.3.2.2.3, Figure 2–19, and section 3.3.3.1). Additionally, and in response to public comments, the Administrator notes additional air quality analyses conducted by the EPA,[121] that provide a more refined analysis of whether areas that meet the current standards experience peak concentrations reported in controlled human exposure studies. He notes that 2-hour observations greater than 120 $\mu g/m^3$ and 4-hour observations greater than 38 $\mu g/m^3$ rarely occur (*e.g.,* 0.025% of rolling 2-hour observations are greater than 120 $\mu g/m^3$ and 0.78% of rolling 4-hour observations greater than 38 $\mu g/m^3$). Based on this information, the Administrator finds that the current suite of standards maintains subdaily concentrations of $PM_{2.5}$ in ambient air far below the exposure concentrations in controlled human exposure studies where consistent effects have been observed, and notes that while these studies generally do not include the most at-risk individuals, the exposure concentrations in these studies also do not elicit adverse effects.

Further, in light of the Administrator's emphasis on the annual standard as the controlling standard, with the 24-hour standard providing supplemental protection against peak concentrations, he next considers the potential impact of a revised annual standard of 9.0 $\mu g/m^3$ on the occurrence of peak sub-daily $PM_{2.5}$ concentrations. Specifically, the Administrator takes note of the new air quality analyses [122] where he observes that lower percentages of concentrations greater than 120 $\mu g/m^3$ and 38 $\mu g/m^3$ occur in areas meeting an annual standard of 9.0 $\mu g/m^3$ and a 24-hour standard of 35 $\mu g/m^3$, versus an annual standard of 12.0 $\mu g/m^3$ and a 24-hour standard of 35 $\mu g/m^3$. Thus, he concludes that an annual standard that is controlling across most areas of the country will continue to effectively limit peak daily concentrations in conjunction with the existing 24-hour standard, with its level of 35 $\mu g/m^3$ and 98th percentile form, which continues to provide supplemental protection against peak concentrations.

In addition, the Administrator also notes that the majority of the CASAC in their review of the 2021 draft PA, as well as a number of public commenters, support their recommendation to revise the current 24-hour standard by pointing to ''substantial epidemiologic evidence from both morbidity and mortality studies'' which ''includes three U.S. air pollution studies with analyses restricted to 24-hour concentrations below 25 $\mu g/m^3$'' (Sheppard, 2022a, p. 17 consensus responses). The Administrator notes that the epidemiologic evidence available in this reconsideration, including the studies that restrict short-term $PM_{2.5}$ exposures (*i.e.,* 24-hour $PM_{2.5}$ concentrations) to levels below 25 $\mu g/m^3$, provides support for positive and statistically significant associations between short-term exposure to $PM_{2.5}$ and all-cause mortality (Di et al., 2017a) and CVD hospital admissions (deSouza et al., 2021; Di et al., 2017a). He agrees that these studies help to provide additional support for reaching conclusions on causality in the 2019 ISA. He further agrees that the available epidemiologic studies provide important information that it is appropriate to consider in this reconsideration, including information on associations between health effects and $PM_{2.5}$ exposures in diverse populations that are broadly representative of the U.S. population, and include populations identified as at-risk (*e.g.,* older adults, minority populations), as well as evidence of linear, no-threshold concentration-response relationships in those associations, although with less certainty in the shape of the curve at long-term average concentrations below about 8 $\mu g/m^3$.

However, the Administrator also notes significant limitations in the currently available epidemiologic information that limit his ability to draw conclusions from the key short-term studies, including those that employ restricted analyses, to inform his decision regarding the level of the 24-hour $PM_{2.5}$ standard. As a result of these limitations, the Administrator does not find that the short-term epidemiologic studies, or the other evidence such as the controlled human exposure studies or the risk assessment, provide a sufficient justification for revising the 24-hour standard.

First, he notes that short-term epidemiologic studies examine associations between day-to-day variations in $PM_{2.5}$ concentrations and health outcomes, often over multi-year study periods. As such, these studies report long-term mean 24-hour $PM_{2.5}$ concentrations (*e.g.,* mean 24-hour $PM_{2.5}$ concentrations over multi-year study periods), rather than at specific points in the distribution (*i.e.,* 90th or 98th percentile 24-hour concentrations) at which effects occur. Further, he notes

[121] Jones et al. (2023). Comparison of Occurrence of Scientifically Relevant Air Quality Observations Between Design Value Groups. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

[122] Jones et al. (2023). Comparison of Occurrence of Scientifically Relevant Air Quality Observations Between Design Value Groups. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

that while there can be considerable variability in daily exposures over a multi-year study period, the bulk of the observations reflect days with ambient $PM_{2.5}$ concentrations in the middle of the air quality distribution (*i.e.,* ''typical'' days rather than days with extremely low or extremely high concentrations). As a result, the results of these studies are more directly applicable to decisions regarding the annual standard (which is based on the long-term mean of both short- and long-term epidemiologic studies), and the fact that they do not report other air quality statistics, such as the 98th percentile concentrations which might be more directly compared to the level of the 24-hour standard, makes them less useful for informing decisions on the 24-hour standard. As discussed in responding to comments above, the form of the annual standard is based on the annual mean $PM_{2.5}$ concentration averaged over three years,[123] which makes it better suited as a basis for controlling air quality to avoid effects observed in both long-term and short-term epidemiologic studies. By contrast, the form of the 24-hour standard is the 98th percentile averaged over three years, which makes it appropriate for controlling short-term peak concentrations. However, based on the available air quality information, including distribution statistics of $PM_{2.5}$ concentrations and health events reported in the short-term epidemiologic studies, these studies are too limited in their ability to identify health effects attributable to specific short-term peak concentrations that are necessary to evaluate whether the 24-hour standard with its 98th percentile form should be revised (*e.g.,* restricted epidemiologic studies do not report the number or the percentile of health events or the percentile of $PM_{2.5}$ concentrations across the highest part of the restricted air quality distribution, including the 98th percentile). Thus, the Administrator does not consider it appropriate to use the reported means from short-term studies to determine the appropriate level for a 24-hour standard with a 98th percentile form.

Similarly, the Administrator does not consider the results of the restricted analyses to be well suited to informing the choice of level for a 24-hour standard. Restricted analyses use a subset of data from their main analyses to evaluate health events that occur at concentrations below a certain concentration (*e.g.,* 25 $\mu g/m^3$). The Administrator notes that the associations between the health effects (*e.g.,* mortality and cardiovascular morbidity) and $PM_{2.5}$ concentrations remain even after excluding higher concentrations in the restricted analyses, and he also recognizes that the magnitude of the effect is generally greater in the restricted analyses compared to the associations reported in the main analysis. He considers such analyses to be informative in indicating that the health effects association reported in the main (unrestricted) analysis are not driven only by the upper peaks of the $PM_{2.5}$ air quality distribution, but rather persist at lower portions of the distribution (consistent with his emphasis on the annual standard, which is focused on exposures near the mean concentration, where the bulk of the exposure distribution is concentrated). Indeed, he notes that if peak concentrations were the principal driver of health effects associated with $PM_{2.5}$ exposure, one might expect the associations to become weaker as the upper portion of the data is excluded in the restricted analyses, which is not what is reported by the analyses (*e.g.,* the restricted analyses generally report associations that are greater in magnitude compared to the main analyses). However, he disagrees with the assertion by the CASAC in their review of the 2021 draft PA and some public commenters that it would be appropriate to focus on the specific $PM_{2.5}$ concentration (*e.g.,* 25 or 30 $\mu g/m^3$) at which the analysis was restricted as the basis for choosing a 24-hour standard level. The Administrator recognizes that in restricted analyses, while an association continues to persist across the full range of the air quality distribution, and that the cutpoint concentration at which the analysis was restricted (*e.g.,* 25 or 30 $\mu g/m^3$) becomes the maximum $PM_{2.5}$ concentration in the distribution, he also notes that these studies do not provide information related to the distribution of health events and $PM_{2.5}$ concentrations, and as such, he is more uncertain where the bulk of the data are and where he has confidence in the reported association.[124] He notes that no evidence exists to support a conclusion that the $PM_{2.5}$ concentration chosen as the cutpoint in a restricted analysis has any bearing on the concentration at which effects are likely to occur (or not occur). He notes that, as with long-term studies, the evidence does not suggest there is a specific point in the air quality distribution of these short-term studies that represents a ''bright line'' at and above which effects have been observed and below which effects have not been observed. In order to identify a level of the 24-hour standard based on associations between the ''upper end'' of exposures, either in the unrestricted or the restricted analyses, and adverse health effects, it would be necessary to have a better understanding of how specific 24-hour concentrations correspond to the frequency and total number of observed health events in the study. Currently, such information, including 98th percentile statistics, are not reported in the key short-term epidemiologic studies (and if they were reported, the Administrator would have to carefully consider how to weigh the data). As such, in reaching his decision on the primary 24-hour $PM_{2.5}$ standard, the Administrator judges that the currently available information from short-term epidemiologic studies, including those that employ restricted analyses, does not provide a sufficient basis to revise the current 24-hour standard, given that the 24-hour standard focuses on reducing ''peak'' exposures (with its 98th percentile form), but rather that such information supports his judgment that it is appropriate to focus on revising the annual standard for purposes of reducing all exposures, across the entire distribution of air quality, to increase public health protection.

In reaching final decisions regarding the adequacy of the primary 24-hour $PM_{2.5}$ standard, the Administrator continues to view an approach that focuses on setting a generally controlling annual standard as the most effective and efficient way to reduce total population risk associated with both long- and short-term $PM_{2.5}$ exposures. Additionally, he emphasizes that improvements in air quality associated with meeting an annual standard level of 9.0 $\mu g/m^3$ will result in lowering risk associated with both long- and short-term $PM_{2.5}$ exposure by lowering the overall air quality distribution. The Administrator concludes that reducing the annual standard is the most efficient way to reduce the risks from short-term exposures identified in the epidemiologic studies, as the available evidence suggests the bulk of the risk comes from the large number of days across the bulk of the air quality distribution, not the relatively small number of days with peak concentrations. However, as in the 2012

[123] The annual mean is calculated by averaging daily values in a calendar quarter and then averaging calendar quarters. See 40 CFR part 50 Appendix N, section 4.4.

[124] These studies do not report information about the distribution of the health events and $PM_{2.5}$ concentrations (*e.g.,* means, medians, other percentiles) in the restricted analyses.

review, the Administrator recognizes that an annual standard alone would not be expected to offer sufficient protection with an adequate margin of safety against the effects of short-term $PM_{2.5}$ exposures in all parts of the country and concludes that, in conjunction with a revised annual standard level of 9.0 μg/m³, it is appropriate to continue to provide supplemental protection by means of a 24-hour standard, particularly for areas with high peak-to-mean ratios possibly associated with strong local or seasonal sources.

In selecting the level of a 24-hour standard designed to provide supplemental protection against peak exposures (in conjunction with a revised annual standard of 9.0 μg/m³), the Administrator considers the information from the controlled human exposure studies and the EPA's analysis of peak concentrations observed in areas meeting the current standard of 35 μg/m³ in conjunction with a revised standard of 9.0 μg/m³ to be of particular relevance. He notes the controlled human exposure evidence includes studies reporting effects on one or more indicators of cardiovascular function following 2-hour exposures at and above 120 μg/m³, including effects reported at and above 149 μg/m³ for vascular impairment, the effect shown to be most consistent across studies, and less consistent effects at lower concentrations, including a single study at near ambient concentrations (Wyatt et al., 2020) reporting effects following 4-hour exposures at 37.8 μg/m³. He recognizes that the effects observed (in those studies that observed effects) are ones that signal an intermediate effect in the body, likely due to short-term exposure to $PM_{2.5}$, and typically would not, by themselves, be judged as adverse, and the study participants were healthy individuals.

He notes in particular that, in the EPA's analysis, in areas meeting the current 24-hour standard and the revised annual standard 0.029 percent of 2-hour observations and 0.41 percent of 4-hour observations reach $PM_{2.5}$ concentrations higher than 120 μg/m³ and 37.8 μg/m³, respectively. He also notes the lack of evidence of effects from controlled human exposure studies at levels below the current 24-hour standard and the fact that the results of Wyatt et al. (2020) are inconsistent with other available studies, as well as the intermediate nature of effects observed in this study. In his judgment, the small number of occurrences of peak exposures indicate that, in conjunction with a revised annual standard of 9.0 μg/m³, the current 24-hour standard of 35 μg/m³ remains requisite to protect public health with an adequate margin of safety, and that there is substantial basis to doubt whether further improvements in public health would be achieved by further reducing these exposures. Furthermore, the Administrator concludes that due to the limitations and uncertainties outlined above, the information from recent short-term epidemiologic studies, including those that use restricted analyses, is inadequate to inform decisions regarding the adequacy of the current 24-hour standard. Thus, in reaching his decision on the primary 24-hour $PM_{2.5}$ standard, the Administrator concludes that currently available evidence does not call into question the adequacy of the current standard.

In addition to the scientific evidence, the Administrator also considers the risk assessment in evaluating the appropriate level of the 24-hour $PM_{2.5}$ standard. The risk assessment indicates that the annual standard is the controlling standard across most of the urban study areas evaluated (*i.e.,* when air quality related to the annual average $PM_{2.5}$ concentrations decrease, daily average $PM_{2.5}$ concentrations are also expected to decrease). When air quality is adjusted to just meet an alternative 24-hour standard level of 30 μg/m³ in the areas where the 24-hour standard is controlling, the risk assessment estimates reductions in $PM_{2.5}$-associated risks across a more limited population and number of areas compared to when air quality is adjusted to simulate alternative levels for the annual standard (*i.e.,* where the annual standard is controlling), and these predictions are largely confined to areas located in the western U.S., several of which are also likely to experience risk reductions upon meeting a revised annual standard. With respect to the CASAC's advice in their review of the 2021 draft PA, the Administrator notes that the minority of CASAC advised that these results suggest that the annual standard can be used to limit both long- and short-term $PM_{2.5}$ concentrations and views these risk assessment results as supporting the conclusion that the current 24-hour standard is adequate (Sheppard, 2022a, p. 4 of consensus letter). In contrast, the majority of CASAC members in their review of the 2021 draft PA, as well as a number of public commenters that support revision of the 24-hour standard, placed greater weight on the evidence-based considerations (*e.g.* scientific evidence, like the restricted analyses) than on the values estimated by the risk assessment, noting the potential for uncertainties in how the risk assessment was able to ''capture areas with wintertime stagnation and residential wood-burning where the annual standard is less likely to be protective'' (Sheppard, 2022a, p. 4 of consensus letter).

In considering the application of the risk assessment to judgments about the adequacy of the current primary 24-hour $PM_{2.5}$ standard, the Administrator again notes that the risk assessment analyses of $PM_{2.5}$-attributable mortality use input data that include C–R functions from epidemiologic studies that have no threshold and a linear C–R relationship down to zero, as well an air quality adjustment approach that incorporates proportional decreases in $PM_{2.5}$ concentrations to meet lower standard levels. As such, the Administrator notes that this quantitative approach does not incorporate any elements of uncertainty in associations of health effects at lower concentrations and that simulated air quality improvements will always lead to proportional decreases in risk (*i.e.,* each additional μg/m³ reduction produces additional benefits with no clear stopping point at any $PM_{2.5}$ concentration). Therefore, the Administrator recognizes that while the risk estimates can help to place the evidence for specific health effects into a broader public health context, the results should be considered along with the inherent uncertainties and limitations of such analyses when informing judgments about the potential for additional public health protection associated with $PM_{2.5}$ exposure and related health effects. Further, the Administrator notes additionally that air quality analyses have also been considered in looking at the adequacy of the 24-hour standard in controlling peak $PM_{2.5}$ concentrations of potential concern,[125] and that those analyses included monitoring information from across the entire U.S., specifically highlighting areas with higher peak concentrations and including areas impacted by wintertime stagnation and residential wood-burning. Thus, while the risk assessment may have focused on a subset of areas across the U.S. based on the study area selection criteria, the Administrator is considering a broader set of information in reaching his conclusions regarding the appropriateness of the current 24-

[125] Jones et al. (2023). Comparison of Occurrence of Scientifically Relevant Air Quality Observations Between Design Value Groups. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

hour standard to control peak concentrations.

The Administrator also considers the advice from the CASAC in their reviews of the 2019 draft PA and 2021 draft PA. In their review of the 2019 draft PA, the CASAC ''agrees with the EPA and finds that the available evidence does not call into question the adequacy of public health protection afforded by the current 24-hour $PM_{2.5}$ standard and concurs that it be retained'' (Cox, 2019b, p. 3 of letter). He also notes that in their review of the 2021 draft PA, the CASAC did not reach consensus on whether the current 24-hour standard is adequate, with the majority of the CASAC recommending that the 24-hour standard be revised and the minority of the CASAC recommending that the standard be retained. The majority of the CASAC members further stated that ''[t]here is also less confidence that the annual standard could adequately protect against health effects of short-term exposures. A range of 25–30 $\mu g/m^3$ for the 24-hour $PM_{2.5}$ standard would be adequately protective'' (Sheppard, 2022a, p. 4 of consensus letter). The Administrator also acknowledges that some public commenters agreed with the majority of the CASAC in supporting a revision to the level of the 24-hour standard to a range between 25–30 $\mu g/m^3$. These commenters cite a number of reasons, including: (1) Results from controlled human exposure studies at near ambient concentrations; (2) aspects of the scientific evidence, including restricted analyses that report positive and significant associations below 35 $\mu g/m^3$; and (3) quantitative risk analyses that show decreasing risk with decreasing $PM_{2.5}$ concentrations. In responding to these comments, the Administrator recognizes that some commenters have different interpretations of the evidence, air quality information, and quantitative results from the risk assessment in this review and would make different judgments about the weight to place on the relative strength and limitations of the currently available scientific evidence and information and how such information could be used in making public health policy decisions on the 24-hour standard. However, as outlined above, the Administrator has carefully considered the information available from controlled human exposure studies and short-term epidemiologic studies, and weighed the strengths and limitations of this evidence in formulating his decisions. Furthermore, as discussed above the Administrator has noted significant uncertainties and limitations inherent in the risk estimates, as well as noting that very few areas were included. In addition, he has given careful consideration to the majority of the CASAC's advice in their review of the 2021 draft PA, but has drawn different conclusions with respect to how currently available evidence and air quality information inform the selection of level for the 24-hour primary $PM_{2.5}$ standard.

In considering the advice of the majority of CASAC, the Administrator notes that a decision to set the level of the 24-hour standard to below 35 $\mu g/m^3$ would place a large amount of emphasis on the potential public health importance of further reducing the occurrence of peak $PM_{2.5}$ concentrations. However, the Administrator concludes that there is insufficient basis to conclude that a more stringent standard to further reduce peak concentrations is needed or would benefit public health. As discussed above, he judges that the $PM_{2.5}$ exposures in controlled human exposure studies that correspond to peak concentrations will already be well controlled via the combination of the revised annual standard, with a level of 9.0 $\mu g/m^3$, and the 24-hour standard with its level 35 $\mu g/m^3$ and its 98th percentile form. Taking into consideration the inconsistent results reported in controlled human exposure studies, the intermediate nature of the health effects observed in the controlled human exposure studies that are not typically considered adverse, the health status of the study participants, and how infrequently peak concentrations of potential concern are anticipated to occur in areas meeting the revised primary annual $PM_{2.5}$ standard, he judges that the current 24-hour standard is requisite to protect against the effects reported in these studies with an adequate margin of safety. Likewise, he judges that neither the epidemiologic studies (including the studies that use restricted analyses) nor the risk assessment provide a sufficient basis for revising the 24-hour standard. As discussed above, the epidemiologic studies, including short-term studies and those with restricted analyses, are not well-suited for identifying a level for a 24-hour standard to address health effects associated with peak concentrations. The restricted analyses support the conclusion that the health effects associated with $PM_{2.5}$ is not associated primarily with exposure to higher concentrations of the main analyses, but like other epidemiologic studies they typically report only long-term mean 24-hour concentrations (*e.g.,* restricted epidemiologic studies do not report the number or the percentile of health events or the percentile of $PM_{2.5}$ concentrations across the highest part of the restricted air quality distribution, including the 98th percentile) and do not identify any particular concentration within the air quality distribution above which effects have been observed and below which effects have not been observed. Similarly, the risk assessment highlights that the annual standard is controlling across much of the U.S. and is generally more effective at reducing risk than the 24-hour standard and, taking into account the limitations and assumptions of the risk assessment discussed above, does not provide a basis for revising the 24-hour standard. For the reasons discussed herein, the Administrator judges that the uncertainties as to whether there would be public health benefits from a more stringent 24-hour standard are too great to justify revising the standard.

Thus, having carefully considered the scientific evidence, quantitative information, CASAC advice, and public comments, the Administrator is retaining the current primary 24-hour $PM_{2.5}$ standard, with its level of to 35 $\mu g/m^3$ and its 98th percentile form. In the Administrator's judgment, based on the currently available evidence and information, a 24-hour standard set at this level and using the specified indicator, averaging time, and form would be requisite to protect public health with an adequate margin of safety, in conjunction with the annual standard. As noted, in evaluating the adequacy of the current standards, the Administrator focuses on evaluating the public health protection afforded by the annual and 24-hour standards, taken together, against adverse health effects associated with long- or short-term $PM_{2.5}$ exposures. A 24-hour standard set at a level of 35 $\mu g/m^3$, in conjunction with a revised annual standard level of 9.0 $\mu g/m^3$, in the judgment of the Administrator, provides an appropriate level of public health protection, for both long- and short-term $PM_{2.5}$ exposures. The Administrator believes that a 24-hour standard set at 35 $\mu g/m^3$ would continue to be sufficient to protect public health with a margin of safety, and believes that a lower standard would be more than what is necessary to provide this degree of protection when considered in conjunction with a revised annual standard. The Administrator concludes the current 24-hour standard at a level of 35 $\mu g/m^3$, in conjunction with a revised annual standard level of 9.0 $\mu g/m^3$, will provide appropriate protection

in areas in which the long-term mean concentrations are already relatively low (*i.e.,* below 9 μg/m³) but where there may be elevated short-term peak $PM_{2.5}$ concentrations, often associated with strong local or seasonal sources. This judgment by the Administrator appropriately considers the degree of protection that is neither more nor less stringent than necessary for this purpose and recognizes that the CAA does not require that primary standards be set at a zero-risk level, but rather at a level that reduces risk sufficiently so as to protect public health with an adequate margin of safety.

In making this decision to retain the current level of the primary $PM_{2.5}$ 24-hour standard at 35 μg/m³ in conjunction with revising the annual standard level from 12.0 μg/m³ to 9.0 μg/m³, given all of the evidence and information discussed above, the Administrator judges that the revised suite of primary $PM_{2.5}$ standards and the rationale supporting these levels appropriately reflects consideration of the strength of the available evidence and other information and its associated uncertainties as well as the advice of CASAC and consideration of public comments. He additionally judges that this suite of primary $PM_{2.5}$ standards is requisite to protect public health, including at-risk populations, with an adequate margin of safety from effects associated with long and short-term exposures to fine particles. This judgment by the Administrator appropriately considers the requirement for standards that are requisite to protect public health but are neither more nor less stringent than necessary.

C. Decisions on the Primary $PM_{2.5}$ Standards

For the reasons discussed above, and taking into account the information and assessments presented in the 2019 ISA and ISA Supplement, the scientific and quantitative risk information in the 2022 PA, the advice and recommendations of the CASAC, and public comments, the Administrator revises the current suite of primary $PM_{2.5}$ standards. Specifically, the Administrator revises the level of the primary annual $PM_{2.5}$ standard to 9.0 μg/m³ while retaining its form, indicator and averaging time. In conjunction with revising the primary annual $PM_{2.5}$ standard level to provide protection from effects associated with long- and short-term $PM_{2.5}$ exposures, the Administrator retains the level of 35 μg/m³ and the 98th percentile form, indicator and averaging time of the primary 24-hour $PM_{2.5}$ standard to continue to provide supplemental protection for areas with high peak $PM_{2.5}$ concentrations. The Administrator concludes that this suite of standards is requisite to protect public health with an adequate margin of safety against health effects potentially associated with long- and short-term $PM_{2.5}$ exposures.

III. Rationale for Decisions on the Primary PM_{10} Standard

This section presents the rationale for the Administrator's decision to retain the existing primary PM_{10} standard. This decision is based on a thorough review of the latest scientific information, published through January 2018 [126] and evaluated in the 2019 ISA, on human health effects associated with $PM_{10–2.5}$ in ambient air. As described in section I above and in section 1.2 of the ISA Supplement, the scope of the updated scientific evaluation of the health effects evidence is based on those PM size fractions, exposure durations, and health effects category combinations where the 2019 ISA concluded a causal relationship exists (U.S. EPA, 2019a, U.S. EPA, 2022b).). Therefore, because the 2019 ISA did not conclude a causal relationship for $PM_{10–2.5}$ for any exposure durations or health effect categories, the ISA Supplement does not include an evaluation of additional studies for $PM_{10–2.5}$. As a result, the 2019 ISA continues to serve as the scientific foundation for assessing the adequacy of the primary PM_{10} standard in this reconsideration of the 2020 final decision (U.S. EPA, 2019a, section 1.7; U.S. EPA, 2022a). The Administrator's decision also takes into account the 2022 PA evaluation of the policy-relevant information in the 2019 ISA, CASAC advice and recommendations, and public comments.

In presenting the rationale for the Administrator's final decision and its foundations, Section III.A provides background on the 2020 final decision to retain the primary PM_{10} and a brief summary of key aspects of the currently available health effects information. Section III.B summarizes the CASAC advice and the Administrator's proposed conclusions to retain the existing primary PM_{10} standard, addresses public comments received on the proposal, and presents the Administrator's conclusions on the adequacy of the current standard, drawing on consideration of information in the 2019 ISA and the 2022 PA, advice from the CASAC, and comments from the public. Section III.C summarizes the Administrator's decision on the primary PM_{10} standard.

A. Introduction

The general approach for this reconsideration of the 2020 final decision on the primary PM_{10} standard relies on the scientific information available for this review, as well as the Administrator's judgments regarding the available public health effects evidence, and the appropriate degree of public health protection for the existing standards. With the 2020 decision, the then-Administrator retained the existing primary 24-hour PM_{10} standard, with its level of 150 μg/m³ and its one-expected-exceedance form on average over three years, to continue to provide public health protection against short-term exposures to $PM_{10–2.5}$ (85 FR 82725, December 18, 2020).

1. Background on the Current Standard

Consistent with the 2009 ISA, the 2019 ISA concluded that the available epidemiologic, controlled human exposure, and animal toxicological studies, including uncertainties, provided support for the causality determinations of ''suggestive of, but not sufficient to infer, a causal relationship'' between short-term exposures to $PM_{10–2.5}$ and cardiovascular effects, respiratory effects, and mortality (U.S. EPA, 2019a, section 1.4.2). The 2019 ISA also reached the conclusion that the evidence supports a ''suggestive of, but not sufficient to infer, a causal relationship'' between short-term $PM_{10–2.5}$ exposures and metabolic effects, an endpoint that was not evaluated in the 2009 ISA (U.S. EPA, 2019a, section 1.4.2).

Compared to the 2009 ISA, the 2019 ISA includes expanded evidence for the relationships between long-term exposures and cardiovascular effects, metabolic effects, nervous system effects, cancer, and mortality. The 2019 ISA concluded that the small number of epidemiologic and experimental studies, including uncertainties, contribute to the determination that, ''the evidence is suggestive of, but not sufficient to infer, a causal relationship between long-term $PM_{10–2.5}$ exposure and cardiovascular effects, metabolic effects, nervous system effects, cancer, and mortality and cancer (U.S. EPA, 2019a, p. 10–87). For long-term exposures and cardiovascular effects,

[126] In addition to the review's opening ''call for information'' (79 FR 71764, December 3, 2014), the 2019 ISA identified and evaluated studies and reports that have undergone scientific peer review and were published or accepted for publication between January 1, 2009, through approximately January 2018 (U.S. EPA, 2019a, p. ES–2). References cited in the 2019 ISA, the references considered for inclusion but not cited, and electronic links to bibliographic information and abstracts can be found at: *https://hero.epa.gov/hero/particulate-matter.*

cardiovascular effects, and cancer, this is an upgrade from the ''inadequate to infer the presence or absence of a causal relationship'' conclusions in the 2009 ISA (U.S. EPA, 2019a, section 1.4.2). This determination is also the first for long-term exposures and metabolic effects, as the 2009 ISA did not include metabolic effects as an endpoint (U.S. EPA, 2019a section 1.4.2).

In considering the available body of evidence, it was noted in the 2020 review there were considerable uncertainties and limitations associated with the experimental evidence for $PM_{2.5}$ exposures and health effects, and as such more weight was placed on the available epidemiologic evidence. Therefore, the primary focus in the 2020 review was on multi-city and single-city epidemiologic studies that evaluated associations between short-term $PM_{10–2.5}$ and mortality, cardiovascular effects (hospital admissions and emergency department visits, as well as blood pressure and hypertension), and respiratory effects. Despite differences in the approaches [127] used to estimate ambient $PM_{10–2.5}$ concentrations, the majority of the studies reported positive, though often not statistically significant, associations with short-term $PM_{10–2.5}$ exposures. Most $PM_{10–2.5}$ effect estimates remained positive in copollutant models that included either gaseous pollutants or other particulate matter size fractions (*e.g.,* $PM_{2.5}$). In U.S. study locations likely to have met the PM_{10} standard during the study period, a few studies reported positive associations between $PM_{10–2.5}$ and mortality that were statistically significant and remained so in copollutant models (U.S. EPA, 2019a). In addition to the epidemiologic studies, there were a small number of controlled human exposure studies evaluated in the 2019 ISA that reported alterations in heart rate variability or increased pulmonary inflammation following short-term exposure to $PM_{10–2.5}$, providing some support for the associations in the epidemiologic studies. Animal toxicological studies examined the effect of short-term $PM_{10–2.5}$ exposures using non-inhalation (*e.g.,* intratracheal instillation) route.[128] Therefore, these studies provided limited evidence for the biological plausibility of $PM_{10–2.5}$-induced effects (U.S. EPA, 2019a). Although the scientific evidence available in the 2019 ISA expanded the understanding of health effects associated with $PM_{10–2.5}$ exposures, a number of important uncertainties remained. These uncertainties, and their implications for interpreting the scientific evidence, include the following:

- The potential for confounding by copollutants, notably $PM_{2.5}$, was addressed with copollutant models in a relatively small number of $PM_{10–2.5}$ epidemiologic studies (U.S. EPA, 2019a). This was particularly important given the relatively small body of experimental evidence (*i.e.,* controlled human exposure and animal toxicological studies) available to support the independent effect of $PM_{10–2.5}$ on human health. This increases the uncertainty regarding the extent to which $PM_{10–2.5}$ itself, rather than one or more copollutants, is responsible for the mortality and morbidity effects reported in epidemiologic studies.
- There was greater spatial variability in $PM_{10–2.5}$ concentrations than $PM_{2.5}$ concentrations, resulting in the potential for increased exposure error for $PM_{10–2.5}$ (U.S. EPA, 2019a). Available measurements did not provide sufficient information to adequately characterize the spatial distribution of $PM_{10–2.5}$ concentrations (U.S. EPA, 2019a). The limitations in estimates of ambient $PM_{10–2.5}$ concentrations ''would tend to increase uncertainty and make it more difficult to detect effects of $PM_{10–2.5}$ in epidemiologic studies'' (U.S. EPA, 2019a).
- Estimation of $PM_{10–2.5}$ concentrations over which reported health outcomes occur remain highly uncertain. When compared with $PM_{2.5}$, there is uncertainty spanning all epidemiologic studies examining associations with $PM_{10–2.5}$ including deficiencies in the existing monitoring networks, the lack of a systematic evaluation of the various methods used to estimate $PM_{10–2.5}$ concentrations and the resulting uncertainty in the spatial as well as the temporal variability in $PM_{10–2.5}$ concentration (U.S. EPA, 2019a).). Given these limitations in routine monitoring, epidemiologic studies employed a number of different approaches for estimating $PM_{10–2.5}$ concentrations, including (1) calculating the difference between PM_{10} and $PM_{2.5}$ at co-located monitors, (2) calculating the difference between county-wide averages of monitored PM_{10} and $PM_{2.5}$ based on monitors that are not necessarily co-located, and (3) direct measurement of $PM_{10–2.5}$ using a dichotomous sampler (U.S. EPA, 2019a, section 1.4.2). Given the relatively small number of $PM_{10–2.5}$ monitoring sites, the relatively large spatial variability in ambient $PM_{10–2.5}$ concentrations, the use of different approaches to estimating ambient $PM_{10–2.5}$ concentrations across epidemiologic studies, and the limitations inherent in such estimates, the distributions of $PM_{10–2.5}$ concentrations over which reported health outcomes occur remain highly uncertain (U.S. EPA, 2019a).

There was relatively little information available to characterize potential exposure differences that may inform the apparent variability in associations between short-term $PM_{10–2.5}$ exposures and health effects across study locations (U.S. EPA, 2019a). Specifically, the potential spatial and temporal variability in $PM_{10–2.5}$ exposures complicates the interpretation of results between study locations as well as the relative lack of information on the chemical and biological composition of $PM_{10–2.5}$ (U.S. EPA, 2009a U.S. EPA, 2019a).

In reaching his decision in 2020 to retain the existing 24-hour primary PM_{10} standard, the then-Administrator specifically noted that, while the health effects evidence was somewhat expanded since the prior reviews, the overall conclusions in the 2019 ISA, including uncertainties and limitations, were generally consistent with what was considered in the 2012 review (85 FR 82725, December 18, 2020). In addition, the then-Administrator recognized that there were still a number of uncertainties and limitations associated with the available evidence.

With regard to the evidence on $PM_{10–2.5}$-related health effects, the then-Administrator noted that epidemiologic studies continued to report positive associations with mortality and morbidity in cities across North America, Europe, and Asia, where $PM_{10–2.5}$ sources and composition were expected to vary widely. While significant uncertainties remained in the 2020 review, the then-Administrator recognized that this expanded body of evidence had broadened the range of effects that have been linked with $PM_{10–2.5}$ exposures. The studies evaluated in the 2019 ISA expanded the scientific foundation presented in the 2009 ISA and led to revised causality determinations (and new determinations) for long-term $PM_{10–2.5}$

[127] As discussed further below, methods employed by the epidemiologic studies to estimate ambient $PM_{10–2.5}$ concentrations include: (1) Calculating the difference between PM_{10} and $PM_{2.5}$ at co-located monitors, (2) calculating the difference between county-wide averages of monitored PM_{10} and $PM_{2.5}$ based on monitors that are not necessarily co-located, and (3) direct measurement of $PM_{10–2.5}$ using a dichotomous sampler (U.S. EPA, 2019a, section 1.4.2).

[128] Non-inhalation exposure experiments (*i.e.,* intratracheal [IT] instillation) are informative for size fractions (*e.g.,* $PM_{10–2.5}$) that cannot penetrate the airway of a study animal and may provide information relevant to biological plausibility and dosimetry (U.S. EPA, 2019a, section A–12).

exposures and mortality, cardiovascular effects, metabolic effects, nervous system effects, and cancer (85 FR 82726, December 18, 2020). Drawing from his consideration of this evidence, the then-Administrator concluded that the scientific information available since the time of the last review supported a decision to maintain a primary PM_{10} standard to provide public health protection against $PM_{10–2.5}$ exposures, regardless of location, source of origin, or particle composition (85 FR 82726, December 18, 2020). With regard to uncertainties in the available evidence, the then-Administrator first noted that a number of limitations were identified in the 2012 review related to: (1) Estimates of ambient $PM_{10–2.5}$ concentrations used in epidemiologic studies; (2) limited evaluation of copollutant models to address the potential for confounding; and (3) limited experimental studies supporting biological plausibility for $PM_{10–2.5}$-related effects. Despite the expanded body of evidence for $PM_{10–2.5}$ exposures and health effects, the then-Administrator recognized that uncertainties in the 2020 review continued to include those associated with the exposure estimates used in epidemiologic studies, the independence of the $PM_{10–2.5}$ health effect associations, and the biologically plausible pathways for $PM_{10–2.5}$ health effects (85 FR 82726, December 18, 2020). These uncertainties contributed to the 2019 ISA determinations that the evidence is at most ''suggestive of, but not sufficient to infer'' causal relationships (85 FR 82726, December 18, 2020). In considering the available evidence in his basis for the decision, the then-Administrator emphasized evidence supporting ''causal'' and ''likely to be causal'' relationships, and therefore, judged that the $PM_{10–2.5}$-related health effects evidence provided an uncertain scientific foundation for making standard-setting decisions. He further judged limitations in the evidence raised questions as to whether additional public health improvements would be achieved by revising the existing PM_{10} standard (85 FR 24126, April 30, 2020). In the 2020 decision, for all of the reasons discussed above and recognizing the CASAC conclusion that the evidence provided support for retaining the current standard, the then-Administrator concluded that it was appropriate to retain the existing primary PM_{10} standard, without revision. His decision was consistent with the CASAC advice related to the primary PM_{10} standard. Specifically, the CASAC agreed with the 2020 PA conclusions that, while these effects are important, the ''evidence does not call into question the adequacy of the public health protection afforded by the current primary PM_{10} standard'' and ''supports consideration of retaining the current standard in this review'' (Cox, 2019b, p. 3 of consensus letter). Thus, the then-Administrator concluded that the primary PM_{10} standard (in all of its elements (*i.e.,* indicator, averaging time, form, and level)) was requisite to protect public health with an adequate margin of safety against effects that have been associated with $PM_{10–2.5}$. In light of this conclusion, the EPA retained the existing PM_{10} standard.

2. Overview of the Health Effects Evidence

The information summarized here is based on the scientific assessment of the health effects evidence available in this reconsideration; this evaluation is documented in the 2019 ISA and its policy implications are discussed further in the 2022 PA. As noted above, the ISA Supplement does not include an evaluation of studies for $PM_{10–2.5}$, and the 2019 ISA continues to serve as the scientific foundation for this reconsideration.

a. Nature of Effects

For the health effect categories and exposure duration combinations evaluated, the 2019 ISA concludes that the evidence supports causality determinations for $PM_{10–2.5}$ that are at most ''suggestive of, but not sufficient to infer, a causal relationship''. While the evidence supporting the causal nature of relationships between exposure to $PM_{10–2.5}$ has been strengthened for some health effect categories since the completion of the 2009 ISA, the 2019 ISA concludes that overall ''the uncertainties in the evidence identified in the 2009 ISA have, to date, still not been addressed'' (U.S. EPA, 2019a, section 1.4.2, p. 1–41; U.S. EPA, 2022b, section 4.3.1). Specifically, epidemiologic studies available in the 2012 review relied on various methods to estimate $PM_{10–2.5}$ concentrations, and these methods had not been systematically compared to evaluate spatial and temporal correlations in $PM_{10–2.5}$ concentrations. Methods included: (1) Calculating the difference between PM_{10} and $PM_{2.5}$ concentrations at co-located monitors, (2) calculating the difference between county-wide averages of monitored PM_{10}- and $PM_{2.5}$-based on monitors that are not necessarily co-located, and (3) direct measurement of $PM_{10–2.5}$ using a dichotomous sampler (U.S. EPA, 2019a, section 1.4.2). As described in the 2019 ISA, there continues to be variability across epidemiologic studies in the approaches used to estimate $PM_{10–2.5}$ concentrations. Additionally, some studies estimate long-term $PM_{10–2.5}$ exposures as the difference between PM_{10} and $PM_{2.5}$ concentrations based on information from spatiotemporal or land use regression (LUR) models, in addition to monitors. The various methods used to estimate $PM_{10–2.5}$ concentrations have not been systematically evaluated (U.S. EPA, 2019a, section 3.3.1.1), contributing to uncertainty regarding the spatial and temporal correlations in $PM_{10–2.5}$ concentrations across methods and in the $PM_{10–2.5}$ exposure estimates used in epidemiologic studies (U.S. EPA, 2019a, section 2.5.1.2.3). Given the greater spatial and temporal variability of $PM_{10–2.5}$ and the lower number of $PM_{10–2.5}$ monitoring sites, compared to $PM_{2.5}$, this uncertainty is particularly important for the coarse size fraction. Beyond the uncertainty associated with $PM_{10–2.5}$ exposure estimates in epidemiologic studies, the limited information on the potential for confounding by copollutants and the limited support available for the biological plausibility of health effects following $PM_{10–2.5}$ exposures also continue to contribute to uncertainty in the $PM_{10–2.5}$ health evidence. Uncertainty related to potential confounding stems from the relatively small number of epidemiologic studies that have evaluated $PM_{10–2.5}$ health effect associations in copollutants models with both gaseous pollutants and other PM size fractions. On the other hand, uncertainty related to the biological plausibility of effects attributed to $PM_{10–2.5}$ exposures results from the small number of controlled human exposure and animal toxicological studies that have evaluated the health effects of experimental $PM_{10–2.5}$ inhalation exposures. The evidence supporting the 2019 ISA's ''suggestive of, but not sufficient to infer, a causal relationship'' causality determinations for $PM_{10–2.5}$, including uncertainties in this evidence, is summarized below in sections III.B.1.a through III.B.1.f.

i. Mortality

Due to the dearth of studies examining the association between long-term $PM_{10–2.5}$ exposure and mortality, the 2009 ISA concluded that the evidence was ''inadequate to determine if a causal relationship exists'' (U.S. EPA, 2009a). As reported in the 2019 ISA, some cohort studies conducted in the U.S. and Europe report positive associations between long-term $PM_{10–2.5}$ exposure and total (nonaccidental)

mortality, though results are inconsistent across studies (U.S. EPA, 2019a, Table 11–11). The examination of copollutant models in these studies remains limited and, when included, $PM_{10–2.5}$ effect estimates are often attenuated after adjusting for $PM_{2.5}$ (U.S. EPA, 2019a, Table 11–11). Across studies, $PM_{10–2.5}$ exposure concentrations are estimated using a variety of approaches, including direct measurements from dichotomous samplers, calculating the difference between PM_{10} and $PM_{2.5}$ concentrations measured at collocated monitors, and calculating difference of area-wide concentrations of PM_{10} and $PM_{2.5}$. As discussed above, temporal and spatial correlations between these approaches have not been evaluated, contributing to uncertainty regarding the potential for exposure measurement error (U.S. EPA, 2019a, section 3.3.1.1 and Table 11–11). The 2019 ISA concludes that this uncertainty ''reduces the confidence in the associations observed across studies'' (U.S. EPA, 2019a, p. 11–125). The 2019 ISA additionally concludes that the evidence for long-term $PM_{10–2.5}$ exposures and cardiovascular effects, respiratory morbidity, and metabolic disease provide limited biological plausibility for $PM_{10–2.5}$-related mortality (U.S. EPA, 2019a, sections 11.4.1 and 11.4). Taken together, the 2019 ISA concludes that, ''this body of evidence is suggestive, but not sufficient to infer, that a causal relationship exists between long-term $PM_{10–2.5}$ exposure and total mortality'' (U.S. EPA, 2019a, p. 11–125).

With regard to short-term $PM_{10–2.5}$ exposures and mortality, the 2009 ISA concluded that the evidence is ''suggestive of a causal relationship between short-term exposure to $PM_{10–2.5}$ and mortality'' (U.S. EPA, 2009a). The 2019 ISA included multicity epidemiologic studies conducted primarily in Europe and Asia that continue to provide consistent evidence of positive associations between short-term $PM_{10–2.5}$ exposure and total (nonaccidental) mortality (U.S. EPA, 2019a, Table 11–9). Although these studies contribute to increasing confidence in the $PM_{10–2.5}$-mortality relationship, the use of various approaches to estimate $PM_{10–2.5}$ exposures continues to contribute uncertainty to the associations observed. Recent studies expand the assessment of potential copollutant confounding of the $PM_{10–2.5}$-mortality relationship and provide evidence that $PM_{10–2.5}$ associations generally remain positive in copollutant models, though associations are attenuated in some instances (U.S. EPA, 2019a, section 11.3.4.1, Figure 11–28, Table 11–10). The 2019 ISA concludes that, overall, the assessment of potential copollutant confounding is limited due to the lack of information on the correlation between $PM_{10–2.5}$ and gaseous pollutants and the small number of locations in which copollutant analyses have been conducted. Associations with cause-specific mortality (*i.e.,* cardiovascular and respiratory mortality) provide some support for associations with total (nonaccidental) mortality, though associations with respiratory mortality are more uncertain (*i.e.,* wider confidence intervals) and less consistent (U.S. EPA, 2019a, section 11.3.7). The 2019 ISA concludes that the evidence for $PM_{10–2.5}$-related cardiovascular effects provides only limited support for the biological plausibility of a relationship between short-term $PM_{10–2.5}$ exposure and cardiovascular mortality (U.S. EPA, 2019a, section 11.3.7). Based on the overall evidence, the 2019 ISA concludes that, ''this body of evidence is suggestive, but not sufficient to infer, that a causal relationship exists between short-term $PM_{10–2.5}$ exposure and total mortality'' (U.S. EPA, 2019a, p. 11–120).

ii. Cardiovascular Effects

In the 2009 ISA, the evidence describing the relationship between long-term exposure to $PM_{10–2.5}$ and cardiovascular effects was characterized as ''inadequate to infer the presence or absence of a causal relationship.'' The limited number of epidemiologic studies reported contradictory results and experimental evidence demonstrating an effect of $PM_{10–2.5}$ on the cardiovascular system was lacking (U.S. EPA, 2019a, section 6.4).

The evidence relating long-term $PM_{10–2.5}$ exposures to cardiovascular mortality remains limited, with no consistent pattern of associations across studies and, as discussed above, uncertainty stemming from the use of various approaches to estimate $PM_{10–2.5}$ concentrations (U.S. EPA, 2019a, Table 6–70). The evidence for associations with cardiovascular morbidity has grown and, while results across studies are not entirely consistent, some epidemiologic studies report positive associations with ischemic heart disease (IHD) and MI (U.S. EPA, 2019a, Figure 6–34); stroke (U.S. EPA, 2019a, Figure 6–35); atherosclerosis (U.S. EPA, 2019a, section 6.4.5); venous thromboembolism (VTE) (U.S. EPA, 2019a, section 6.4.7); and blood pressure and hypertension (U.S. EPA, 2019a, Section 6.4.6). $PM_{10–2.5}$ cardiovascular mortality effect estimates are often attenuated, but remain positive, in copollutants models that adjust for $PM_{2.5}$. For morbidity outcomes, associations are inconsistent in copollutant models that adjust for $PM_{2.5}$, NO_2, and chronic noise pollution (U.S. EPA, 2019a, p. 6–276). The lack of toxicological evidence for long-term $PM_{10–2.5}$ exposures represents a data gap (U.S. EPA, 2019a, section 6.4.10), resulting in the 2019 ISA conclusion that ''evidence from experimental animal studies is of insufficient quantity to establish biological plausibility'' (U.S. EPA, 2019a, p. 6–277). Based largely on the observation of positive associations in some epidemiologic studies, the 2019 ISA concludes that ''evidence is suggestive of, but not sufficient to infer, a causal relationship between long-term $PM_{10–2.5}$ exposure and cardiovascular effects'' (U.S. EPA, 2019a, p. 6–277).

With regard to short-term $PM_{10–2.5}$ exposures and cardiovascular effects, the 2009 ISA found that the available evidence for short-term $PM_{10–2.5}$ exposure and cardiovascular effects was ''suggestive of a causal relationship.'' This conclusion was based on several epidemiologic studies reporting associations between short-term $PM_{10–2.5}$ exposure and cardiovascular effects, including IHD hospitalizations, supraventricular ectopy, and changes in heart rate variability (HRV). In addition, dust storm events resulting in high concentrations of crustal material were linked to increases in total cardiovascular disease emergency department visits and hospital admissions. However, the 2009 ISA noted the potential for exposure measurement error primarily due to the different methods used across studies to estimate $PM_{10–2.5}$ concentrations and copollutant confounding in these epidemiologic studies. In addition, there was only limited evidence of cardiovascular effects from a small number of experimental studies (*e.g.* animal toxicological studies and controlled human exposure studies) that examined short-term $PM_{10–2.5}$ exposures (U.S. EPA, 2009a, section 6.2.12.2). In the 2019 ISA, key uncertainties included the potential for exposure measurement error, copollutant confounding, and limited evidence of biological plausibility for cardiovascular effects following inhalation exposure (U.S. EPA, 2019a, section 6.3.13).

The evidence for short-term $PM_{10–2.5}$ exposure and cardiovascular outcomes has expanded since the 2009 ISA, though important uncertainties remain. The 2019 ISA notes that there are a small number of epidemiologic studies reporting positive associations between short-term exposure to $PM_{10–2.5}$ and cardiovascular-related morbidity

outcomes. However, the 2019 ISA notes that there is limited evidence to support that these associations are biologically plausible, or independent of copollutant confounding. The 2019 ISA also concludes that it remains unclear how the approaches used to estimate $PM_{10–2.5}$ concentrations in epidemiologic studies compare amongst one another and subsequently how exposure measurement error varies between each method. Specifically, it is unclear how well-correlated $PM_{10–2.5}$ concentrations are both temporally and spatially across these methods and therefore whether exposure measurement error varies across these methods. Taken together, the 2019 ISA concludes that ''the evidence is suggestive of, but not sufficient to infer, a causal relationship between short-term $PM_{10–2.5}$ exposures and cardiovascular effects'' (U.S. EPA, 2019a, p. 6–254).

iii. Respiratory Effects

With regard to short-term $PM_{10–2.5}$ exposures and respiratory effects, the 2009 ISA (U.S. EPA, 2009a) concluded that the relationship between short-term exposure to $PM_{10–2.5}$ and respiratory effects is ''suggestive of a causal relationship'' based on a small number of epidemiologic studies observing associations with some respiratory effects and limited evidence from experimental studies to support biological plausibility. Epidemiologic findings were consistent for respiratory infection and combined respiratory-related diseases, but not for COPD. Studies were characterized by overall uncertainty in the exposure assignment approach and limited information regarding potential copollutant confounding. Controlled human exposure studies of short-term $PM_{10–2.5}$ exposures found no lung function decrements and inconsistent evidence for pulmonary inflammation. Animal toxicological studies were limited to those using non-inhalation (*e.g.,* intratracheal instillation) routes of $PM_{10–2.5}$ exposure.

Recent epidemiologic findings consistently link $PM_{10–2.5}$ exposure to asthma exacerbation and respiratory mortality, with some evidence that associations remain positive (though attenuated in some studies of mortality) in copollutant models that include $PM_{2.5}$ or gaseous pollutants. Epidemiologic studies provide limited evidence for positive associations with other respiratory outcomes, including COPD exacerbation, respiratory infection, and combined respiratory-related diseases (U.S. EPA, 2019a, Table 5–36). As noted above for other endpoints, an uncertainty in these epidemiologic studies is the lack of a systematic evaluation of the various methods used to estimate $PM_{10–2.5}$ concentrations and the resulting uncertainty in the spatial and temporal variability in $PM_{10–2.5}$ concentrations compared to $PM_{2.5}$ (U.S. EPA, 2019a, sections 2.5.1.2.3 and 3.3.1.1). Specifically, the existing monitoring networks do not provide a good characterization of how well correlated concentrations are both spatially and temporally across the $PM_{10–2.5}$ estimation methods and overall spatial and temporal patterns in $PM_{10–2.5}$ concentrations. Taken together, the 2019 ISA concludes that ''the collective evidence is suggestive of, but not sufficient to infer, a causal relationship between short-term $PM_{10–2.5}$ exposure and respiratory effects'' (U.S. EPA, 2019a, p. 5–270).

iv. Cancer

In the 2012 review, little information was available from studies of cancer following inhalation exposures to $PM_{10–2.5}$. Thus, the 2009 ISA determined the evidence was ''inadequate to evaluate the relationship between long-term $PM_{10–2.5}$ exposures and cancer'' (U.S. EPA, 2009a). The scientific information evaluated in the 2019 ISA of long-term $PM_{10–2.5}$ exposure and cancer remains limited, with a few recent epidemiologic studies reporting positive, but imprecise, associations with lung cancer incidence (U.S. EPA, 2019a). Moreover, uncertainty remains in these studies with respect to exposure measurement error due to the use of $PM_{10–2.5}$ predictions that have not been validated by monitored $PM_{10–2.5}$ concentrations (U.S. EPA, 2019a, sections 3.3.2.3 and 10.3.4). Relatively few experimental studies of $PM_{10–2.5}$ have been conducted, though available studies indicate that $PM_{10–2.5}$ exhibits two key characteristics of carcinogens: genotoxicity and oxidative stress. While limited, such experimental studies provide some evidence of biological plausibility for the findings in a small number of epidemiologic studies (U.S. EPA, 2019a, section 10.3.4).

Taken together, the small number of epidemiologic and experimental studies, along with uncertainty with respect to exposure measurement error, contribute to the determination in the 2019 ISA that, ''the evidence is suggestive of, but not sufficient to infer, a causal relationship between long-term $PM_{10–2.5}$ exposure and cancer'' (U.S. EPA, 2019a, p. 10–87).

v. Metabolic Effects

The 2009 ISA did not make a causality determination for $PM_{10–2.5}$-related metabolic effects. One epidemiologic study in the 2019 ISA reports an association between long-term $PM_{10–2.5}$ exposure and incident diabetes, while additional cross-sectional studies report associations with effects on glucose or insulin homeostasis (U.S. EPA, 2019a, section 7.4). As discussed above for other outcomes, uncertainties with the epidemiologic evidence include the potential for copollutant confounding and exposure measurement error due to the different methods used across studies to estimate $PM_{10–2.5}$ concentrations (U.S. EPA, 2019a, Tables 7–14 and 7–15). The evidence base to support the biological plausibility of metabolic effects following $PM_{10–2.5}$ exposures is limited, but a cross-sectional study that investigated biomarkers of insulin resistance and systemic and peripheral inflammation may support a pathway leading to type 2 diabetes (U.S. EPA, 2019a, sections 7.4.1 and 7.4.3). Based on the expanded, though still limited evidence base, the 2019 ISA concludes that, ''[o]verall, the evidence is suggestive of, but not sufficient to infer, a causal relationship between [long]-term $PM_{10–2.5}$ exposure and metabolic effects'' (U.S. EPA, 2019a, p. 7–56).

vi. Nervous System Effects

The 2009 ISA did not make a causality determination for $PM_{10–2.5}$-related nervous system effects. In the 2019 ISA, available epidemiologic studies report associations between $PM_{10–2.5}$ and impaired cognition and anxiety in adults in longitudinal analyses (U.S. EPA, 2019a, Table 8–25, section 8.4.5). Associations of long-term exposure with neurodevelopmental effects are not consistently reported in children (U.S. EPA, 2019a, sections 8.4.4 and 8.4.5). Uncertainties in these studies include the potential for copollutant confounding, as no studies examined copollutants models (U.S. EPA, 2019a, section 8.4.5), and for exposure measurement error, given the use of various methods to estimate $PM_{10–2.5}$ concentrations (U.S. EPA, 2019a, Table 8–25). In addition, there is limited animal toxicological evidence supporting the biological plausibility of nervous system effects (U.S. EPA, 2019a, sections 8.4.1 and 8.4.5). Overall, the 2019 ISA concludes that, ''the evidence is suggestive of, but not sufficient to infer, a causal relationship'' between long-term $PM_{10–2.5}$ exposure and nervous system effects (U.S. EPA, 2019a, p. 8–75).

B. Conclusions on the Primary PM_{10} Standard

In drawing conclusions on the adequacy of the current primary PM_{10} standard, in view of the advances in scientific knowledge and additional information now available, the Administrator has considered the evidence base, information, and policy judgments that were the foundation of the 2020 review and reflects upon the body of information and evidence available in this reconsideration. In so doing, the Administrator has taken into account both evidence-based and quantitative information-based considerations, as well as advice from the CASAC and public comments. Evidence-based considerations draw upon the EPA's integrated synthesis of the scientific evidence from animal toxicologic, controlled human exposure, and epidemiologic studies evaluating health effects related to exposures to $PM_{10-2.5}$ as presented in the 2019 ISA and discussed in section III.A.2. In addition to the evidence, the Administrator has weighed a range of policy-relevant considerations as discussed in the 2022 PA and summarized in sections III.B and III.C of the proposal and summarized in section III.B.2 below. These considerations, along with the advice from the CASAC (section III.B.1) and public comments (section III.B.3), are discussed below. A more detailed summary of all significant comments, along with the EPA's responses in the Response to Comments document, can be found in the docket for this rulemaking (Docket No. EPA–HQ–OAR–2015–00072). This document is available for review in the docket for this rulemaking and through EPA's NAAQS website (link). The Administrator's conclusions in this reconsideration regarding the adequacy of the current primary PM_{10} standard and whether any revisions are appropriate are described in section III.B.4.

1. CASAC Advice

As described in section I.X, the EPA decided to prepare a revised PA for the reconsideration of the 2020 final decision. The CASAC's advice on the 2019 draft PA and the 2021 draft PA was documented in letters to the prior and current Administrators (Cox, 2019b; Sheppard, 2022a) and is summarized below. In reviewing both the 2019 draft PA and the 2021 draft PA, the CASAC agreed with the EPA's preliminary conclusion that the available scientific evidence, including its uncertainties and limitations, does not call into question the adequacy of the current primary PM_{10} standard and that the standard should be retained, without revision.

In its review of the 2019 draft PA, the CASAC concurred with the overall preliminary conclusion that it is appropriate to consider retaining the current primary PM_{10} standard, without revision. In their agreement with the conclusions in the 2019 draft PA, the CASAC stated that ''that key uncertainties identified in the last review remain'' (Cox, 2019b) and that ''none of the identified health outcomes linked to $PM_{10-2.5}$'' were judged to be causal or likely to be causal (Cox, 2019b, p. 12 of consensus responses). Moreover, to reduce these uncertainties in future reviews, the CASAC recommended improvements to $PM_{10-2.5}$ exposure assessment, including a more extensive network for direct monitoring of the $PM_{10-2.5}$ fraction (Cox, 2019b, p. 13 of consensus responses). The CASAC also recommended additional controlled human exposure and animal toxicological studies of the $PM_{10-2.5}$ fraction to improve the understanding of biological mechanisms and pathways (Cox, 2019b, p. 13 of consensus responses). Overall, the CASAC agreed with the EPA's preliminary conclusion in the 2019 draft PA that ''. . . the available evidence does not call into question the adequacy of the public health protection afforded by the current primary PM_{10} standard and that evidence supports consideration of retaining the current standard in this review'' (Cox, 2019b, p. 3 of letter).

In its review of the 2021 draft PA, the CASAC provided advice on the adequacy of the current primary PM_{10} standard in the context of its review of the revised PA for this reconsideration (Sheppard, 2022a) [129].) [130]. In this context, the CASAC supported the preliminary conclusion in the 2021 draft PA that the evidence reviewed in the 2019 ISA does not call into question the public health protection provided by the current primary PM_{10} standard against $PM_{10-2.5}$ exposures and concurs with the 2021 draft PA's overall preliminary conclusion that it is appropriate to consider retaining the current primary PM_{10} standard (Sheppard, 2022a, p. 4 of consensus letter). Additionally, the CASAC concurred that ''. . . at this time, PM_{10} is an appropriate choice as the indicator for $PM_{10-2.5}$'' and ''that it is important to retain the level of protection afforded by the current PM_{10} standard'' (Sheppard, 2022a, p. 4 of consensus letter). The CASAC also recognized uncertainties associated with the scientific evidence, including ''compared to $PM_{2.5}$ studies, the more limited number of epidemiology studies with positive statistically significant findings, and the difficulty in extracting the sole contribution of coarse PM to observed adverse health effects'' (Sheppard, 2022a, p. 19 of consensus responses).

The CASAC recommended several areas for additional research to reduce uncertainties in the $PM_{10-2.5}$ exposure estimates used in the epidemiologic studies, to evaluate the independence of $PM_{10-2.5}$ health effect associations, to evaluate the biological plausibility of $PM_{10-2.5}$-related effects, and to increase the number of studies examining $PM_{10-2.5}$-related health effects in at-risk populations (Sheppard, 2022a, p. 20 of consensus responses). Furthermore, the CASAC ''recognizes a need for, and supports investment in research and deployment of measurement systems to better characterize $PM_{10-2.5}$'' and to ''provide information that can improve public health'' (Sheppard, 2022a, p. 20 of consensus responses).

2. Basis for the Proposed Decision

At the time of the proposal, the Administrator carefully considered the assessment of the current evidence and conclusions reached in the 2019 ISA, considerations and staff conclusions and associated rationales presented in the 2020 PA and 2022 PA, and advice and recommendations of the CASAC (88 FR 5634, January 27, 2023). Consistent with previous reviews, the Administrator first considered the available scientific evidence for $PM_{10-2.5}$-related exposures and health effects, as evaluated in the 2019 ISA. As an initial matter, the Administrator recognized that the scientific evidence for $PM_{10-2.5}$-related effects available in this reconsideration is the same body of evidence that was available at the time of the 2020 review, as evaluated in the 2019 ISA and summarized in section III.A.2 above. The 2019 ISA concludes that the evidence supports ''suggestive of, but not sufficient to infer'' causal relationships between short- and long-term exposures to $PM_{10-2.5}$ and cardiovascular effects, cancer, and mortality and long-term $PM_{10-2.5}$ exposures and metabolic effects and nervous system effects (U.S. EPA, 2019a). The Administrator noted that

[129] As described in section I.C.5.b above, the scope of the ISA Supplement did not include consideration of studies of health effects associated with exposure to $PM_{10-2.5}$. Therefore, the information and conclusions presented in the 2022 PA are very similar to those in the 2020 PA.

[130] As described in section I.C.5.b above, the scope of the ISA Supplement did not include consideration of studies of health effects associated with exposure to $PM_{10-2.5}$. Therefore, the information and conclusions presented in the 2022 PA are very similar to those in the 2020 PA.

the evidence for several $PM_{10-2.5}$-related health effects has expanded since the completion of the 2009 ISA, but important uncertainties remain. The uncertainties in the epidemiologic studies contribute to the determinations in the 2019 ISA that the evidence for short and long-term $PM_{10-2.5}$ exposures and mortality, cardiovascular effects, metabolic effects, nervous system effects, and cancer is ''suggestive of, but not sufficient to infer'' causal relationships (U.S. EPA, 2019a; U.S. EPA, 2022b, section 4.3.1). Drawing from the evidence evaluated in the 2019 ISA and consideration of the scientific evidence in the 2022 PA, the Administrator noted that, consistent with previous reviews, the 2019 ISA and the 2022 PA highlight a number of uncertainties associated with the evidence, including: (1) $PM_{10-2.5}$ exposure estimates used in epidemiologic studies, (2) independence of $PM_{10-2.5}$ health effect associations, and (3) biological plausibility of the $PM_{10-2.5}$-related effects. These uncertainties contribute to the determinations in the 2019 ISA that the evidence for short-term $PM_{10-2.5}$ exposures and key health effects is ''suggestive of, but not sufficient to infer'' causal relationships. In considering the available scientific evidence, consistent with approaches employed in past NAAQS reviews, the Administrator placed the most weight on evidence supporting ''causal'' and ''likely to be causal'' relationships. In so doing, he noted that the available evidence for short- and long-term $PM_{10-2.5}$ exposures and health effects does not support causality determinations of a ''causal relationship'' or ''likely to be causal relationship.'' Furthermore, the Administrator recognized that, because of the uncertainties and limitations in the evidence base, the 2022 PA does not include a quantitative assessment of $PM_{10-2.5}$ exposures and risk that might further inform decisions regarding the adequacy of the current 24-hour primary PM_{10} standard. Therefore, in light of the 2019 ISA conclusions that the evidence supports ''suggestive of, but not sufficient to infer'' causal relationships. The Administrator judged that there are substantial uncertainties that raise questions regarding the degree to which additional public health improvements would be achieved by revising the existing PM_{10} standard. In considering the available evidence for long-term $PM_{10-2.5}$ exposures, the Administrator noted that there is limited evidence that would support consideration of an annual standard to provide protection against such effects, in conjunction with the current primary 24-hour PM_{10} standard. He preliminarily concluded that the current primary 24-hour $PM_{2.5}$ standard that reduces 24-hour exposures also likely reduces long-term average exposures, and therefore provides some margin of safety against the health effects associated with long-term $PM_{10-2.5}$ exposures.

In reaching his proposed decision on the adequacy of the current primary 24-hour PM_{10} standard, the Administrator also considered advice from the CASAC. As noted above in section III.B.1, the CASAC recognized uncertainties associated with the scientific evidence and agreed with the 2019 draft PA and 2021 draft PA conclusions that the scientific evidence does not call into question the adequacy of the primary PM_{10} standard and supports consideration of retaining the current standard.

When considering the above information together, the Administrator proposed to conclude that the available scientific evidence continues to support a PM_{10} standard to provide some measure of protection against $PM_{10-2.5}$ exposures. Additionally, he recognized that there are important uncertainties and limitations associated with the available evidence for $PM_{10-2.5}$-related health effects, for both short and long-term exposure, as evaluated in the 2019 ISA. Consistent with the decisions in the previous reviews, the Administrator proposed to conclude that these limitations lead to considerable uncertainty regarding the potential public health implications of revising the level of the current primary 24-hour PM_{10} standard. Thus, based on his consideration of the evidence and associated uncertainties and limitations for $PM_{10-2.5}$-related health effects and his consideration of CASAC advice on the primary PM_{10} standard, the Administrator proposed to retain the current primary PM_{10} standard, without revision.

3. Comments on the Proposed Decision

Of the public comments received on the proposal, very few commenters provided comments on the primary PM_{10} standard. Of those commenters who did provide comments on the primary PM_{10} standard, the majority agree with the EPA's proposed decision to retain the primary PM_{10} standard. In so doing, these commenters agree with the EPA's rationale regarding the available scientific information, including uncertainties and limitations, for informing decisions on the standard. These commenters state that no new scientific evidence or quantitative information has emerged since the 2020 decision to retain the current standard. Furthermore, these commenters note that the EPA did not evaluate any new scientific evidence related to $PM_{10-2.5}$ exposures and health effects as a part of the 2022 ISA Supplement developed for this reconsideration, nor did the revised 2022 PA consider any new or different information from the 2020 PA, and therefore, the EPA reached the same conclusion as is the 2020 PA that the current standard is adequate and should be retained. This group includes industries and industry groups, as well as some State and local governments. All of these commenters generally note their agreements with the rationale provided in the proposal and the CASAC concurrence with the 2021 draft PA conclusion that the available information does not call into question the adequacy of the current standard, and therefore, does not support revision and that the current standard should be retained.

Some commenters, including those from environmental and public health organizations and groups, some states, and individuals, disagreed with the Administrator's proposed decision to retain the current primary PM_{10} standard. These commenters recommend that the EPA revise the primary PM_{10} standard to a lower level to provide increased public health protection, citing to the available scientific evidence, as well as the proposed revision to the primary $PM_{2.5}$ standard.

Commenters who disagreed with the proposal to retain the current standard state that revision to the primary PM_{10} standard is necessary to protect public health with an adequate margin of safety. In their recommendations for revising the standard, some commenters contend that the current standard, with its indicator of PM_{10} to target exposures to $PM_{10-2.5}$, has become less protective as ambient concentrations of $PM_{2.5}$ have been reduced with revisions to that standard. These commenters assert that the current primary PM_{10} standard allows increased exposure to $PM_{10-2.5}$ in ambient air because retaining the primary PM_{10} would allow proportionately more $PM_{10-2.5}$ mass as the $PM_{2.5}$ standard has been revised downward. Moreover, in support of their recommendations, the commenters note that the available evidence of $PM_{10-2.5}$-related health effects has been expanded and strengthened since the time of the last review. Taken together, the commenters contend that the primary PM_{10} standard should be revised and failure to do so would be arbitrary and capricious. Some of these

commenters assert that the level of the primary PM_{10} standard should be revised to 140 or 145 μg/m³, concurrent with a strengthened primary 24-hour $PM_{2.5}$ standard, while other commenters recommend revising the level of the standard to within the range of 65–75 μg/m³, to provide increased public health protection.

We disagree with the commenters that the primary PM_{10} standard should be revised because of reductions in ambient concentrations of $PM_{2.5}$. As an initial matter, we note that overall, ambient concentrations of both PM_{10} and $PM_{2.5}$ have declined significantly over time. Ambient concentrations of PM_{10} have declined by 46% across the U.S. from 2000 to 2019,[131] while $PM_{2.5}$ concentrations in ambient air have declined by 43% during this same time period.[132] As noted in the 2022 PA (p. 2–41), the majority of $PM_{10-2.5}$ sites have generally remained steady and do not exhibit a trend of increasing or decreasing concentrations during this time period, reflecting the relatively consistent level of dust emission across the U.S. from 2000 to 2019 (U.S. EPA, 2022b).

The 2019 ISA provides a comparison of the relative contribution of $PM_{2.5}$ and $PM_{10-2.5}$ to PM_{10} concentrations by region and season using the more comprehensive monitoring data from the NCore network available in this reconsideration (U.S. EPA, 2019, section 2.5.1.1.4). The data indicate that, for urban areas, there are roughly equivalent amounts of $PM_{2.5}$ and $PM_{10-2.5}$ contributing to PM_{10} in ambient air, while rural locations have a slightly higher contribution of $PM_{10-2.5}$ contributing to PM_{10} concentrations than $PM_{2.5}$ (U.S. EPA, 2019, section 2.5.1.1.4, Table 2–7). There is generally a greater contribution from the $PM_{2.5}$ fraction in the East and a greater contribution from the $PM_{10-2.5}$ fraction in the West and Midwest.

The EPA recognizes that when the primary annual $PM_{2.5}$ standard was revised from 15.0 μg/m³ to 12.0 μg/m³ while leaving the 24-hour $PM_{2.5}$ standards unchanged at 35 μg/m³ and the 24-hour PM_{10} standard unchanged at 150 μg/m³, the $PM_{10-2.5}$ fraction of PM_{10} could increase in some areas as the $PM_{2.5}$ fraction decreases (78 FR 3085, March 03, 2013). As described in the 2019 ISA, PM_{10} has become considerably coarser across the U.S. compared to similar observations in the 2009 ISA such that, in urban areas, the mass of the coarse fraction of PM is similar to or greater than the mass of the fine fraction of PM (U.S. EPA, 2019, section 2.5.1.1.4; U.S. EPA, 2009c). However, in considering recent air quality data, the EPA notes that in most areas of the country $PM_{2.5}$ and PM_{10} concentrations have declined and are well below their respective 24-hour standards. While the contribution of fine and coarse PM to PM_{10} mass concentrations may vary spatially and temporally, based on the trends in recent air quality data, the Administrator concludes that the current primary 24-hour PM_{10} standard is maintaining air quality at level that provides requisite protection against $PM_{10-2.5}$. That is, recent air quality data does not suggest that $PM_{10-2.5}$ concentrations have been increasing as $PM_{2.5}$ concentrations have been decreasing. In considering the available $PM_{10-2.5}$ health effects evidence in this reconsideration, there continue to be significant uncertainties and limitations, specifically with respect to the exposure assessment methods used to estimate $PM_{10-2.5}$ concentrations, that make it difficult to fully assess the public health implications of revising the primary PM_{10} standard even considering the possibility for additional variability in the relative ratio of $PM_{2.5}$ to $PM_{10-2.5}$ in current PM_{10} air quality across the U.S. As described in detail above in section III.A.2 and in the proposal (85 FR 5558, January 27, 2023), the uncertainties and limitations in the health effects evidence for $PM_{10-2.5}$ contributed to the determinations in the 2019 ISA that the evidence for key $PM_{10-2.5}$ health effects is ''suggestive of, but not sufficient to infer, a causal relationship'' or ''inadequate to infer the presence, or absence of a causal relationship'' (U.S. EPA, 2019a). While the evidence base for $PM_{10-2.5}$-related health effects has somewhat expanded since the 2009 ISA, the Administrator concludes that the evidence remains too limited to inform judgments regarding whether a more protective primary PM_{10} standard is warranted at this time.

Beyond the uncertainties and limitations associated with the available scientific evidence, the EPA also notes that, while the NCore monitoring network has been expanded since the time of the last review, epidemiologic studies available in this review do not use $PM_{10-2.5}$ NCore data in evaluating associations between $PM_{10-2.5}$ in ambient air and long- or short-term exposures. In the absence of such evidence, the public health implications of changes in ambient $PM_{10-2.5}$ concentrations as $PM_{2.5}$ concentrations decrease remain unclear. Therefore, the EPA continues to recognize this as an area for future research, to address the existing uncertainties (U.S. EPA, 2022b, section 4.6), and inform future reviews of the PM NAAQS. Taken together, as at the time of proposal, the Administrator concludes that these and other limitations in the $PM_{10-2.5}$ evidence raised questions as to whether additional public health improvements would be achieved by revising the existing PM_{10} standard, particularly when considering such judgments along with his decision to retain the current primary 24-hour $PM_{2.5}$ standard. Therefore, the EPA does not agree with the commenters that the currently available air quality information or scientific evidence support revisions to the primary PM_{10} standard in this reconsideration.

Consistent with their comments on the 2020 proposal, some commenters disagreed with the Administrator's proposed conclusion to retain the current primary PM_{10} standard, primarily focusing their comments on the need for revisions to the form of the standard or the level of the standard. With regard to comments on the form of the standard, some commenters assert that the EPA should revise the standard by adopting a separate form (or a ''compliance threshold'' in their words)—the 99th percentile, averaged over three years—for the primary PM_{10} standard for continuous monitors, which provide data every day, while maintaining the current form of the standard (one exceedance, averaged over three years) for 1-in-6 samplers, given the increased use of continuous monitoring and to ease the burden of demonstrating exceptional events. These commenters, in support of their comment, contend that the 99th percentile would effectively change the form from the 2nd highest to the 4th highest and would allow no more than three exceedances per year, averaged over three years. These commenters additionally highlight the EPA's decision in the 1997 review to adopt a 99th percentile form, averaged over three years, citing to advantages of a percentile-based form in the Administrator's rationale in that review. The comments further assert that a 99th percentile form for the primary PM_{10} standard is still more conservative than the form for other short-term NAAQS (*e.g.,* $PM_{2.5}$ and NO_2).

[131] PM_{10} concentrations presented as the annual second maximum 24-hour concentration (in μg/m³) at 262 sites in the U.S. For more information, see: *https://www.epa.gov/air-trends/particulate-matter-pm10-trends*

[132] $PM_{2.5}$ concentrations presented as the seasonally-weighted annual average concentration (in μg/m³) at 406 sites in the U.S. For more information, see: *https://www.epa.gov/air-trends/particulate-matter-pm25-trends*

First, the EPA has long recognized that the form is an integral part of the NAAQS and must be selected together with the other elements (*i.e.,* indicator, averaging time, level) of the NAAQS to ensure the appropriate stringency and requisite degree of public health protection. Thus, if the EPA were to change the form according to the monitoring method it would be establishing two different NAAQS, varying based on the monitoring method. The EPA has not done this to date, did not propose such an approach, and declines to adopt it for the final rule, as we believe such a decision in this final rule is beyond the scope of the proposal, and that each PM standard should have a single form, indicator, level and averaging time, chosen by the Administrator as necessary and appropriate. While certain continuous monitors may be established and approved as a Federal Equivalent Method (FEM) for PM_{10}, as an alternative to a Federal Reference Method (FRM), the use of an FEM is intended as an alternative means of determining compliance with the NAAQS, not as authorizing a different NAAQS.

Even if the commenters had asked that the change in form be made without regard to monitoring method, the EPA does not believe such a change would be warranted. The change in form for continuous monitors suggested by the commenters, without also lowering the level of such a standard, would allow more exceedances and thereby reduce the public health protection provided against exposures to $PM_{10–2.5}$ in ambient air, resulting in a less stringent primary PM_{10} standard than the current standard. These commenters have not provided new evidence or analyses to support their conclusion that an appropriate degree of public health protection could be achieved by allowing the use of an alternative form (*i.e.,* 99th percentile), while retaining the other elements of the standard.

With regard to the commenters' assertion that an alternate form of the standard would ease the burden of demonstrating exceptional events, the EPA recognizes, consistent with the CAA, that it may be appropriate to exclude monitoring data influenced by ''exceptional'' events when making certain regulatory determinations. However, the EPA notes that the cost of implementation of the standards may not be considered by the EPA in reviewing the standards. The EPA continues to update and develop documentation and tools to facilitate the implementation of the 2016 Exceptional Events Rule, including new $PM_{2.5}$ implementation focused products under development that are intended to assist air agencies with the development of demonstrations for specific types of exceptional events. With regard to the commenters' specific concerns for wildfires or high winds, the EPA released updated guidance documents on the preparation of exceptional event demonstrations related to wildfires in September 2016, high wind dust events in April 2019, and prescribed fires in August 2019. These guidance documents outline the regulatory requirements and provide examples for air agencies preparing demonstrations for wildfires, high wind dust, and prescribed fire events. For all of the reasons discussed above, the EPA does not agree with the commenters that the form of the primary PM_{10} standard should be revised to a 99th percentile for continuous monitors.

4. Administrator's Conclusions

This section summarizes the Administrator's considerations and conclusions related to the current primary PM_{10} standard. In establishing primary standards under the Act that are ''requisite'' to protect the public health with an adequate margin of safety, the Administrator is seeking to establish standards that are neither more nor less stringent than necessary for this purpose. In so doing, the Administrator notes that his final decision in this reconsideration is a public health policy judgment that draws upon scientific information, as well as judgments about how to consider the range and magnitude of uncertainties that are inherent in the information. Accordingly, he recognizes that his decision requires judgments based on the interpretation of the evidence that neither overstates nor understates the strength or limitations of the evidence nor the appropriate inferences to be drawn. He recognizes, as described in section I.A above, that the Act does not require that primary standards be set at a zero-risk level; rather, the NAAQS must be sufficient but not more stringent than necessary to protect public health, including the health of sensitive groups with an adequate margin of safety.

Given these requirements, and consistent with the primary $PM_{2.5}$ standards discussed above (section II.C.3), the Administrator's final decision in this reconsideration of the current primary PM_{10} standard will be a public health policy judgment that draws upon the scientific information examining the health effects of $PM_{10–2.5}$ exposures, including how to consider the range and magnitude of uncertainties inherent in that information. The Administrator's final decision is based on an interpretation of the scientific evidence that neither overstates nor understates its strengths and limitations, nor the appropriate inferences to be drawn.

Having carefully considered advice from the CASAC and public comments, as discussed above, the Administrator notes that the fundamental scientific conclusions on health effects of $PM_{10–2.5}$ in ambient air that were reached in the 2019 ISA and summarized in the 2020 PA and 2022 PA remain valid. Additionally, the Administrator believes the judgments he proposed (85 FR 5558, January 27, 2023) with regard to the evidence remain appropriate. Further, in considering the adequacy of the current primary PM_{10} standard in this reconsideration, the Administrator has carefully considered the policy-relevant evidence and conclusions contained in the 2019 ISA; the rationale and conclusions presented in the 2020 PA and 2022 PA; the advice and recommendations from the CASAC in their reviews of the 2019 draft PA and 2021 draft PA; and public comments, as addressed in section III.B.3 above and in the RTC document. In the discussion below, the Administrator gives weight to the conclusions in the 2020 PA and 2022 PA, with which the CASAC has concurred, as summarized in section III.C of the proposal and takes note of the key aspects of the rationale for those conclusions that contribute to his decision in this review. In considering this information, the Administrator concludes that the preliminary conclusions and policy judgments supporting his proposed decision remain valid, and that the current primary PM_{10} standard provides requisite protection of public health with an adequate margin of safety and should be retained. In considering the 2020 PA and 2022 PA evaluations and conclusions, the Administrator notes that, while the health effects evidence is somewhat expanded since the 2009 ISA as described in section III.A.2 above, the overall conclusions are generally consistent with those reached in the 2009 ISA (U.S. EPA, 2020b, section 4.4). In so doing, he additionally notes that the CASAC supported the preliminary conclusion in the 2019 draft PA and 2021 draft PA that the evidence reviewed in the 2019 ISA does not call into question the public health protection provided by the current primary PM_{10} standard against $PM_{10–2.5}$ exposures and concurs that it is appropriate to consider retaining the current primary PM_{10} standard (Cox,

2019b, p. 13 of consensus responses; Sheppard, 2022a, p. 4 of consensus letter).

As noted below, the scientific evidence for $PM_{10–2.5}$-related health effects has expanded somewhat since the 2012 review, in particular for long-term exposures. The Administrator recognizes, however, that there are a number of uncertainties and limitations associated with the available information, as described in the proposal (85 FR 5558, January 27, 2023) and below. With regard to the current evidence on $PM_{10–2.5}$-related health effects, the Administrator takes note of recent epidemiologic studies that continue to report positive associations with mortality and morbidity in cities across North America, Europe, and Asia, where $PM_{10–2.5}$ sources and composition are expected to vary widely. While significant uncertainties remain, as described below, the Administrator recognizes that this expanded body of evidence has broadened the range of effects that have been linked with $PM_{10–2.5}$ exposures. These studies provide an important part of the scientific foundation supporting the 2019 ISA's revised causality determinations (and new determinations) for long-term $PM_{10–2.5}$ exposures and mortality, cardiovascular effects, metabolic effects, nervous system effects, and cancer (U.S. EPA, 2019a; U.S. EPA, 2022b, section 4.2). Drawing from his consideration of this evidence, the Administrator concludes that the available scientific information supports a decision to maintain a primary PM_{10} standard to provide public health protection against $PM_{10–2.5}$ exposures, regardless of location, source of origin, or particle composition. With regard to uncertainties in the evidence, the Administrator first notes that a number of limitations were identified in the 2012 review related to: (1) Estimates of ambient $PM_{10–2.5}$ concentrations used in epidemiologic studies; (2) limited evaluation of copollutant models to address the potential for confounding; and (3) limited experimental studies supporting biological plausibility for $PM_{10–2.5}$-related effects. Despite the expanded body of evidence for $PM_{10–2.5}$ exposures and health effects assessed in the 2019 ISA, the Administrator recognizes that uncertainties remain, similar to those in the 2012 review. As summarized in section III.A.2 above and in responding to public comments, uncertainties in the available scientific evidence continue to include those associated with the exposure estimates used in epidemiologic studies, the independence of the $PM_{10–2.5}$ health effect associations, and the biologically plausible pathways for $PM_{10–2.5}$ health effects (U.S. EPA, 2022b, section 4.3). These uncertainties contribute to the 2019 ISA determinations that the evidence is ''suggestive of, but not sufficient to infer'' causal relationships (U.S. EPA, 2019a). The Administrator recognizes that the NAAQS must allow for a margin of safety but also places emphasis on evidence supporting ''causal'' or ''likely to be causal'' relationships (as described in sections II.A.2 and III.A.2 above). Finding that there is too much uncertainty that a more stringent standard would improve public health, the Administrator judges that the available evidence provides support for his conclusion that the current standard provides the requisite level of protection from the effects of $PM_{10–2.5}$. In making this judgment, the Administrator considers whether this level of protection is more than what is requisite and whether a less stringent standard would be appropriate to consider. He notes that there continues to be uncertainty associated with the evidence, as reflected by the ''suggestive of, but not sufficient to infer'' causal determinations. The Administrator recognizes that the CAA requirement that primary standards provide an adequate margin of safety, as summarized in section I.A above, is intended to address uncertainties associated with inconclusive scientific evidence and technical information, as well as to provide a reasonable degree of protection against hazards that research has not yet identified. In light of these considerations and the current body of evidence, including uncertainties and limitations, the Administrator concludes that a less stringent standard would not provide the requisite protection of public health, including an adequate margin of safety. The Administrator also considers whether the level of protection associated with the current standard is less than what is requisite and whether a more stringent standard would be appropriate to consider. In so doing, the Administrator considers, as discussed above, the level of protection offered from exposures for which public health implications are less clear. In so doing, he again notes the significant uncertainties and limitations that persist in the scientific evidence. In particular, he notes limitations in the approaches used to estimate ambient $PM_{10–2.5}$ concentrations in epidemiologic studies, limited examination of the potential for confounding by co-occurring pollutants, and limited support for the biological plausibility of the serious effects reported in many epidemiologic studies that are reflected by the ''suggestive of, but not sufficient to infer'' causal determinations. Thus, in light of the currently available information, including the uncertainties and limitations of the evidence base available to inform his judgments regarding protection against $PM_{10–2.5}$-related effects, the Administrator does not find it appropriate to increase the stringency of the standard in order to provide the requisite public health protection. Rather, he judges it appropriate to maintain the level of protection provided by the current primary PM_{10} standard for $PM_{10–2.5}$ exposures and he does not judge that the available information and the associated uncertainties indicate the need for a greater level of public health protection.

In reaching his conclusions on the primary PM_{10} standard, the Administrator also considers advice from the CASAC. In their comments, the CASAC noted that uncertainties that were identified in the 2012 review persist in the evidence for $PM_{10–2.5}$-related health effects (Cox, 2019b, p. 13 of consensus responses; Sheppard, 2022a, p. 4 of consensus letter) In considering these comments, the Administrator takes note of the CASAC consideration of the evidence, and associated uncertainties, and its conclusion that the evidence reviewed in the 2019 ISA does not call into question the adequacy of the public health protection afforded by the current primary PM_{10} standard (Cox, 2019b, p. 3 of letter; Sheppard, 2022a, p. 4 of consensus letter). The Administrator further notes the unanimous conclusions of the CASAC that evidence supports consideration of retaining the current primary PM_{10} standard (Cox, 2019b, p. 3 of consensus letter; Sheppard, 2022a, p. 4 of consensus letter). In addition to the CASAC's advice, the Administrator also considers public comments, the majority of which supported retaining the primary PM_{10} standard, citing to and agreeing with the Administrator's rationale for his proposed decision. The Administrator also recognizes that a few public commenters supported revising the primary PM_{10} standard in order to provide increased protection against $PM_{10–2.5}$-related health effects.

The Administrator also notes that the scientific record for his decision on the primary PM_{10} standard is the same as the record before the then-Administrator in 2020, as the scope of the ISA Supplement focused on health effect categories where the 2019 ISA concluded a causal relationship (*i.e.,*

short- and long-term $PM_{2.5}$ exposure and cardiovascular effects and mortality). Therefore, because no health outcome categories for short- or long-term $PM_{10–2.5}$ exposure in the 2019 ISA were greater than ''suggestive of, but not sufficient to infer, a causal relationship'', the ISA Supplement did not evaluate studies published after the literature cutoff date of the 2019 ISA related to $PM_{10–2.5}$ exposures and health effects. The Administrator further notes his decision is consistent with the decision of the prior Administrator in 2020 to retain the primary PM_{10} standard.

With regard to the indicator for the primary PM_{10} standard, the Administrator recognizes that the 2022 PA notes that the evidence continues to support retaining the PM_{10} indicator to provide public health protection against $PM_{10–2.5}$-related effects. He notes that, consistent with the approaches in previous reviews, a standard with a PM_{10} mass-based indicator, in conjunction with a $PM_{2.5}$ mass-based standard, will result in controlling allowable concentrations of $PM_{10–2.5}$. The Administrator also takes note of the 2019 ISA comparison that showed that the relative contribution of $PM_{2.5}$ and $PM_{10–2.5}$ to PM_{10} concentrations can vary across the U.S. by region and season, with urban locations having a somewhat higher contribution of $PM_{2.5}$ contributing to PM_{10} concentrations than $PM_{10–2.5}$ (U.S. EPA, 2019a, section 2.5.1.1.4, Table 2–7). In these urban locations, where $PM_{2.5}$ concentrations are somewhat higher than in rural locations, the toxicity of the PM_{10} may be higher due to contaminating $PM_{2.5}$. Further, although uncertainties with the evidence persist, the strongest health effects evidence associated with $PM_{10–2.5}$ comes from epidemiologic studies conducted in urban areas. He also notes that the CASAC agreed with the EPA's conclusions that a PM_{10} indicator remained appropriate (Cox, 2019b, p. 13 of consensus responses; Sheppard, 2022a, p. 4 of letter). In light of this information, the Administrator concludes that the PM_{10} indicator remains appropriate and provides protection from exposure to all coarse PM, regardless of location, source of origin, or particle composition.

Similarly, with regard to averaging time, form, and level of the standard, the Administrator takes note of uncertainties in the available evidence and information and continues to find that the current standard, as defined by in all of its elements, is requisite. As an initial matter, the Administrator notes that the current primary PM_{10} standard, with its level of 150 $\mu g/m^3$, 24-hour averaging time, not to be exceeded more than once per year on average over three years, is intended to protect against short-term peak $PM_{10–2.5}$ exposures. In so doing, while the Administrator notes that changes in $PM_{2.5}$ concentrations in ambient air can influence the contribution of the fine and coarse fractions to PM_{10} mass, such that reductions in $PM_{2.5}$ concentrations can lead to more allowable $PM_{10–2.5}$ under the current primary PM_{10} standard, he recognizes that there is no new information available in this reconsideration to suggest that the public health protection provided by the current standard is not requisite or that a more stringent standard is warranted at this time. The Administrator concludes that, particularly in light of his decision to retain the primary 24-hour $PM_{2.5}$ standard with its level of 35 $\mu g/m^3$ as described in section II.B.4 above, the primary PM_{10} standard would be expected to maintain $PM_{10–2.5}$ concentrations in ambient air below those that have been considered to be associated with serious health effects in past NAAQS reviews. The Administrator also notes that while the scientific evidence available in the 2019 ISA has expanded since the completion of the 2009 ISA, he concludes that this information does not provide support for the causal or likely to be causal relationships upon which he places the greatest weight in considering the adequacy of the current standards. He further concludes that the uncertainties and limitations of the scientific evidence, along with the absence of information to inform a quantitative exposure or risk assessment, make it difficult to reach decisions regarding whether a more protective standard is warranted at this time. He has additionally considered the public comments regarding revisions to these elements of the standard and continues to judge that the existing level and the existing form, in all its aspects, together with the other elements of the existing standard provide an appropriate level of public health protection. For all of the reasons discussed above and recognizing the CASAC's conclusion that the current evidence provides support for retaining the current standard, the Administrator concludes that the current primary PM_{10} standard (in all of its elements) is requisite to protect public health with an adequate margin of safety from effects of $PM_{10–2.5}$ in ambient air and should be retained without revision.

C. Decision on the Primary PM_{10} Standard

For the reasons discussed above and considering information and assessments presented in the 2019 ISA and the 2022 PA, the advice from the CASAC, and public comments, the Administrator concludes that the current primary PM_{10} standard is requisite to protect public health with an adequate margin of safety, including the health of at-risk populations, and is retaining the current standard without revision.

IV. Communication of Public Health

A. Air Quality Index Overview

Information about the public health implications of ambient concentrations of criteria pollutants is communicated to the public using the Air Quality Index (AQI) reported on the EPA's AirNow website.[133] The current AQI has been in use since its inception in 1999.[134] It provides useful, timely, and easily understandable information about the daily degree of pollution. The goal of the AQI is to establish a nationally uniform system of indexing pollution concentrations for ozone, carbon monoxide, nitrogen dioxide, PM, and sulfur dioxide. The AQI is recognized internationally as a proven tool to effectively communicate air quality information to the public as demonstrated by the fact that many countries have created similar indices based on the AQI.

The AQI converts an individual pollutant concentration in a community's air to a number on a scale from 0 to 500. Reported AQI values for specific pollutants enable the public to know whether air pollution levels in a particular location are characterized as good (0–50), moderate (51–100), unhealthy for sensitive groups (101–150), unhealthy (151–200), very unhealthy (201–300), or hazardous (301+). Across criteria pollutants, the AQI value of 100 typically corresponds to the level of the short-term (*e.g.,* 24-hour, 8-hour, or 1-hour standard) NAAQS for each pollutant. Below an index value of 100, an intermediate value of 50 is defined either as the level of the annual standard if an annual standard has been established (*e.g.,* $PM_{2.5}$, nitrogen dioxide), a

[133] See *http://www.airnow.gov/.*

[134] In 1976, the EPA established a nationally uniform air quality index, then called the Pollutant Standard Index (PSI), for use by State and local agencies on a voluntary basis (41 FR 37660, September 7, 1976; 52 FR 24634, July 1,1987). In August 1999, the EPA adopted revisions to this air quality index (64 FR 42530, August 4, 1999) and renamed the index the AQI.

concentration equal to one-half the value of the 24-hour standard used to define an index value of 100 (*e.g.,* carbon monoxide), or a concentration based directly on health effects evidence (*e.g.,* ozone). An AQI value greater than 100 means that a pollutant is in one of the unhealthy categories (*i.e.,* unhealthy for sensitive groups, unhealthy, very unhealthy, or hazardous). An AQI value at or below 100 means that a pollutant concentration is in one of the satisfactory categories (*i.e.,* moderate or good). The scientific evidence on pollutant-related health effects for each NAAQS review support decisions related to pollutant concentrations at which to set the various AQI breakpoints, which delineate the AQI categories for each individual pollutant (*i.e.,* the pollutant concentrations corresponding to index values of 150, 200, 300, and 500). The AQI is reported three ways by the EPA and State, local and Tribal agencies, all of which are useful and complementary. The daily AQI is reported for the previous day and used to observe trends in community air quality, the AQI forecast helps people plan their outdoor activities for the next day, and the near-real-time AQI, or NowCast AQI, tells people whether it is a good time for outdoor activity.

Historically, State and local agencies have primarily used the AQI to provide general information to the public about air quality and its relationship to public health. For more than two decades, many State and local agencies, as well as the EPA and other Federal agencies, have been developing new and innovative programs and initiatives to provide more information related to air quality and health messaging to the public in a more timely way. These initiatives, including air quality forecasting, near real-time data reporting through the AirNow website, use of data from air quality sensors on the EPA and U.S. Forest Service's (USFS) Fire and Smoke Map, and air quality action day programs, provide useful, up-to-date, and timely information to the public about air pollution and its health effects. Such information can help the public learn when their well-being may be compromised, so they can take actions to avoid or to reduce exposures to ambient air pollution at concentrations of concern. This information can also encourage the public to take actions that will reduce air pollution on days when concentrations are projected to be of concern to local communities (*e.g.,* air quality action day programs can encourage individuals to drive less or carpool).

B. Air Quality Index Category Breakpoints for $PM_{2.5}$

Recognizing the scientific information available and current AQI reporting practices, the EPA proposed several revisions to the AQI $PM_{2.5}$ breakpoints. EPA solicited and received comments on these proposed revisions. Upon reviewing the information in the proposal and considering the comments received EPA is making final revisions to the AQI category breakpoints for $PM_{2.5}$. This section summarizes the proposed revisions, which can be read in full in the proposal (88 FR 5638, January 27, 2023), significant comments, and final revisions.

1. Summary of Proposed Revisions

One purpose of the AQI is to communicate to the public when air quality is poor and thus when they should consider taking actions to reduce their exposures. The higher the AQI value, the higher the level of air pollution and the greater the health concern. In recognition of the scientific information available that is informing the reconsideration of the 2020 final decision on the primary $PM_{2.5}$ standards, including a number of new controlled human exposure and epidemiologic studies published since the completion of the 2009 ISA, as well as additional epidemiologic studies from other peer reviewed documents that evaluate the health effects of wildfire smoke exposure and that can inform the selection of AQI breakpoints at higher $PM_{2.5}$ concentrations,[135] the EPA proposed to make two sets of changes to the $PM_{2.5}$ sub-index of the AQI. First, the EPA proposed to continue to use the approach used in the revisions to the AQI in 2012 (77 FR 38890, June 29, 2012) of setting the lower breakpoints (50, 100 and 150) to be based on the levels of the primary $PM_{2.5}$ annual and 24-hour standards and proposed to revise the lower breakpoints to be consistent with changes to the primary $PM_{2.5}$ standards that are part of this reconsideration. Second, the EPA proposed to revise the upper AQI breakpoints (200 and above) and to replace the linear-relationship approach used in 1999 to set these breakpoints, with an approach that more fully considers the $PM_{2.5}$ health effects evidence from controlled human exposure and epidemiologic studies that have become available in the last 20 years (64 FR 42530, August 4, 1999).

[135] In evaluating the scientific evidence available to inform decisions regarding the AQI breakpoints, the EPA considered studies that were included as a part of the 2019 ISA and ISA Supplement, but also considered other studies that were not included as a part of the review of the air quality criteria. The ISAs have specific criteria for study inclusion and consideration in reaching conclusions regarding causal relationships, and some studies that may not have met those criteria (*e.g.,* epidemiologic studies that evaluate the health effects of wildfire smoke exposure that would have higher $PM_{2.5}$ concentrations, which are outside of the scope of the ISA) were identified as studies that could be used to inform decisions on the AQI, particularly for the upper breakpoints.

a. Air Quality Index Values of 50, 100 and 150

With respect to the lower AQI breakpoints in the proposal (88 FR 5638, January 27, 2023), the EPA proposed to conclude that it is appropriate to continue setting these breakpoints to be consistent with the primary annual and 24-hour $PM_{2.5}$ standard levels. The lowest AQI value of 50 provides the breakpoint between the ''good'' and ''moderate'' categories. At and below this concentration, air quality is considered ''good'' for everyone. Above this concentration, in the ''moderate'' category, the AQI contains advisories for unusually sensitive individuals. The EPA has historically set this breakpoint at the level of the primary annual $PM_{2.5}$ standard. In doing so, the EPA has recognized that: (1) The annual standard is set to provide protection to the public, including at-risk populations, from $PM_{2.5}$ concentrations, which, when experienced on average for a year, have the potential to result in adverse health effects; and (2) the AQI exposure period represents a shorter exposure period (*e.g.,* 24-hour (or less)) while focusing on the most sensitive individuals. The EPA saw no basis for deviating from this approach in this reconsideration. Thus, the EPA proposed to set the AQI value of 50 at a daily (*i.e.,* 24-hour) average concentration equal to the level of the primary annual $PM_{2.5}$ standard that is promulgated.

The historical approach to setting an AQI value of 100, which is the breakpoint between the ''moderate'' and ''unhealthy for sensitive groups'' categories, and above which advisories are generated for sensitive groups, is to set it at the same level as the primary 24-hour $PM_{2.5}$ standard. In so doing, the EPA has recognized that the primary 24-hour $PM_{2.5}$ standard is set to provide protection to the public, including at-risk populations, from short-term exposures to $PM_{2.5}$ concentrations that have the potential to result in adverse health effects. Given this, it is appropriate to generate advisories for sensitive groups at concentrations above this level. In the past, State, local, and Tribal air quality agencies have expressed strong support for this approach (78 FR 3086, January 15, 2013). The EPA saw no basis to deviate

from this approach in this reconsideration. In the proposal (88 FR 5638, January 27, 2023), the EPA proposed to retain the current primary 24-hour $PM_{2.5}$ standard with its level of 35 μg/m³ but took comment on revising the level of that standard to 25 μg/m³ (section II.D.3.b). Thus, the EPA proposed to retain the AQI value of 100 set at the level of the current primary 24-hour $PM_{2.5}$ standard concentration of 35 μg/m³ (*i.e.,* 24-hour average).

With respect to an AQI value of 150, which is the breakpoint between the ''unhealthy for sensitive groups'' and ''unhealthy categories,'' this breakpoint concentration in this reconsideration is based upon the considering the same health effects information, as assessed in the 2019 ISA and ISA Supplement and described in section II above, that informs the proposed decisions on the level of the 24-hour standard and the AQI value of 100. Previously, the Agency has used a proportional adjustment in which the AQI value of 150 was set proportionally to the AQI value of 100. This proportional adjustment inherently recognizes that the available epidemiologic studies provide no evidence of discernible thresholds, below which effects do not occur in either sensitive groups or in the general population, that could inform conclusions regarding concentrations at which to set this breakpoint. Given that the epidemiologic evidence continues to be the most relevant health effects evidence for informing this range of AQI values, the EPA saw no basis to deviate from this approach in this reconsideration. Therefore, the EPA proposed to set an AQI value of 150 proportionally, depending on the breakpoint concentration of the AQI value of 100 (*i.e.,* 55.4 for a 24-hour standard of 35 μg/m³).

b. Air Quality Index Values of 200 and Above

In the proposal (88 FR 5639, January 27, 2023), the EPA summarized the history of setting the AQI values of 300 and above in the 1999 rule (64 FR 42530, August 4, 1999) and established breakpoints for $PM_{2.5}$ in that range. In general, the AQI values between 100 and 500 were based on $PM_{2.5}$ concentrations that generally reflected a linear relationship between increasing index values and increasing $PM_{2.5}$ concentrations.[136] It was found that this linear relationship was generally consistent with the health effects evidence, which suggested that as $PM_{2.5}$ concentrations increase, increasingly larger numbers of people are likely to experience serious health effects in this range of $PM_{2.5}$ concentrations (64 FR 42536, August 4, 1999). For the AQI breakpoint of 500, the concentration was based on the method used to establish a previously existing PM_{10} breakpoint that was informed by studies conducted in London using the British Smoke method, which uses a different particle size cutpoint as noted in the proposal (88 FR 5639, January 27, 2023). Due to limited ambient $PM_{2.5}$ monitoring data available at that time, the decision on the 500 value concentration for $PM_{2.5}$ was based on the stated assumption that PM concentrations measured by the British Smoke method were approximately equivalent to $PM_{2.5}$ concentrations (64 FR 42530, August 4, 1999). Given that the British Smoke method has a larger particle size cutpoint than the current $PM_{2.5}$ monitoring method, which has a cutpoint of 2.5 microns, a concentration of 500 μg/m³ based on the British Smoke method would be equivalent to a lower $PM_{2.5}$ concentration. With respect to the upper breakpoints of the AQI, the EPA has historically been concerned about establishing these upper breakpoints using evidence based on larger size fractions of PM, given that $PM_{2.5}$ is the indicator for the AQI. While monitoring data for higher $PM_{2.5}$ concentrations in ambient air has been available for many years, the health effects evidence has only recently become available for consideration in informing decisions on the upper breakpoints of the AQI.

As part of this reconsideration, the EPA recognized that the health effects evidence associated with $PM_{2.5}$ exposure has greatly expanded in recent years. Multiple controlled human exposure studies have become available that provide information about health effects across a range of concentrations. While many of the new studies evaluated in the 2019 ISA focused on examining health effects associated with exposure to lower $PM_{2.5}$ concentrations, there are also several new controlled human exposure studies that provide information about the health effects observed in study participants at concentrations well above the standard levels. Additionally, there are also epidemiologic studies now available and evaluated in other Agency peer-reviewed documents that can inform health effects associated with higher $PM_{2.5}$ concentrations (U.S. EPA, 2021b).[137] Thus, the EPA concluded that it is appropriate to reevaluate the upper AQI breakpoints, taking into account the expanded body of scientific evidence, particularly given several new epidemiologic studies conducted during high pollution events like wildfires and multiple controlled human exposure studies. While it remains unclear the exact $PM_{2.5}$ concentrations at which specific health effects occur, the more recent studies do provide more refined information about the concentration range in which these effects might occur in some populations. These studies provide support for coherence of effects across scientific disciplines and potentially biologically plausible pathways for the overt population-level health effects observed in epidemiologic studies. Therefore, taking into account the short exposure time period in these studies (*e.g.,* 1–6 hours) and that the studies generally do not include at-risk (or sensitive) populations, but rather young, healthy adults, these studies, in conjunction with information from epidemiologic studies, the EPA preliminarily concluded it would be appropriate to be more cautionary and offer advisories to the public for reducing exposures at lower concentrations than recommended with the current AQI breakpoints.

The AQI value of 200 is the breakpoint between the ''unhealthy'' and ''very unhealthy'' categories. At AQI values above 200, the AQI would be providing a health warning that the risk of anyone experiencing a health effect following short-term exposures to these $PM_{2.5}$ concentrations has increased. To inform proposed decisions on this breakpoint, the EPA takes note of studies indicating the potential for respiratory or cardiovascular effects that are on their own representative of or are on the biologically plausible pathway to more serious health outcomes (*e.g.,* emergency department visits, hospital admissions). The controlled human exposure studies evaluated in the 2009 and 2019 ISAs provide evidence of inflammation as well as cardiovascular effects in healthy subjects at and above 120 μg/m³. For example, Ramanathan et al. (2016) observed a transient reduction in antioxidant/anti-inflammatory function after exposing healthy young subjects to a mean concentration of 150 μg/m³ of $PM_{2.5}$ for 2 hours. Urch et al.

[136] The AQI breakpoint at 150 was originally set in 1999 to be linearly related to the concentrations at the 100 and 500 breakpoints but then revised in 2012 to be proportional to the AQI breakpoint concentration at 100 (78 FR 3181, January 15, 2013).

[137] In this reconsideration, the controlled human exposure studies were evaluated in the 2019 ISA, whereas the epidemiologic studies of wildfire smoke exposures were included in the EPA Comparative Assessment of the Impacts of Prescribed Fire Versus Wildfire (CAIF): A Case Study in the Western U.S. (U.S. EPA 2021b).

(2010) also reported increased markers of inflammation when exposing both asthmatic and non-asthmatic subjects to a mean concentration of 140 μg/m³ of $PM_{2.5}$ for 3 hours. In studies specifically examining cardiovascular effects, Ghio et al. (2000) and Ghio et al. (2003) exposed healthy subjects to a mean concentration of 120 μg/m³ for 2 hours and reported significantly increased levels of fibrinogen, a marker of coagulation that increases during inflammation. Sivagangabalan et al. (2011) exposed healthy subjects to a mean concentration of 150 μg/m³ of $PM_{2.5}$ for 2 hours and noted an increased QT interval (3.4 ± 1.4) indicating some evidence for conduction abnormalities, an indicator of possible arrhythmias. Lastly, Brook et al. (2009) reported a transient increase of 2.9 mm Hg in diastolic blood pressure in healthy subjects during the 2-hour exposure to a mean concentration of 148 μg/m³ of $PM_{2.5}$.

In addition to epidemiologic studies evaluated in the 2019 ISA that analyzed exposures at ambient $PM_{2.5}$ concentrations, there are a number of recent epidemiologic studies focusing on wildfire smoke that have become available that were evaluated in the EPA's recently released peer-reviewed assessment on wildland fire (U.S. EPA, 2021b). One of these studies, Hutchinson et al. (2018), conducted a bidirectional case-crossover analysis to examine associations between wildfire-specific $PM_{2.5}$ exposure and respiratory-related healthcare encounters (*i.e.,* ED visits, inpatient hospital admissions, and outpatient visits) prior and during the 2007 San Diego wildfires. This study found positive and significant associations to $PM_{2.5}$ exposures and respiratory-related healthcare encounters. Further, during the initial 5-day period of the wildfire event, the study observed that there was evidence of increases in a number of respiratory-related outcomes particularly ED visits for asthma, upper respiratory infection, respiratory symptoms, acute bronchitis, and all respiratory-related visits (Hutchinson et al., 2018). When examining the air quality during the wildfire event, $PM_{2.5}$ concentrations were highest during the initial five days of the wildfire, with 24-hour average $PM_{2.5}$ concentrations of 89.1 μg/m³ across all zip codes and with the highest 24-hour average of 160 μg/m³ on the first day (Hutchinson et al., 2018).

When considering this collective body of evidence from controlled human exposure and epidemiologic studies, the Agency proposed to set an AQI value of 200 at a daily (*i.e.,* 24-hour average) concentration of $PM_{2.5}$ of 125 μg/m³. As discussed above and in the proposal (88 FR 5640, January 27, 2023), this concentration is at the lower end of the concentrations consistently shown to be associated with respiratory and cardiovascular effects in controlled human exposure studies following short-term exposures (*e.g.,* 2–3 hours) and in young, healthy adults (Ghio et al., 2000; Ghio et al., 2003; Urch et al., 2010; Ramanathan et al., 2016; Sivagangabalan et al., 2011; and Brook et al., 2009) and also within the range of 5-day average and maximum concentrations observed to be associated with respiratory-related outcomes following exposure to wildfire smoke (Hutchinson et al., 2018).

The AQI value of 300 denotes the breakpoint between the ''very unhealthy'' and ''hazardous'' categories, and thus marks the beginning of the ''hazardous'' AQI category. At AQI values above 300, the AQI provides a health warning that everyone is likely to experience effects following short-term exposures to these $PM_{2.5}$ concentrations. To inform decisions on this AQI breakpoint, the EPA takes note of controlled human exposure studies that consistently show subclinical effects which are often associated with more severe cardiovascular outcomes. As discussed above, Brook et al. (2009) reported a transient increase of 2.9 mm Hg in diastolic blood pressure in healthy subjects during the 2-hour exposure to a mean concentration of 148 μg/m³ of $PM_{2.5}$. Bellavia et al. (2013) exposed healthy subjects to an average $PM_{2.5}$ concentration of 242 μg/m³ for 2 hours and reported increased systolic blood pressure (2.53 mm Hg). Tong et al. (2015) exposed healthy subjects to an average $PM_{2.5}$ concentration of 253 μg/m³ for 2 hours and observed a significant increase in diastolic blood pressure (2.1 mm Hg) and a nonsignificant increase in systolic blood pressure (2.5 mm Hg). Lucking et al. (2011) reported impaired vascular function and increased potential for coagulation when exposing healthy subjects to diesel exhaust (DE) with an average $PM_{2.5}$ concentration of 320 μg/m³ for a duration of 1 hour.[138] These studies all provided evidence of impaired vascular function, including vasodilatation impairment and increased thrombus formation, with Tong et al. (2015), Bellavia et al. (2013), Brook et al. (2009) all reporting increases in blood pressure. Additionally, Behbod et al. (2013) reported increased inflammatory markers following a 2-hour exposure to an average $PM_{2.5}$ concentration of 250 μg/m³ in healthy subjects.

In addition to the controlled human exposure studies discussed above, the epidemiologic study conducted by DeFlorio-Barker et al. (2019) examined the relationship between wildfire smoke and cardiopulmonary hospitalizations among adults 65 years of age and older from 2008–2010 in 692 U.S. counties. The authors reported a 2.22% increase in all-cause respiratory hospitalizations on wildfire smoke days for a 10 μg/m³ increase in 24-hour average $PM_{2.5}$ concentrations (DeFlorio-Barker et al., 2019). The maximum 24-hour average concentration in this study on wildfire smoke days was 212.5 μg/m³ (DeFlorio-Barker et al., 2019). In considering this study, the EPA notes the increased probability that even healthy adults experience effects at this maximum exposure concentration, particularly given that this maximum concentration is near the exposure concentrations in controlled human exposure studies that consistently reported evidence of impaired vascular function and several that reported increases in blood pressure in healthy adults following 2-hour exposures.

Based on the information discussed above and in the proposal (88 FR 5640, January 27, 2023), the EPA proposed to revise the 300 level of the AQI, which marks the beginning of the ''hazardous'' AQI category, to a concentration that is consistent with the $PM_{2.5}$ concentrations associated with health effects as reported in the controlled human exposure (Brook et al., 2009; Bellavia et al., 2013; Tong et al., 2015; Behbod et al., 2013) and epidemiologic studies (DeFlorio-Barker et al. (2019). Specifically, the Agency proposed to set an AQI value of 300 at a daily (*i.e.,* 24-hour average) $PM_{2.5}$ concentration of 225 μg/m³. This concentration falls between the 2-hour average concentrations reported in controlled human exposure studies found to be consistently associated, in healthy adults, with impaired vascular function and/or increases in blood pressure, which could both be a precursor to more severe cardiovascular effects following short-term (1- to 2-hour) exposures, and the maximum 24-hour average $PM_{2.5}$ concentrations on wildfire smoke days reported in the epidemiologic study conducted by DeFlorio-Barker et al. (2019).

[138] Although participants in Lucking et al. (2011) were exposed to diesel exhaust (DE), the authors also conducted analyses using a particle trap, and as noted in the 2019 ISA, this type of study design allows for the assessment of the role of $PM_{2.5}$ on the health effects observed by removing PM from the DE mixture.

c. Air Quality Index Value of 500

Lastly, the EPA also proposed revisions to the 500 value of the AQI. The 500 value of the AQI is within the ''hazardous'' category but is specified and used to calculate the slope of the AQI values in the ''hazardous category'' above and below AQI values of 500. In the past, this breakpoint had a very prominent role in determining the current upper AQI values given that it was used as part of the linear relationship with the concentration at the AQI value of 100 to determine the AQI values of 200 and 300 in 1999 (64 FR 42530, August 4, 1999).

As discussed above and in the proposal (88 FR 5641, January 27, 2023), the current breakpoint concentration for the 500 value of the AQI was set in 1999 at a 24-hour average $PM_{2.5}$ concentration of 500 μg/m³ and was based on studies conducted in London using the British Smoke method, which used a different particle size cutpoint and likely overestimated the $PM_{2.5}$ concentration. In looking to improve upon that approach, the EPA considered several recent controlled human exposure studies that observe health effects that are on the biologically plausible pathway to more severe cardiovascular outcomes and note that these seem to follow exposures to high $PM_{2.5}$ concentrations that are well above those typically observed in ambient air. More specifically, in controlled human exposure studies, Vieira et al. (2016a) and Vieira et al. (2016b) exposed healthy subjects and subjects with heart failure to diesel exhaust (DE) with a mean $PM_{2.5}$ concentration of 325 μg/m³ for 21 minutes and reported decreased stroke volume, and increased arterial stiffness (an indicator of endothelial dysfunction) in both healthy and heart failure subjects.[139] Also as summarized above and discussed in the proposal (88 FR 5641, January 27, 2023), Lucking et al. (2011) exposed healthy subjects to DE with a mean $PM_{2.5}$ concentration of 320 μg/m³ for 1 hour.[140] Epidemiologic studies have linked the types of cardiovascular effects observed in these controlled human exposure studies with the exacerbation of ischemic heart disease (IHD) and heart failure as well as myocardial infarction (MI) and stroke.

In addition to the controlled human exposure studies discussed in the proposal (88 FR 5641, January 27, 2023) and summarized above, recent epidemiologic studies examining the relationship between concentrations of $PM_{2.5}$ during wildfires and respiratory health also informed the proposed decisions on the concentration for the AQI value of 500. As discussed in the proposal (88 FR 5641, January 27, 2023) and summarized earlier in this section, Hutchinson et al. (2018) reported increases in a number of respiratory-related ED visits for asthma, upper respiratory infection, respiratory symptoms, acute bronchitis, and all combined respiratory-related visits based on data from Medi-Cal claims for emergency department presentations, inpatient hospitalizations, and outpatient visits during the initial 5-day period of the 2007 San Diego fire. During the initial 5-day window, $PM_{2.5}$ concentrations were found to be at their highest with the 95th percentile of 24-hour average concentrations of 333 μg/m³.

Although studies of short-term (*i.e.,* daily) exposures to wildfire smoke are more informative in considering alternative level for the AQI value of 500 since they mirror the 24-hour exposure timeframe, additional information from epidemiologic studies of longer-term exposures (*i.e.,* over many weeks) during wildfire events can provide supporting information. As discussed in the proposal (88 FR 5641, January 27, 2023) and summarized here, Orr et al. (2020) conducted a longitudinal study that reported exposure to wildfire smoke from a multi-month fire resulted in reduced lung function in subsequent years and concluded that exposure to high $PM_{2.5}$ concentrations during a multi-week fire event may lead to health consequences, such as declines in lung function. During the 2017 wildfire event (August 1 to September 19, 2017), Orr et al. (2020) reported that many days during the multi-month fire had $PM_{2.5}$ concentrations above 300 μg/m³, resulting in a daily average $PM_{2.5}$ concentration of 220.9 μg/m³ with a maximum $PM_{2.5}$ concentration of 638 μg/m³.

The controlled human exposure studies provide biological plausibility for results of epidemiologic studies that document increases in respiratory-related health care events during the wildfires. The collective evidence from controlled human exposure and epidemiologic studies, which includes decreases in stroke volume, increased arterial stiffness, impaired vascular function and respiratory-related healthcare encounters provide health-based evidence that informed the proposed decisions on the level of the AQI value of 500. Given the concentrations observed in these studies, the Agency proposed to revise the AQI value of 500 to a level set at a daily (*i.e.,* 24-hour average) $PM_{2.5}$ concentration of 325 μg/m³. This concentration is at or below the lowest concentrations observed in the controlled human exposure studies associated with more severe effects discussed above and also at the low end of the daily concentrations observed in the epidemiologic studies conducted by Hutchinson et al. (2018) and Orr et al. (2020).

Table 1 below summarizes the proposed breakpoints for the $PM_{2.5}$ sub-index.

TABLE 1—PROPOSED BREAKPOINTS FOR $PM_{2.5}$ SUB-INDEX

AQI category	Index values	Proposed breakpoints (μg/m³, 24-hour average)
Good	0–50	0.0–(9.0–10.0)
Moderate	51–100	(9.1–10.1)–35.4
Unhealthy for Sensitive Groups	101–150	35.5–55.4
Unhealthy	151–200	55.5–125.4
Very Unhealthy	201–300	125.5–225.4

[139] These effects were attenuated when the DE was filtered, to reduce $PM_{2.5}$ concentrations, indicating the effects were likely associated with $PM_{2.5}$ exposure.

[140] When applying a particle trap, $PM_{2.5}$ concentrations were reduced, and effects associated with cardiovascular function including impaired vascular function, as measured by vasodilatation and thrombus formation were attenuated indicating associations with $PM_{2.5}$.

TABLE 1—PROPOSED BREAKPOINTS FOR $PM_{2.5}$ SUB-INDEX—Continued

AQI category	Index values	Proposed breakpoints ($\mu g/m^3$, 24-hour average)
Hazardous [1]	301+	225.5

[1] AQI values between breakpoints are calculated using equation 1 in appendix G. For AQI values in the hazardous category, AQI values greater than 500 should be calculated using equation 1 and the $PM_{2.5}$ concentration specified for the AQI value of 500.

2. Summary of Significant Comments on Proposed Revisions

The EPA received many comments on the proposed changes to the $PM_{2.5}$ AQI breakpoints. Many commenters generally supported all the proposed revisions to the AQI breakpoints based on the revisions to the primary annual and daily $PM_{2.5}$ standards and recent scientific evidence discussed in the proposal (88 FR 5558, January 27, 2023). However, we received specific comments on proposed revisions to the breakpoints in the lower end of the AQI, related to their linkage to the annual and daily $PM_{2.5}$ standards, and proposed revisions to the breakpoints at the upper end of the AQI, based on EPA's interpretation of available health effects evidence.

a. Air Quality Index Values of 50, 100, and 150

Some commenters agreed with using the historical approach of setting the 50, 100 and 150 breakpoints of the AQI to be consistent with the primary $PM_{2.5}$ standards. Some cited the reason that this approach creates consistent communication with respect to air quality and the standards, and this is how the other AQI sub-indices are set. A few commenters disagreed with the historical approach and suggested instead that the 50 breakpoint of the AQI should not be revised at all, or that the 50 and 100 breakpoints of the AQI should be supported directly by health data similar to the basis for the proposed 200, 300 and 500 breakpoints.

The few commenters that disagreed with the historical approach of the 50 breakpoint of the AQI noted that setting a short-term breakpoint to annual standard was not logical since it is a long-term standard and not meant to be interpreted for short-term messaging with the AQI, in particular when reported hourly via the NowCast. These commenters also noted that additional studies are needed to identify the health impacts of short-term exposures at low concentrations. They also noted that lowering the 50 breakpoint of the AQI in conjunction with the annual standard may cause confusion with the public because some State programs and policy decisions are connected to the AQI while others are based on PM concentrations, which could lead to inconsistent messaging reducing the public's trust. These comments were supported by noting that revised breakpoints could lead to more moderate days than in the past, but the monitor values would be the same as before when the commenters considered it ''healthy,'' possibly eroding trust in air agencies' messaging. Commenters also noted if the breakpoints are revised, the public will not visually be able to detect the difference between what was considered a good AQI day versus a now moderate AQI day.

The EPA disagrees with these commenters. With respect to setting a short-term breakpoint to the level of a much longer-term (annual) standard, setting the lower AQI breakpoints at the level of the annual and daily $PM_{2.5}$ standards for communication purposes was discussed in the proposed reconsideration (88 FR 5558, January 27, 2023) and previously supported by State organizations in the 2012 PM Final Rule (77 FR 38890, June 29, 2012). Both the AQI and the Pollutant Standards Index, which came before it, have historically been normalized across pollutants by defining an index value of 50 and 100 as the numerical level of the annual (when defined) and short-term (*i.e.,* averaging time of 24-hours or less) primary NAAQS for each pollutant. This approach clearly communicates the air quality to the public. The EPA considers this approach to be appropriate given the available evidence and structure of the standard. As discussed in section II.B above and in the notice of final rulemaking for the 2012 review (77 FR 38890, June 29, 2012), the primary annual and 24-hour $PM_{2.5}$ standards work together in concert to provide public health protection. The annual $PM_{2.5}$ standard is generally viewed as the principal means of providing public health protection against ''typical'' daily and annual $PM_{2.5}$ exposures, while the 24-hour $PM_{2.5}$ standard is generally viewed as a means of providing protection against short-term exposures to ''peak'' $PM_{2.5}$ concentrations, such as can occur in areas with strong contributions from local or seasonal sources, even when annual average $PM_{2.5}$ concentrations remain relatively low. Because the annual standard provides public health protection for typical daily $PM_{2.5}$ exposures, the EPA thinks it is appropriate to use that level for the 50 breakpoint of the AQI and describe daily air quality at and below the level of the annual standard ''Good.'' Since an annual standard allows for days with air quality above that level, it is appropriate to call days just above it ''Moderate.'' If the 50 breakpoint of the AQI was set at a level above the annual standard, it would be possible for the majority of days to be called ''good'' in a year when an area exceeds the annual standard. This could cause confusion with the public about air quality if the general perception is that local air quality is ''good,'' but the area fails to meet the annual standard. In addition, the EPA continues to find it appropriate to use the NowCast with the $PM_{2.5}$ AQI index to provide more real-time information to the public. As discussed in the AQI Technical Assistance Document, while the NowCast algorithm is approximating a 24-hour average exposure, it can reflect concentrations observed over shorter averaging times when air quality is changing rapidly (U.S. EPA, 2018a). The EPA continues to consider the use of the primary annual standard level suitable in the NowCast given the health evidence supporting the standard and given that the reported concentrations are an approximation of ''typical'' daily exposure. Additionally, the EPA reflects the nature of the NowCast in the associated health messaging.

With regard to the commenter stating the public may not be able to visually detect a difference in the air quality, the EPA notes that the AQI is intended to be a communication tool for public awareness precisely because it is generally difficult for the public to visually judge air quality risks when air pollution is ''moderate.'' Moreover, since the establishment of the AQI, the EPA and State and local air agencies and organizations have developed experience in educating the public about changes in the standards and,

concurrently, related changes to AQI breakpoints and advisories. When the standards change, the EPA and State and local agencies have sought to help the public understand that air quality is not getting worse, it's that the health evidence underlying the standards and the AQI has changed. The EPA's Air Quality System (AQS), the primary repository for air quality monitoring data, is also adjusted to reflect the revised breakpoints. Specifically, all historical AQI values in AQS are recomputed with the revised breakpoints, so that all data queries and reports downstream of AQS will show appropriate trends in AQI values over time. If any State, local or Tribal air agency is concerned that people are or will be confused on a moderate AQI day, then they could use the communication information that has been developed with this rulemaking.

Some commenters stated that the AQI should not necessarily be linked to the primary $PM_{2.5}$ standards. One example is the comment that if the annual standard is not lowered to 8 μg/m³, the EPA should lower the 50 breakpoint of the AQI to that level to better inform the public of the need for behavioral modifications to reduce the harm to health from $PM_{2.5}$ exposure. Similar to the reasons discussed above, the EPA concludes that setting the 50 breakpoint of the AQI at the level of the annual $PM_{2.5}$ standard is appropriate from a health perspective and for communication purposes. The Administrator has judged the primary annual standard (in conjunction with the other primary standards) as revised in this final action to be requisite to protect public health with an adequate margin of safety, based on the health evidence discussed in section II.A.2. Setting the 50 breakpoint lower than the annual standard also has the potential to cause confusion with the public since it does not reflect the standards and the Administrator's judgments about the standards as well.

With regard to the 100 breakpoint of the AQI, several commenters expressed the view that the level of the 24-hour $PM_{2.5}$ standard and an AQI value of 100 should be set at 25 μg/m³ based on the body of evidence and lower end of the range recommended by CASAC. These commenters noted that if the current 24-hour standard and AQI value of 100 is retained at 35 μg/m³ then the public will not be able to make informed decisions about actions to take to protect their health. Many of these commenters further recommended that the AQI value of 100 should be lowered to 25 μg/m³ even if the standard is retained. Commenters expressed the view that this would more adequately allow the public to take health-protective actions.

The EPA disagrees with these commenters and notes that many State, Tribal and local air agencies have expressed strong support for aligning the 100 breakpoint of the AQI with the short-term 24-hour primary $PM_{2.5}$ standards as discussed in the proposal (88 FR 5558, January 27, 2023). The EPA agrees with the view, expressed by State, local and Tribal entities, that aligning the lower breakpoints with the standards enables clear communication of the standards. This alignment approach is also utilized in the other AQI sub-indices lower breakpoints and taking a different approach with the $PM_{2.5}$ AQI could cause confusion. Additionally, the Administrator has judged that it is appropriate to retain the 24-hour standard at a level of 35 μg/m³ (in conjunction with the other primary standards) to protect public health with an adequate margin of safety, based on the health evidence discussed in section II.A.2. Thus, EPA disagrees that it is necessary or appropriate to set the 100 breakpoint at a lower concentration to provide further information to the public. The 50 breakpoint, which is set at a level below 25 μg/m³, will continue to provide information to members of the public particularly concerned about exposures to $PM_{2.5}$. As with the 50 breakpoint, aligning the breakpoint with the standard both reflects the Administrator's judgment about the health risks and eliminates the potential to cause confusion in the public about those risks.

b. Air Quality Index Values of 200 and Above

Some commenters supported the proposed revisions to the 200, 300 and 500 breakpoints that recognize the expanded body of scientific evidence, particularly several new epidemiologic studies conducted during high pollution events such as wildfires and multiple controlled human exposure studies. A few commenters agreed with incorporating the expanded body of scientific evidence into the 200, 300 and 500 breakpoints, but suggested a modified linear approach between 200 (115 μg/m³) and 500 (312 μg/m³, setting the 300 breakpoint to 187 μg/m³) based on recent epidemiologic wildfire smoke studies.

Other commenters disagreed with the proposed revisions and suggested the EPA should continue using the previous breakpoints that follow the 1999 linear approach (64 FR 42530, August 4, 1999), because not changing the breakpoints would simplify communications. A few commenters stated the proposed revisions to the AQI upper breakpoints are not justified because the scientific evidence supporting the revisions is inadequate. To support this view, the commenters suggest that only three epidemiologic studies were used in determining the upper breakpoints and none of them were representative of potential effects in the general public; of the 13 studies cited only three were near the proposed revised breakpoints; four of the studies involved exposure to PM from diesel and traffic pollution, which is different than PM from wildfire smoke; and the data supporting the revisions only indicated ''mild'' health effects that were mostly in sensitive populations.

The EPA agrees with the majority of commenters that supported utilizing the expanded body of scientific evidence to revise the 200, 300 and 500 breakpoints of the AQI. The EPA appreciates the suggestion of using a revised linear approach from 200 to 500. But rather than using the available evidence to only set the breakpoint of 500, the EPA finds it appropriate to set the breakpoints for 200, 300 and 500 using an evidence-based approach, by relying on information presented in both controlled human exposure studies and epidemiologic studies that examine relationships between high $PM_{2.5}$ exposure episodes (*i.e.,* periods of wildfire smoke) and various health outcomes. Setting these breakpoints based directly on health effects evidence, which can be communicated, is more useful and appropriate than using a linear approach, because it can better describe the potential health effects and symptoms which also helps the public better understand why more health protective actions are needed. By its nature, a linear approach does not evaluate and identify associated health effects and risk factors.

The EPA disagrees with the commenters that expressed the view that these upper breakpoints should not be revised based largely on the numerous peer-reviewed studies published since the 200, 300 and 500 breakpoints were originally established in 1999 (64 FR 42530, August 4, 1999). As discussed in the proposal (88 FR 5641, January 27, 2023), the rationale behind the proposed revisions is rooted in the fact the upper AQI breakpoints are based on outdated scientific evidence. Specifically, the traditional linear approach was predicated on the 500 value of the AQI, which was estimated using health studies that used the British Smoke Method. The British Smoke Method is based on a particle size fraction (4.5 microns) that is larger

than $PM_{2.5}$. Given that the British Smoke method has a larger particle size cutpoint than the current $PM_{2.5}$ monitoring method, which has a cutpoint of 2.5 microns, a concentration of 500 μg/m^3 based on the British Smoke method would be equivalent to a lower $PM_{2.5}$ concentration (88 FR 5641, January 27, 2023). The combination of a larger particle size fraction informing previous decisions around upper AQI breakpoints and more recent scientific evidence than the London Fog Episode, on the potential health consequences of what we currently consider to be high $PM_{2.5}$ exposures, provides the underlying basis for revising the upper breakpoints to better inform the public about air quality to allow the public to take health protective actions as appropriate. Moreover, as discussed above, until recently there was limited information upon which to base the breakpoints between 150 and 500, so the linear approach was a reasonable substitute. While not changing the breakpoints may be easier because there is no change to communicate, using a health-based approach is more appropriate, because it helps the public better understand that more health protective actions are needed.

The Agency disagrees that the scientific evidence discussed in the proposal is inadequate to revise the 200, 300 and 500 breakpoints of the AQI (88 FR 5640, January 27, 2023). The EPA disagrees that these studies should not be considered because they ''indicated mild health effects in sensitive populations.'' The EPA notes that many of the subclinical effects discussed in the proposal (88 FR 5640, January 27, 2023) that informed the breakpoints are on the biologically plausible pathway (see 2019 ISA, section 6.1.1 and Figure 6–1) to more severe cardiovascular outcomes, such as ED visits, hospital admissions, and death as depicted in the large number of epidemiologic studies evaluated in the 2019 ISA and ISA Supplement. From a public health perspective, the purpose of the AQI is to inform the public when air quality could adversely affect their health. The scientific evidence informed revisions to the breakpoints at the upper end of the AQI allow it to better reflect the risk of experiencing health effects at higher $PM_{2.5}$ concentrations. In addition, the EPA disagrees with the commenter that the effects reported at these higher concentrations were observed only in sensitive populations as these effects were also reported in healthy populations (Ghio et al., 2000; Ghio et al., 2003; Urch et al., 2010; Ramanathan et al., 2016; Sivagangabalan et al., 2011; Brook et al., 2009; Bellavia et al. (2013); Tong et al. (2015); Behbod et al. (2013); Vieira et al. (2016a) Vieira et al. (2016b); and Lucking et al. (2011)).

c. Other Comments

The EPA received a few additional comments on elements of the $PM_{2.5}$ AQI, including the averaging time. Some commenters expressed the view that the 24-hour averaging time was not useful when informing the public how to protect their health, particularly during rapidly changing conditions such as wildfire smoke events. Instead, they suggested a subdaily averaging time of 1–3 hours would be more effective because it more closely aligns with how people breathe.

A few of these commenters suggested that instead of changing the AQI averaging time, which aligns with the short-term standard, the EPA could create a public health warning system for unhealthy $PM_{2.5}$ levels. The commenters noted that aligning the AQI averaging time with the short-term standard could be useful for consistent communication with the standards and attainment but suggested that a subdaily warning system could better allow the public to take health protective actions.

The EPA disagrees that a shorter averaging period for the $PM_{2.5}$ AQI sub-index would be better. The health effects evidence supporting a subdaily metric is limited and inconsistent. As part of its review of the health effects evidence, the 2019 ISA evaluated whether a subdaily metric would be more closely related to health effects. Most epidemiologic studies that examined the relationship between short-term $PM_{2.5}$ exposures and health effects evaluated an exposure metric averaged over 24-hours. Some recent studies, focusing on respiratory and cardiovascular effects and mortality, have examined whether there is evidence that subdaily exposure metrics are more closely related to health effects than a traditional 24-hour average metric. After evaluating this limited newer evidence, the 2019 ISA concluded that ''collectively, the available evidence does not indicate that subdaily averaging periods for $PM_{2.5}$ are more closely associated with health effects than the 24-hour avg exposure metric,'' (2019 ISA, chapter 1, section 1.5.2.1, pp. 146–147; U.S. EPA, 2022a).

In addition, there are communication benefits to aligning the averaging time of the AQI with the daily standard, as some of these commenters note, such as providing consistent messages about when it may be beneficial for people to take actions to reduce $PM_{2.5}$ exposures. Furthermore, with regard to an additional warning system, the EPA is concerned that having two air quality communication systems operating at the same time would likely be confusing to the public and reduce the effectiveness of the systems.

At the same time, the EPA recognizes that when air quality is rapidly changing, such as during wildfire smoke events, reporting information based on a 24-hour metric may not be as useful for the public as reporting more frequently would be. The EPA has balanced concerns about being able to provide timely communication of air quality hazards when conditions are changing quickly with the goal of limiting the number of air quality communications systems and its judgment that the evidence supports a 24-hour-based metric linked to the daily standard by establishing the NowCast, which takes into consideration subdaily $PM_{2.5}$ concentrations and provides a near real-time AQI value based on the AQI colors and scale. Specifically, the NowCast shows air quality conditions for the most current hour of $PM_{2.5}$ data available by using a calculation that involves multiple hours of past data. As noted in the AQI Technical Assistance Document, the NowCast currently uses longer averages during periods of stable air quality and shorter averages (down to a 3-hour average) when air quality is changing rapidly, such as during a wildfire (U.S. EPA, 2018a). As discussed further in section IV.D.2 of this notice, the EPA uses the NowCast to approximate the complete daily AQI (24-hour average) during any given hour. This means the subdaily NowCast is approximating a 24-hour average exposure, which aligns with the health evidence and the existing AQI communications network, while also being capable of communicating rapidly changing conditions to the public.

3. Summary of Final Revisions

Upon reviewing and considering the comments on the proposed revisions (summarized above in Section IV.C) along with the scientific evidence outlined in the proposal (88 FR 5639, January 27, 2023) and summarized above in section IV.A, the EPA is finalizing the proposed changes to the AQI.

Thus, as discussed in section IV of the preamble (88 FR 5639, January 27, 2023) to the proposed rule, the EPA is taking final action to revise the AQI value of 50 to 9.0 μg/m^3, 24-hour average, consistent with the final decision on the primary annual $PM_{2.5}$ standard level as summarized in section II.C of the

preamble to the final rule; retain the AQI value of 100 at 35 μg/m³, 24-hour average, consistent with the final decision on the primary 24-hour $PM_{2.5}$ standard level as summarized in section II.C of the preamble to the final rule; and retain the AQI value of 150 at 55 μg/m³, 24-hour average. The EPA is also taking action to revise the AQI value of 200 to 125 μg/m³, 24-hour average; 300 to 225 μg/m³, 24-hour average; and 500 to 325 μg/m³, 24-hour average, consistent with the rationale discussed above and the health evidence discussed in section IV of the preamble (88 FR 5639, January 27, 2023) to the proposed rule. The EPA has prepared communications materials to assist States with adjusting to the revised AQI and looks forward to working with, and learning from the experiences of, State, local, and Tribal governments in implementing these changes.

C. Air Quality Index Category Breakpoints for PM_{10}

The EPA proposed to retain the PM_{10} sub-index of the AQI consistent with the proposed decision to retain the primary PM_{10} standard, and consistent with the health effects information that supports this proposed decision, as discussed in section III.D of the proposal (88 FR 5632, January 27, 2023). EPA did not receive comments on this and is taking final action to retain the PM_{10} sub-index of the AQI for the reasons stated in the preamble to the proposed rule (88 FR 5642, January 27, 2023).

D. Air Quality Index Reporting

With respect to the reporting requirements for the AQI and as noted in the proposal (88 FR 5642, January 27, 2023) there have been many technological advances in air quality monitoring and data reporting since the appendix G to 40 CFR part 58 was last revised in 1999. Federal, State, local, and Tribal agencies have used these changes to make health information and air quality data more readily available and easier to access. Given this, it is useful to update the reporting requirements and recommendations to match current practices and ensure the public has the most useful and timely information to take health-protective behaviors.

1. Summary of Proposed Revisions

Currently, appendix G defines daily reporting as five days per week. When this reporting requirement was originated in 1999 the technology available at that time was not sufficient to calculate and report the AQI more than five days per week without requiring additional staffing on the weekends. Since that time, advances in technology have allowed for reporting seven days per week automatically without expending additional resources on weekends. As a result, most State, local, and Tribal air agencies now report the AQI seven days per a week. Given these technological advances and noting that reporting agencies currently report the AQI seven days per week, the EPA proposed that State, local, and Tribal agencies that report the AQI be required to report it seven days a week, ensuring that the members of the public continue to have access to daily air quality and health information that they can use to take steps to protect their health.

Improvements in monitoring networks and modeling capabilities have also enabled the ability to report the AQI in near real-time. This allows State, local, and Tribal air agencies to provide timely air quality information to the public for making health-protective decisions and to help satisfy AQI reporting requirements. The availability of near real-time AQI data also allows for more timely responses by the public when air quality conditions are changing rapidly, such as during wildfire smoke events. Subdaily reporting of the AQI can be critical when there are rapidly change conditions and/or high pollution events so that the public is able to make informed decisions to protect their health. Many State, local, and Tribal air agencies currently report the AQI hourly to ensure that the public has access to accurate and timely information. In recognition of these advances, and to continue to provide for near-real time AQI reporting that the public has come to rely on, the EPA proposed to recommend that State, local, and Tribal agencies report the AQI in near-real time.

In lieu of or along with reporting the near-real-time AQI directly to the public, most State/local and Tribal agencies submit hourly air quality data to the EPA. The EPA and some State, local and Tribal air quality agencies use this near-real-time data to create products for use by the public, weather service providers and the media as discussed in the proposal (88 FR 5643, January 27, 2023). To continue to ensure the availability of the products that the public and many stakeholders rely upon, the EPA proposed to recommend that State, local, and Tribal air quality agencies submit hourly data to the EPA's air quality database. Submitting hourly data to the EPA for use on the AirNow website and in other products also enables State, local, and Tribal air quality agencies to meet the recommendation to report the AQI in near-real-time.

In addition to the proposed updates to the reporting requirements and recommendations for near-real-time reporting and data submission recommendations, the Agency also proposed reformatting the question-and-answer format used in appendix G to align with the current standard formatting used in the Code of Federal Regulations. In proposing to update the format, the EPA did not reopen the language that has merely been moved or rearranged as there are no substantive changes.

Another change the EPA proposed to make to appendix G is with regard to Table 2—Breakpoints for the AQI for purposes of clarity. As discussed in the proposal (88 FR 5642, January 27, 2023) and summarized here, the EPA proposed to collapse the two rows presented for the Hazardous Category into one. The two rows in the current table specify pollutant concentrations for two AQI ranges within the Hazardous category (301–400 and 401–500), with an intermediate break at 400. The 400 breakpoint for all criteria pollutants in the current Table 2 is set at the proportional pollutant concentration approximately halfway between the Index values of 300 and 500. In proposing updated AQI breakpoints for $PM_{2.5}$, the EPA considered adjusting the 400 breakpoint similarly. However, the EPA concluded that collapsing the two rows into a single range (301–500) would provide a more transparent and easy-to-follow presentation of the pollutant concentrations corresponding to the AQI range for the Hazardous category. Moreover, collapsing the Hazardous category into a single row in Table 2 has no substantive effect on the Emergency Episode program in 40 CFR part 51, appendix L. Thus, the EPA proposed to remove the breakpoint of 400 from the table in appendix G but this change would not substantively affect the derivation of the AQI for any pollutant.

In addition, the EPA proposed to move some information currently in appendix G into the Technical Assistance Document for the Reporting of Daily Air Quality, or TAD (U.S. EPA, 2018a), so that it can be updated in a more timely manner to reflect current scientific and health effects evidence and current communication methods, thereby assisting State, local, and Tribal agencies in providing accurate and timely information to the public. Information that was proposed to be moved from appendix G to the TAD included the definitions of the sensitive (at-risk) populations for each pollutant.

This definition is typically evaluated and updated, as warranted, in most NAAQS reviews, even if the standard is not revised. Generally, if the standard is not revised in a review of the NAAQS, then appendix G is also not revised. Moving the definitions of sensitive groups to the TAD allows them to be updated even when a NAAQS is not revised to be consistent with the definitions of the sensitive (at-risk) populations identified in the ISA for that NAAQS review. Also, the proposal (88 FR 5642, January 27, 2023) recognized that the ways that air quality and health information is supplied to the news media and public changes regularly and thus proposed that information about suggested approaches for public communication be taken out of appendix G and discussed in the TAD.

2. Summary of Significant Comments on the Proposed Revisions

The EPA received many comments on the proposed changes to AQI reporting, many of which supported the proposed revisions. EPA discusses several of the topics that received the most attention from commenters below. Discussion of other comments received on the proposed changes to the AQI can be found in section IV of the Responses to Significant Comments on the 2023 Proposed Reconsideration of the National Ambient Air Quality Standards for Particulate Matter.

Most commenters expressed support for revising the definition of ''daily reporting'' from five days a week to seven days a week. A commenter did not support this change and recommended the EPA maintain the definition of daily as five days per week, noting that State and local air agencies do not routinely work seven days per week and would not be available to perform quality control of this data and report it reliably on weekends.

The EPA appreciates the support for this proposed revision and disagrees that the proposed change would require personnel to perform quality control of AQI data on weekends. 40 CFR part 58 Appendix D defines continuous monitoring requirements for agencies participating in the State/Local Air Monitoring Stations (SLAMS) network, and Appendix G states that agencies '' . . . must use concentration data from State/Local Air Monitoring Stations (SLAMS) required by 40 CFR 58.10'' when reporting the AQI. Therefore, as noted in Appendix D and G, Agencies are required to report the AQI using monitors within SLAMS, which are not subject to daily quality control/validation.

A few commenters noted that the proposal preamble language mentioned AQI is reported three ways (88 FR 5637, 5638, January 27, 2023): ''The AQI is reported three ways all of which are useful and complementary. The daily AQI is reported for the previous day and used to observe trends in community air quality, the AQI forecast helps people plan their outdoor activities for the next day, and the near-real-time AQI, or NowCast AQI, tells people whether it is a good time for outdoor activity.'' These commenters suggested that the NowCast is being codified in 40 CFR part 58 Appendix G as a method of calculating the AQI, which they oppose, saying that codifying its use is inappropriate given the shortest averaging period of the $PM_{2.5}$ NAAQS remains at 24-hours. Some stated that NowCast values have no direct correlation to the AQI calculation methodology codified in 40 CFR part 58 Appendix G. These commenters say that codifying the NowCast would impose a significant burden on States' forecasting staff.

However, some other commenters noted they appreciate the public-friendly format and near real-time data the NowCast provides and use it in their clinical encounters with patients. One air agency recognized the importance of the NowCast near real-time AQI during high pollution events and suggested the EPA should provide more ''concrete'' health messaging for these short-term spikes.

The EPA disagrees that the preamble language proposed to codify the NowCast or to impose a burden on reporting agencies. The preamble to the proposed rule references the AQI being reported in three ways and it does so because the EPA and many State, local and Tribal air quality agencies already report it these three ways. However, text included in the preamble is generally explanatory and does not alter regulatory provisions. Comments that State that EPA is codifying the NowCast into Appendix G are incorrect. Further, in proposed revisions to 40 CFR part 58 Appendix G, the EPA recommended, but did not propose to require, the use of air quality forecasts and a subdaily AQI. Consistent with the proposal, the EPA is therefore not finalizing any additional requirement or burden on States' forecasting staff relative to forecasts or a subdaily AQI.

The EPA disagrees with the comment that the NowCast values have no direct correlation to the AQI calculation methodology codified in 40 CFR part 58 Appendix G. As noted in the AQI Technical Assistance Document (Technical Assistance Document for the Reporting of Daily Air Quality—the Air Quality Index (AQI)), the NowCast algorithm is based on the AQI methodology but provides more real-time information to the public (U.S. EPA, 2018a). While the NowCast algorithm is approximating a 24-hour average exposure, it can reflect concentrations observed over shorter averaging times when air quality is changing rapidly (U.S. EPA, 2018a). The EPA reflects the nature of the NowCast in the health messaging provided there.

As noted in the above discussion of the AQI, air quality can change quickly during the day. A central purpose of the AQI is to help the public know when it is prudent to take action to reduce their exposure to pollution. Accordingly, the EPA developed the NowCast to estimate the 24-hour AQI for the current hour to give people information and tools to reduce their exposures to protect their health, particularly when air quality may be changing. The NowCast gives people the knowledge and ability to take timely action. They can use this information to reduce their exposure—reducing exposures if $PM_{2.5}$ is high only during a few hours a day will help reduce a person's 24-hour exposure—or be active when air quality is better.

The first NowCast method was developed in 2003 and was designed so ''current conditions'' represent the 24-hour $PM_{2.5}$ standard as closely as possible. This method proved to be slow to respond during rapid air quality changes. In 2013, the EPA developed an updated NowCast method for $PM_{2.5}$ [141] that responds more quickly to rapidly changing air quality conditions, such as those we see during wildfires, to make air quality alerts more timely. We analyzed millions of data points in developing this NowCast method and presented this information to State, local and Tribal air agencies. The updated NowCast, which is still in use, was launched August 1, 2013, on AirNow.gov. It was designed to represent a shorter average (target 3-hour) when air quality is changing rapidly, in part because 3-hour averages from some continuous monitors are more stable than 1-hour averages. The NowCast reflects a longer-term (12-hour) average when air quality is stable.

After evaluating the 2013 NowCast method, the EPA concluded that it matched the desired characteristics. The NowCast method responds to rapid changes in air quality yet still reflects a

[141] U.S. EPA. (2013). Transitioning to a New NowCast Method. Presentation available in the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072), at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

longer-term average when air quality is stable; will work in any location with adequate air quality data and for any air quality situation; gives people the best possible estimate of a 24-hour exposure; allows the EPA to caution people in time for them to take protective action and reduce their 24-hour exposure; and ensures that AQI maps on AirNow more closely match what people see.

The AQI is designed to allow people to reduce their exposure when pollution levels are higher and be active outdoors when pollution levels are lower. Since air quality almost always changes during the day, that level of granularity is not possible with a 24-hour forecast. If the public has only the 24-hour forecast, they may miss the times to be active outdoors when air quality is better and may be active outdoors when air quality is worse.

Also as noted above, many entities appreciate the near real-time reporting of the AQI that the NowCast provides and suggested more specific messaging is needed. The EPA appreciates this insight and will continue to consider ways to communicate air quality information most effectively to the public. For example, in light of recent wildfire events, the EPA worked with the USFS to pilot the AirNow Fire and Smoke Map.

3. Summary of Final Revisions

Upon reviewing and considering the comments on the proposed revisions (summarized above in Section IV.C) along with the rationale outlined in the proposal (88 FR 5638, January 27, 2023) and summarized above in section IV.C, the EPA is finalizing the proposed changes to the AQI reporting requirements. Thus, as discussed in section IV of the preamble to the proposed rule, the EPA is taking final action to require the AQI be reported seven days a week; recommend that State, local, and Tribal agencies report the AQI in near-real time; recommend that State, local, and Tribal air quality agencies submit hourly data to the EPA's air quality database; reformat appendix G to align with the current standard formatting used in the Code of Federal Regulations; collapse the two rows in Table 2 presented for the Hazardous Category into one by removing the 400 breakpoint; and move some information currently in appendix G into the Technical Assistance Document for the Reporting of Daily Air Quality, or TAD (U.S. EPA, 2018a) such as including the definitions of the sensitive (at-risk) populations for each pollutant and suggested approaches for public communication as stated in the revised Appendix G.

Table 2 below summarizes the breakpoints for the $PM_{2.5}$ sub-index.

TABLE 2—BREAKPOINTS FOR $PM_{2.5}$ SUB-INDEX

AQI category	Index values	Breakpoints ($\mu g/m^3$, 24-hour average)
Good	0–50	0.0–9.0
Moderate	51–100	9.1–35.4
Unhealthy for Sensitive Groups	101–150	35.5–55.4
Unhealthy	151–200	55.5–125.4
Very Unhealthy	201–300	125.5–225.4
Hazardous [1]	301+	225.5

[1] AQI values between breakpoints are calculated using equation 1 in appendix G. For AQI values in the hazardous category, AQI values greater than 500 should be calculated using equation 1 and the $PM_{2.5}$ concentration specified for the AQI value of 500.

V. Rationale for Decisions on the Secondary PM Standards

This section presents the rationale for the Administrator's decision that no change to the current secondary PM standards is required at this time to provide requisite protection against the public welfare effects of PM within the scope of this reconsideration (*i.e.,* visibility, climate, and materials effects).[142] This decision is based on a thorough review of the scientific evidence generally published through December 2017,[143] as presented in the 2019 ISA (U.S. EPA, 2019a), on the non-ecological public welfare effects of PM pertaining to the presence of PM in ambient air, specifically visibility, climate, and materials effects. Additionally, this decision is based on a thorough evaluation of some studies that became available after the literature cutoff date of the 2019 ISA that could either further inform the adequacy of the current PM NAAQS or address key scientific topics that have evolved since the literature cutoff date for the 2019 ISA, generally through March 2021, as presented in the ISA Supplement [144] (U.S. EPA, 2022a). The selection of welfare effects evaluated within the ISA Supplement was based on the causality determinations reported in the 2019 ISA and the subsequent use of scientific evidence in the 2020 PA.[145]

[142] Consistent with the 2016 Integrated Review Plan (U.S. EPA, 2016), other welfare effects of PM, including ecological effects, are being considered in the separate, on-going review of the secondary NAAQS for oxides of nitrogen, oxides of sulfur and PM. Accordingly, the public welfare protection provided by the secondary PM standards against ecological effects such as those related to deposition of nitrogen- and sulfur-containing compounds in vulnerable ecosystems is being considered in that separate review. Thus, the Administrator's decision in this reconsideration will be focused only and specifically on the adequacy of public welfare protection provided by the secondary PM standards from effects related to visibility, climate, and materials and hereafter ''welfare effects'' refers to non-ecological welfare effects (*i.e.,* visibility, climate, and materials effects).

[143] In addition to the 2020 review's opening ''call for information'' (79 FR 71764, December 3, 2014), the 2019 ISA identified and evaluated studies and reports that have undergone scientific peer review and were published or accepted for publication between January 1, 2009 through approximately January 2018 (U.S. EPA, 2019a, p. ES–2). References that are cited in the 2019 ISA, the references that were considered for inclusion but not cited, and electronic links to bibliographic information and abstracts can be found at: *https://hero.epa.gov/hero/particulate-matter.*

[144] As described in more detail in the ISA Supplement, ''the scope of this Supplement provides specific criteria for the types of studies considered for inclusion within the Supplement. Specifically, studies must be peer reviewed and published between approximately January 2018 and March 2021'' (U.S. EPA, 2022a, section 1.2.2).

[145] As described in section 1.2.1 of the ISA Supplement, ''the selection of welfare effects to evaluate within this Supplement is based on the causality determinations reported in the 2019 PM ISA and the subsequent use of scientific evidence in the 2020 PM PA. The 2019 PM ISA concluded a *causal relationship* for each of the welfare effects categories evaluated (*i.e.,* visibility, climate effects, and materials effects). While the 2020 PM PA considered the broader set of evidence for these effects, for climate effects and material effects, it concluded that there remained 'substantial uncertainties with regard to the quantitative relationships with PM concentrations and concentration patterns that limit[ed] [the] ability to quantitatively assess the public welfare protection provided by the standards from these effects (U.S. EPA, 2020b). Given these uncertainties and limitations, the basis of the discussion on conclusions regarding the secondary standards in the 2020 PM PA primarily focused on visibility effects. Therefore, this Supplement focuses only on visibility effects in evaluating newly available scientific information and is limited to studies

Continued

Specifically, for welfare effects, the focus within the ISA Supplement is on visibility effects. The ISA Supplement does not include an evaluation of studies on climate or materials effects. The Administrator's decision also takes into account the 2022 PA evaluation of the policy-relevant information in the 2019 ISA and ISA Supplement and presentation of quantitative analysis of air quality related to visibility impairment; CASAC advice and recommendations, as reflected in discussions of the drafts of the ISA Supplement and 2022 PA at public meetings and in the CASAC's letters to the Administrator; and public comments received on the proposal.

In presenting the rationale for the Administrator's final decision and its foundations, section V.A provides background on the 2020 final decision to retain the secondary PM standards (section V.A.1), and also provides brief summaries of key aspects of the currently available welfare effects evidence (section V.A.2) and quantitative information (section V.A.3). Section V.B summarizes the CASAC's advice (section V.B.1) and the proposed conclusions (section V.B.2), addresses public comments received on the proposal (section V.B.3), and presents the Administrator's conclusions on the adequacy of the current standards (section V.B.4), drawing on consideration of the available scientific and quantitative information, advice from the CASAC, and comments from the public. Section V.C summarizes the Administrator's decision on the secondary PM standards.

A. Introduction

The general approach for this reconsideration of the 2020 final decision on the secondary PM standards relies on the EPA's assessments of the current scientific evidence and associated quantitative analyses to inform the Administrator's judgments regarding secondary standards that are requisite to protect the public welfare from known or anticipated adverse effects associated with the pollutant's presence in the ambient air. The EPA's assessments are primarily documented in the 2019 ISA, ISA Supplement, and 2022 PA, which builds on the 2020 PA, all of which have received CASAC review and public comment (83 FR 53471, October 23, 2018; 83 FR 55529, November 6, 2018; 85 FR 4655, January 27, 2020; 86 FR 52673, September 22, 2021; 86 FR 54186, September 30, 2021; 86 FR 56263, October 8, 2021; 87 FR 958, January 7, 2022; 87 FR 22207, April 14, 2022; 87 FR 31965, May 26, 2022). In bridging the gap between the scientific assessments of the 2019 ISA and ISA Supplement and the judgments required of the Administrator in determining whether the current standards provide the requisite public welfare protection, the 2022 PA evaluates policy implications of the evaluation of the current evidence in the 2019 ISA and ISA Supplement, and the quantitative information documented in the 2022 PA. In evaluating the public welfare protection afforded by the current standards against PM-related effects within the scope of this reconsideration, the four basic elements of the NAAQS (indicator, averaging time, level, and form) are considered collectively.

The final decision on the adequacy of the current secondary standards is a public welfare policy judgment to be made by the Administrator. In reaching conclusions with regard to the standard, the decision draws on the scientific information and analyses about welfare effects, and associated public welfare significance, as well as judgments about how to consider the range and magnitude of uncertainties that are inherent in the scientific evidence and analyses. This approach is based on the recognition that the available evidence generally reflects a continuum that includes ambient air exposures at which scientists agree that effects are likely to occur through lower levels at which the likelihood and magnitude of responses become increasingly uncertain. This approach is consistent with the requirements of the provisions of the Clean Air Act related to the review of NAAQS and with how the EPA and the courts have historically interpreted the Act. These provisions require the Administrator to establish secondary standards that, in the judgment of the Administrator, are requisite to protect public welfare from known or anticipated adverse effects associated with the presence of the pollutant in the ambient air. In so doing, the Administrator seeks to establish standards that are neither more nor less stringent than necessary for this purpose. The Act does not require that standards be set at a zero-risk level, but rather at a level that reduces risk sufficiently so as to protect the public welfare from known or anticipated adverse effects.

1. Background on the Current Standards

The current secondary PM standards were retained in 2020 based on the scientific and technical information available at that time, as well as the then-Administrator's judgments regarding the available welfare effects evidence, the appropriate degree of public welfare protection for the existing standards, and available air quality information on visibility impairment that may be allowed by such a standard (85 FR 82684, December 18, 2020). With the 2020 decision, the then-Administrator retained the secondary 24-hour $PM_{2.5}$ standard, with its level of 35 $\mu g/m^3$, the annual $PM_{2.5}$ standard, with its level of 15.0 $\mu g/m^3$, and the 24-hour PM_{10} standard, with its level of 150 $\mu g/m^3$. The subsections below focus on the key considerations and the then-Administrator's conclusions in the 2020 final decision for climate and materials effects (section V.A.1.a) and visibility effects (section V.A.2.b).

a. Non-Visibility Effects

In light of the robust evidence base, the 2019 ISA concluded there to be causal relationships between PM and climate effects and materials effects (U.S. EPA, 2019a, sections 13.3.9 and 13.4.2). The 2020 final decision was based on a thorough review in the 2019 ISA of the scientific information on PM-induced climate and materials effects. The decision also took into account: (1) Assessments in the 2020 PA of the most policy-relevant information in the 2019 ISA regarding evidence of adverse effects of PM to climate and materials, (2) uncertainties in the available evidence to inform a quantitative assessment of PM-related climate and materials effects, (3) CASAC advice and recommendations, and (4) public comments received during the development of these documents and on the proposal document.

In considering non-visibility welfare effects in the 2020 decision, the then-Administrator concluded that, while it is important to maintain an appropriate degree of control of fine and coarse particles to address non-visibility welfare effects, ''it is generally appropriate to retain the existing standards and that there is insufficient information to establish any distinct secondary PM standards to address climate and materials effects of PM'' (85 FR 82744, December 18, 2020).

With regard to climate, the then-Administrator recognized that there were a number of improvements and refinements to climate models since the 2012 review. However, while the evidence continued to support a causal relationship between PM and climate effects, the then-Administrator noted that significant limitations continued to exist related to quantifying the contributions of direct and indirect

conducted in the U.S. and Canada'' (U.S. EPA, 2022a, section 1.2.1).

effects of PM and PM components on climate forcing (U.S. EPA, 2020b, sections 5.2.2.1.1 and 5.4). He also recognized that the models continued to exhibit considerable variability in estimates of PM-related climate impacts at regional scales (*e.g.,* ~100 km) as compared to simulations at global scales. Therefore, the resulting uncertainty led the then-Administrator to conclude in the 2020 decision that the available scientific information remained insufficient to quantify climate impacts associated with particular concentrations of PM in ambient air (U.S. EPA, 2020b, section 5.2.2.2.1) or to evaluate or consider a level of PM air quality in the U.S. to protect against climate effects and that there was insufficient information available to base a national ambient standard on climate impacts (85 FR 82744, December 18, 2020).

With regard to materials effects, the then-Administrator noted that the evidence available in the 2019 ISA continued to support a causal relationship between materials effects and PM deposition (U.S. EPA, 2019a, section 13.4). He recognized that the deposition of fine and coarse particles to materials can lead to physical damage and/or impaired aesthetic qualities. Particles can contribute to materials damage by adding to the natural weathering processes and by promoting the corrosion of metals, the degradation of building materials, and the weakening of material components. While some new information was available in the 2019 ISA, the information was from studies primarily conducted outside of the U.S. in areas where PM concentrations in ambient air are higher than those observed in the U.S. (U.S. EPA, 2020b, section 13.4). Additionally, the information assessed in the 2019 ISA did not support quantitative analyses of PM-related materials effects in the 2020 PA (U.S. EPA, 2020b, section 5.2.2.2.2). Given the limited amount of information available and its inherent uncertainties and limitations, the Administrator concluded that he was unable to relate soiling or damage to specific levels of PM in ambient air or to evaluate or consider a level of air quality to protect against such materials effects, and that there was insufficient information available to support a distinct national ambient standard based on materials effects (85 FR 82744, December 18, 2020).

In reviewing the 2019 draft PA, the CASAC agreed with staff conclusions that, while these effects are important, ''the available evidence does not call into question the protection afforded by the current secondary PM standards'' and recommended that the secondary standards ''should be retained'' (Cox, 2019b, p. 3 of letter). In reaching a final decision in 2020, for all of the reasons discussed above and recognizing the CASAC conclusion that the evidence provided support for retaining the current secondary PM standards, the then-Administrator concluded that it was appropriate to retain the existing secondary PM standards, without revision. For climate and materials effects, this conclusion reflected his judgment that, although it remains important to maintain secondary $PM_{2.5}$ and PM_{10} standards to provide some degree of control over long- and short-term concentrations of both fine and coarse particles, there was insufficient information to establish distinct secondary PM standards to address non-visibility PM-related welfare effects (85 FR 82744, December 18, 2020).

b. Visibility Effects

The 2019 ISA concluded that, ''the evidence is sufficient to conclude that a causal relationship exists between PM and visibility impairment'' (U.S. EPA, 2019a, section 13.2.6). The 2020 decision on the adequacy of the secondary standards with regard to visibility effects was a public welfare policy judgment made by the then-Administrator, which drew upon the available scientific evidence for PM-related visibility effects and on analyses of visibility impairment, as well as judgments about the appropriate weight to place on the range of uncertainties inherent in the evidence and analyses. The 2020 final decision was based on a thorough review in the 2019 ISA of the scientific information on PM-related visibility effects. The decision also took into account: (1) Assessments in the 2020 PA of the most policy-relevant information in the 2019 ISA regarding evidence of adverse effects of PM on visibility; (2) air quality analyses of the $PM_{2.5}$ visibility index and design values based on the form and averaging time of the existing secondary 24-hour $PM_{2.5}$ standard; (3) CASAC advice and recommendations; and (4) public comments received during the development of these documents and on the 2020 proposal document.

In considering the visibility effects in the 2020 review, the then-Administrator noted the long-standing body of evidence for PM-related visibility impairment. This evidence, which is based on the fundamental relationship between light extinction and PM mass, demonstrated that ambient PM can impair visibility in both urban and remote areas, and had changed very little since the 2012 review (U.S. EPA, 2019a, section 13.1; U.S. EPA, 2009a, section 9.2.5). The evidence related to public perception of visibility impairment was from studies from four areas in North America.[146] These studies provided information to inform our understanding of levels of visibility impairment that the public judged to be ''acceptable'' (U.S. EPA, 2010b; 85 FR 24131, April 30, 2020). In considering these public preference studies, the then-Administrator noted that no new visibility studies conducted in the U.S. were discussed in the 2019 ISA, and there was little newly available information with regard to acceptable levels of visibility impairment in the U.S. The Administrator recognized that visibility impairment can have implications for people's enjoyment of daily activities and their overall well-being, and therefore, considered the degree to which the current secondary standards protect against PM-related visibility impairment.

Consistent with the 2012 review, in the 2020 review, the then-Administrator first concluded that a target level of protection for a secondary PM standard is most appropriately defined in terms of a visibility index that directly takes into account the factors (*i.e.,* species composition and relative humidity) that influence the relationship between $PM_{2.5}$ in ambient air and PM-related visibility impairment. In defining a target level of protection, the then-Administrator considered the specific aspects of such an index, including the appropriate indicator, averaging time, form and level (78 FR 82742–82744, December 18, 2020).

First, with regard to indicator, the then-Administrator noted that in the 2012 review, the EPA used an index based on estimates of light extinction by $PM_{2.5}$ components calculated using an adjusted version of the IMPROVE algorithm, which allows the estimation of the light extinction using routinely monitored components of $PM_{2.5}$, $PM_{10-2.5}$ mass, and estimates of relative humidity. The then-Administrator recognized that, while there have been some revisions to the IMPROVE algorithm since the time of the 2012

[146] Preference studies were available in four urban areas. Three western preference studies were available, including one in Denver, Colorado (Ely et al., 1991), one in the lower Fraser River valley near Vancouver, British Columbia, Canada (Pryor, 1996), and one in Phoenix, Arizona (BBC Research & Consulting, 2003). A pilot focus group study was also conducted for Washington, DC (Abt Associates, 2001), and a replicate study with 26 participants was also conducted for Washington, DC (Smith and Howell, 2009). More details about these studies are available in Appendix D of the 2022 PA (U.S. EPA, 2022b).

review, our fundamental understanding of the relationship between PM in ambient air and light extinction had changed little and the various IMPROVE algorithms appropriately reflected this relationship across the U.S. In the absence of a monitoring network for direct measurement of light extinction, he concluded that a calculated light extinction indicator that utilizes the IMPROVE algorithms continued to provide a reasonable basis for defining a target level of protection against PM-related visibility impairment (78 FR 82742–82744, December 18, 2020).

In further defining the characteristics of a visibility index, the then-Administrator next considered the appropriate averaging time, form, and level of the index. Given the available scientific information the review, and in considering the CASAC's advice and public comments, the then-Administrator concluded that, consistent with the decision in the 2012 review, a visibility index with a 24-hour averaging time and a form based on the 3-year average of annual 90th percentile values remained reasonable. With regard to the averaging time and form of such an index, the Administrator noted analyses conducted in the last review that demonstrated relatively strong correlations between 24-hour and subdaily (*i.e.,* 4-hour average) $PM_{2.5}$ light extinction (78 FR 3226, January 15, 2013), indicating that a 24-hour averaging time is an appropriate surrogate for the subdaily time periods of the perception of PM-related visibility impairment and the relevant exposure periods for segments of the viewing public. This decision in the 2020 review also recognized that a 24-hour averaging time may be less influenced by atypical conditions and/or atypical instrument performance (78 FR 3226, January 15, 2013). The then-Administrator recognized that there was no new information to support updated analyses of this nature, and therefore, he believed these analyses continued to provide support for consideration of a 24-hour averaging time for a visibility index in this review. With regard to the statistical form of the index, the Administrator noted that, consistent with the 2012 review: (1) A multi-year percentile form offers greater stability from the occasional effect of interannual meteorological variability (78 FR 3198, January 15, 2013; U.S. EPA, 2011, p. 4–58); (2) a 90th percentile represents the median of the distribution of the 20 percent worst visibility days, which are targeted in Federal Class I areas by the Regional Haze Program; and (3) public preference studies did not provide information to identify a different target than that identified for Federal Class I areas (U.S. EPA, 2011, p. 4–59). Therefore, the then-Administrator judged that a visibility index based on estimates of light extinction, with a 24-hour averaging time and a 90th percentile form, averaged over three years, remained appropriate (78 FR 82742–82744, December 18, 2020).

With regard to the level of a visibility index, consistent with the 2012 review, the then-Administrator judged that it was appropriate to establish a target level of protection of 30 deciviews (dv),[147] [148] reflecting the upper end of the range of visibility impairment judged to be acceptable by at least 50% of study participants in the available public preference studies (78 FR 3226, January 15, 2013). The 2011 PA identified a range of levels from 20 to 30 dv based on the responses in the public preference studies available at that time (U.S. EPA, 2011, section 4.3.4). At the time of the 2012 review, the then-Administrator noted a number of uncertainties and limitations in public preference studies, including the small number of stated preference studies available, the relatively small number of study participants, the extent to which the study participants may not be representative of the broader study area population in some of the studies, and the variations in the specific materials and methods used in each study. In considering the available preference studies in 2012, with their inherent uncertainties and limitations, the then-Administrator concluded that the substantial degree of variability and uncertainty in the public preference studies should be reflected in a target level of protection based on the upper end of the range of candidate protection levels (CPLs).

Given that there were no new preference studies in the 2019 ISA, the then-Administrator's judgments in 2020 were based on the same studies, with the same range of levels, available in the 2012 review. The 2020 PA (U.S. EPA, 2020b, section 5.5), discussed a number of limitations and uncertainties associated with these studies. In considering the scientific information, with its uncertainties and limitations, as well as public comments on the level of the target level of protection against visibility impairment, the then-Administrator concluded that it was appropriate to again use a level of 30 dv for the visibility index (78 FR 82742–82744, December 18, 2020).

Having concluded that the protection provided by a standard defined in terms of a $PM_{2.5}$ visibility index, with a 24-hour averaging time, and a 90th percentile form, averaged over 3 years, set at a level of 30 dv, was requisite to protect public welfare with regard to visual air quality, the Administrator next considered the degree of protection from visibility impairment afforded by the existing suite of secondary PM standards.

In this context, the then-Administrator considered the updated analyses of visibility impairment presented in the 2020 PA (U.S. EPA, 2020b, section 5.2.1.2), which reflected a number of improvements since the 2012 review. Specifically, the updated analyses examined multiple versions of the IMPROVE equation, including the version incorporating revisions since the time of the 2012 review. These updated analyses provided a further understanding of how variation in the inputs to the algorithms affect the estimates of light extinction (U.S. EPA, 2020b, Appendix D). Additionally, for a subset of monitoring sites with available $PM_{10-2.5}$ data, the updated analyses better characterized the influence of coarse PM on light extinction than in the 2012 review (U.S. EPA, 2020b, section 5.2.1.2).

The results of the updated analyses in the 2020 PA were consistent with those from the 2012 review. Regardless of which version of the IMPROVE equation was used, the analyses demonstrated that, based on 2015–2017 data, the 3-year visibility metric was at or below about 30 dv in all areas meeting the current 24-hour $PM_{2.5}$ standard, and below 25 dv in most of those areas. In locations with available $PM_{10-2.5}$ monitoring, which met both the current 24-hour secondary $PM_{2.5}$ and PM_{10} standards, 3-year visibility index metrics were at or below 30 dv regardless of whether the coarse fraction was included as an input to the algorithm for estimating light extinction (U.S. EPA, 2020b, section 5.2.1.2). While the inclusion of the coarse fraction had a relatively modest impact on the estimates of light extinction, the then-Administrator recognized the continued importance of the PM_{10} standard given the potential for larger impacts on light extinction in areas with higher coarse particle concentrations, which were not included in the analyses in the 2020 PA due to a lack of available data (U.S. EPA, 2019a, section 13.2.4.1; U.S. EPA, 2020b, section 5.2.1.2). He

[147] Deciview (dv) refers to a scale for characterizing visibility that is defined directly in terms of light extinction. The deciview scale is frequently used in the scientific and regulatory literature on visibility.

[148] For comparison, 20 dv, 25 dv, and 30 dv are equivalent to 64, 112, and 191 megameters (Mm^{-1}), respectively.

noted that the air quality analyses showed that all areas meeting the existing 24-hour $PM_{2.5}$ standard, with its level of 35 μg/m^3, had visual air quality at least as good as 30 dv, based on the visibility index. Thus, the secondary 24-hour $PM_{2.5}$ standard would likely be controlling relative to a 24-hour visibility index set at a level of 30 dv. Additionally, areas would be unlikely to exceed the target level of protection for visibility of 30 dv without also exceeding the existing secondary 24-hour $PM_{2.5}$ standard. Thus, the then-Administrator judged that the 24-hour $PM_{2.5}$ standard provided sufficient protection in all areas against the effects of visibility impairment, *i.e.,* that the existing 24-hour $PM_{2.5}$ standard would provide at least the target level of protection for visual air quality of 30 dv which he judged appropriate (78 FR 82742–82744, December 18, 2020).

2. Overview of Welfare Effects Evidence

The information summarized here is based on the scientific assessment of the welfare effects evidence available in this reconsideration; this assessment is documented in the 2019 ISA and ISA Supplement and its policy implications are further discussed in the 2022 PA. While the 2019 ISA provides the broad scientific foundation for this reconsideration, additional literature has become available since the cutoff date of the 2019 ISA that expands the body of evidence related to visibility effects that can inform the Administrator's judgment on the adequacy of the current secondary PM standards. As such, the ISA Supplement builds on the information in the 2019 ISA with a targeted identification and evaluation of new scientific information regarding visibility effects. As described in the ISA Supplement and the 2022 PA, the selection of welfare effects to evaluate within the ISA Supplement were based on the causality determinations reported in the 2019 ISA and the subsequent use of scientific evidence in the 2020 PA (U.S. EPA, 2019a, section 1.2; U.S. EPA, 2022a, section 1.4.2). The ISA Supplement focuses on U.S. and Canadian studies that provide new information on public preferences for visibility impairment and/or developed new methodologies or conducted quantitative analyses of light extinction (U.S. EPA, 2022a, section 1.2). Such studies of visibility effects and quantitative relationships between visibility impairment and PM in ambient air were considered to be of greatest utility in informing the Administrator's conclusions on the adequacy of the current secondary PM standards. The visibility effects evidence presented within the 2019 ISA, along with the targeted identification and evaluation of new scientific information in the ISA Supplement, provides the scientific basis for the reconsideration of the 2020 final decision on the secondary PM standards for visibility effects. For climate and materials effects, the 2020 PA concluded that there were substantial uncertainties associated with the quantitative relationships with PM concentrations and the concentration patterns that limited the ability to quantitatively assess the public welfare protection provided by the standards from these effects. Therefore, the evaluation of the information related to these effects draws heavily from the 2019 ISA and 2020 PA. The subsections below briefly summarize the nature of PM-related visibility (section V.B.1.a), climate (section V.B.1.b), and materials (section V.B.1.c) effects.

a. Nature of Effects

Visibility impairment can have implications for people's enjoyment of daily activities and for their overall sense of well-being (U.S. EPA, 2009a, section 9.2). The strongest evidence for PM-related visibility impairment comes from the fundamental relationship between light extinction and PM mass (U.S. EPA, 2009a), which confirms a well-established ''causal relationship exists between PM and visibility impairment'' (U.S. EPA, 2009a, p. 2–28). Beyond its effects on visibility, the 2009 ISA also identified a causal relationship ''between PM and climate effects, including both direct effects of radiative forcing and indirect effects that involve cloud and feedbacks that influence precipitation formation and cloud lifetimes'' (U.S. EPA, 2009a, p. 2–29). The evidence also supports a causal relationship between PM and effects on materials, including soiling effects and materials damage (U.S. EPA, 2009a, p. 2–31).

The evidence available in this reconsideration is consistent with the evidence available at the time of the 2012 and 2020 reviews and supports the conclusions of causal relationships between PM and visibility, climate, and materials effects (U.S. EPA, 2019a, chapter 13). Evidence newly available in this reconsideration augments the previously available evidence of the relationship between PM and visibility impairment (U.S. EPA, 2019a, section 13.2; U.S. EPA, 2022a, section 4), climate effects (U.S. EPA, 2019a, section 13.3), and materials effects (U.S. EPA, 2019a, section 13.4).

i. Visibility

The fundamental relationship between light extinction and PM mass, and the EPA's understanding of this relationship, has changed little since the 2009 ISA (U.S. EPA, 2009a). The combined effect of light scattering and absorption by particles and gases is characterized as light extinction, *i.e.,* the fraction of light that is scattered or absorbed per unit of distance in the atmosphere.[149] Light extinction is measured in units of 1/distance, which is often expressed in the technical literature as visibility per megameter (abbreviated Mm^{-1}). Higher values of light extinction (usually given in units of Mm^{-1} or dv) correspond to lower visibility. When PM is present in the air, its contribution to light extinction is typically much greater than that of gases (U.S. EPA, 2019a, section 13.2.1). The impact of PM on light scattering depends on particle size and composition, as well as relative humidity. All particles scatter light, as described by the Mie theory, which relates light scattering to particle size, shape, and index of refraction (U.S. EPA, 2019a, section 13.2.3; Mie, 1908, Van de Hulst, 1981). Fine particles scatter more light than coarse particles on a per unit mass basis and include sulfates, nitrates, organics, light-absorbing carbon, and soil (Malm et al., 1994). Hygroscopic particles like ammonium sulfate, ammonium nitrate, and sea salt increase in size as relative humidity increases, leading to increased light scattering (U.S. EPA, 2019a, section 13.2.3).

As at the time of the 2012 and 2020 reviews, direct measurements of PM light extinction, scattering, and absorption continue to be considered more accurate for quantifying visibility than PM mass-based estimates because measurements do not depend on assumptions about particle characteristics (*e.g.,* size, shape, density, component mixture, etc.) (U.S. EPA, 2019a, section 13.2.2.2). Measurements of light extinction can be made with high time resolution, allowing for characterization of subdaily temporal patterns of visibility impairment. A number of measurement methods have been used for visibility impairment (*e.g.,*

[149] All particles scatter light and, although a larger particle scatters more light than a similarly shaped smaller particle of the same composition, the light scattered per unit of mass is greatest for particles with diameters from ~0.3–1.0 μm (U.S. EPA, 2009a, section 2.5.1; U.S. EPA, 2019a, section 13.2.1). Particles with hygroscopic components (*e.g.,* particulate sulfate and nitrate) contribute more to light extinction at higher relative humidity than at lower relative humidity because they change size in the atmosphere in response to relative humidity.

transmissometers, integrating nephelometers, teleradiometers, telephotometers, and photography and photographic modeling), although each of these methods has its own strengths and limitations (U.S. EPA, 2019a, Table 13–1). While some recent research confirms and adds to the body of knowledge regarding direct measurements as is described in the 2019 ISA and ISA Supplement, no major new developments have been made with these measurement methods since prior reviews (U.S. EPA, 2019a, section 13.2.2.2; U.S. EPA, 2022a, section 4.2).

In the absence of a robust monitoring network for the routine measurement of light extinction across the U.S., estimation of light extinction based on existing PM monitoring can be used. The theoretical relationship between light extinction and PM characteristics, as derived from Mie theory (U.S. EPA, 2019a, Equation 13.5), can be used to estimate light extinction by combining mass scattering efficiencies of particles with particle concentrations (U.S. EPA, 2019a, section 13.2.3; U.S. EPA, 2009a, sections 9.2.2.2 and 9.2.3.1). This estimation of light extinction is consistent with the method used in previous reviews. The algorithm used to estimate light extinction, known as the IMPROVE algorithm,[150] provides for the estimation of light extinction (b_{ext}), in units of Mm^{-1}, using routinely monitored components of fine ($PM_{2.5}$) and coarse ($PM_{10-2.5}$) PM. Relative humidity data are also needed to estimate the contribution by liquid water that is in solution with the hygroscopic components of PM. To estimate each component's contribution to light extinction, their concentrations are multiplied by extinction coefficients and are additionally multiplied by a water growth factor that accounts for their expansion with moisture. Both the extinction efficiency coefficients and water growth factors of the IMPROVE algorithm have been developed by a combination of empirical assessment and theoretical calculation using particle size distributions associated with each of the major aerosol components (U.S. EPA, 2019a, sections 13.2.3.1 and 13.2.3.3).

At the time of the 2012 review, two versions of the IMPROVE algorithm were available in the literature—the original IMPROVE algorithm (Lowenthal and Kumar, 2004, Malm and Hand, 2007, Ryan et al., 2005) and the revised IMPROVE algorithm (Pitchford et al., 2007). As described in detail in the 2022 PA (U.S. EPA, 2022b, section 5.3.1.1) and the 2019 ISA (U.S. EPA, 2019a, section 13.2.3), the algorithm has been further evaluated and refined since the time of the 2012 review (Lowenthal and Kumar, 2016), particularly for PM characteristics and relative humidity in remote areas. All three versions of the IMPROVE algorithm were considered in evaluating visibility impairment in this reconsideration.

Consistent with the evidence available at the time of the 2012 and 2020 reviews, our understanding of public perception of visibility impairment comes from visibility preference studies conducted in four areas in North America.[151] The detailed methodology for these studies are described in the 2022 PA (U.S. EPA, 2022b, section 5.3.1.1), the 2019 ISA (U.S. EPA, 2019a), and the 2009 ISA (U.S. EPA, 2019a). In summary, the study participants were queried regarding multiple images that were either photographs of the same location and scenery that had been taken on different days on which measured extinction data were available or digitized photographs onto which a uniform ''haze'' had been superimposed. Results of the studies indicated a wide range of judgments on what study participants considered to be acceptable visibility across the different study areas, depending on the setting depicted in each photograph. Based on the results of the four cities, a range encompassing the $PM_{2.5}$ visibility index values from images that were judged to be acceptable by at least 50 percent of study participants across all four of the urban preference studies was identified (U.S. EPA, 2010b, p. 4–24; U.S. EPA, 2020b, Figure 5–2). Much lower visibility (considerably more haze resulting in higher values of light extinction) was considered acceptable in Washington, DC, than was in Denver, and 30 dv reflected the level of impairment that was determined to be ''acceptable'' by at least 50 percent of study participants (78 FR 3226–3227, January 15, 2013).

Since the completion of the 2009 and 2019 ISAs, there has been only one public preference study that has become available in the U.S. This study uses images of the Grand Canyon, AZ, described in the ISA Supplement (U.S. EPA, 2022a). The Grand Canyon study, conducted by Malm et al. (2019), has a similar study design to that used in the public preference studies discussed above; however, there are several important differences that make it difficult to directly compare the results of the Malm et al. (2019) study with other public preference studies. As an initial matter, the Grand Canyon study was conducted in a Federal Class I area, as opposed to in an urban area, with a scene depicted in the photographs that did not include urban features.[152] We recognize that public preferences with respect to visibility in Federal Class 1 areas may well differ from visibility preferences in urban areas and other contexts, although there is currently a lack of information to on such questions. Further, the Malm et al. (2019) study also used a much lower range of superimposed ''haze'' than the preference studies discussed above.[153] It is unclear whether the participant preferences are a function in part of the range of potential values presented, such that the participant preferences for the Grand Canyon were generally lower[154] than the other preference studies in part because of the lower range of superimposed ''haze'' for the images in that study, or if their preferences would vary if presented with images with a range of superimposed ''haze'' more comparable to the levels used in the other studies (*i.e.,* more ''haze'' superimposed on the images).

The Malm et al. (2019) study also explored alternate methods for evaluating ''acceptable'' levels of visual air quality from the preference studies, including the use of scene-specific visibility indices as potential indicators of visibility levels as perceived by the observer (Malm et al., 2019). In addition to measures of atmospheric haze, such

[150] The algorithm is referred to as the IMPROVE algorithm as it was developed specifically to use monitoring data generated at IMPROVE network sites and with equipment specifically designed to support the IMPROVE program and was evaluated using IMPROVE optical measurements at the subset of monitoring sites that make those measurements (Malm et al., 1994).

[151] Preference studies were available in four urban areas in the last review: Denver, Colorado (Ely et al., 1991), Vancouver, British Columbia, Canada (Pryor, 1996), Phoenix, Arizona (BBC Research & Consulting, 2003), and Washington, DC (Abt Associates, 2001; Smith and Howell, 2009).

[152] The Grand Canyon study used a single scene looking west down the canyon with a small landscape feature of a 100-km-distant mountain (Mount Trumbull), along with other closer landscape features. The scenes presented in the previously available visibility preference studies are presented in more detail in Table D–9 in the 2022 PA (U.S. EPA, 2022b, Appendix D).

[153] The Grand Canyon study superimposed light extinction ranging from 3 dv to 20 dv on the image slides shown to participants compared to the previously available preference studies. In those studies, the visibility ranges presented were as low as 9 dv and as high as 45 dv. The visibility ranges presented in the previously available visibility preference studies are described in more detail in Table D–9 in the 2022 PA (U.S. EPA, 2022b, Appendix D).

[154] In the Grand Canyon study, the level of impairment that was determined to be ''acceptable'' by at least 50 percent of study participants was 7 dv (Malm et al., 2019).

as atmospheric extinction, used in previously available preference studies, other indices for visual air quality include color and achromatic contrast of single landscape figures, average and equivalent contrast of an entire scene, edge detection algorithms such as the Sobel index, and just-noticeable difference or change indexes. The results reported by Malm et al. (2019) suggest that scene-dependent metrics, such as contrast, may be useful alternate predictors of preference levels compared to universal metrics like light extinction (U.S. EPA, 2022a, section 4.2.1). This is because extinction alone is not a measure of ''haze,'' but of light attenuation per unit distance, and visible ''haze'' is dependent on both light extinction and distance to a landscape feature (U.S. EPA, 2022a, section 4.2.1). However, there are very few studies available that use scene-dependent metrics (*i.e.,* contrast) to evaluate public preference information, which makes it difficult to evaluate them as an alternative to the light extinction approach.

ii. Climate

The available evidence continues to support the conclusion of a causal relationship between PM and climate effects (U.S. EPA, 2019a, section 13.3.9). Since the 2012 review, climate impacts have been extensively studied and recent research reinforces and strengthens the evidence evaluated in the 2009 ISA. Recent evidence provides greater specificity about the details of radiative forcing effects [155] and increases the understanding of additional climate impacts driven by PM radiative effects. The Intergovernmental Panel on Climate Change (IPCC) assesses the role of anthropogenic activity in past and future climate change, and since the completion of the 2009 ISA, has issued the Fifth IPCC Assessment Report (AR5; IPCC, 2013), which summarizes any key scientific advances in understanding the climate effects of PM since the previous report. As in the 2009 ISA, the 2019 ISA draws substantially on the IPCC report to summarize climate effects. As discussed in more detail in the 2022 PA (U.S. EPA, 2022b, section 5.3.2.1.1), the general conclusions are similar between the IPCC AR4 and AR5 reports with regard to effects of PM on global climate. Consistent with the evidence available in the 2012 review, the key components, including sulfate, nitrate, organic carbon (OC), black carbon (BC), and dust, that contribute to climate processes vary in their reflectivity, forcing efficiencies, and direction of forcing. Since the completion of the 2009 ISA, the evidence base has expanded with respect to the mechanisms of climate responses and feedbacks to PM radiative forcing; however, the recently published literature assessed in the 2019 ISA does not reduce the considerable uncertainties that continue to exist related these mechanisms.

As described in the proposal (88 FR 5650, January 27, 2023), PM has a very heterogeneous distribution globally and patterns of forcing tend to correlate with PM loading, with the greatest forcings centralized over continental regions. The climate response to this PM forcing, however, is more complicated since the perturbation to one climate variable (*e.g.,* temperature, cloud cover, precipitation) can lead to a cascade of effects on other variables. While the initial PM radiative forcing may be concentrated regionally, the eventual climate response can be much broader spatially or be concentrated in remote regions, and may be quite complex, affecting multiple climate variables with possible differences in the direction of the forcing in different regions or for different variables (U.S. EPA, 2019a, section 13.3.6). The complex climate system interactions lead to variation among climate models, which have suggested a range of factors that can influence large-scale meteorological processes and may affect temperature, including local feedback effects involving soil moisture and cloud cover, changes in the hygroscopicity of the PM, and interactions with clouds (U.S. EPA, 2019a, section 13.3.7). As a result, there remains insufficient evidence to related climate effects to specific PM levels in ambient air or to establish a quantitative relationship between PM and climate effects, particularly at a regional scale. Further research is needed to better characterize the effects of PM on regional climate in the U.S. before PM climate effects can be quantified.

iii. Materials

Consistent with the evidence assessed in the 2009 ISA, the available evidence continues to support the conclusion that there is a causal relationship between PM deposition and materials effects. Effects of deposited PM, particularly sulfates and nitrates, to materials include both physical damage and impaired aesthetic qualities, generally involving soiling and/or corrosion (U.S. EPA, 2019a, section 13.4.2). Because of their electrolytic, hygroscopic, and acidic properties and their ability to sorb corrosive gases, particles contribute to materials damage by adding to the effects of natural weathering processes, by potentially promoting or accelerating the corrosion of metals, degradation of painted surfaces, deterioration of building materials, and weakening of material components.[156] There is a limited amount of recently available data for consideration in this review from studies primarily conducted outside of the U.S. on buildings and other items of cultural heritage. However, these studies involved concentrations of PM in ambient air greater than those typically observed in the U.S. (U.S. EPA, 2019a, section 13.4).

Building on the evidence available in the 2009 ISA, and as described in detail in the proposal (88 FR 5650, January 27, 2023) and in the 2019 ISA (U.S. EPA, 2019a, section 13.4), research has progressed on (1) the theoretical understanding of soiling of items of cultural heritage; (2) the quantification of degradation rates and further characterization of factors that influence damage of stone materials; (3) materials damage from PM components besides sulfate and black carbon and atmospheric gases besides SO_2; (4) methods for evaluating soiling of materials by PM mixtures; (5) PM-attributable damage to other materials, including glass and photovoltaic panels; (6) development of dose-response relationships for soiling of building materials; and (7) damage functions to quantify material decay as a function of pollutant type and load. While the evidence of PM-related materials effects has expanded somewhat since the completion of the 2009 ISA, there remains insufficient evidence to relate soiling or damage to specific PM levels in ambient air or to establish a quantitative relationship between PM and materials degradation. The recent evidence assessed in the 2019 ISA is generally similar to the evidence available in the 2009 ISA, including

[155] Radiative forcing (RF) for a given atmospheric constituent is defined as the perturbation in net radiative flux, at the tropopause (or the top of the atmosphere) caused by that constituent, in watts per square meter (Wm^2), after allowing for temperatures in the stratosphere to adjust to the perturbation but holding all other climate responses constant, including surface and tropospheric temperatures (Fiore et al., 2015; Myhre et al., 2013). A positive forcing indicates net energy trapped in the Earth system and suggests warming of the Earth's surface, whereas a negative forcing indicates net loss of energy and suggests cooling (U.S. EPA, 2019a, section 13.3.2.2).

[156] As discussed in the 2019 ISA (U.S. EPA, 2019a, section 13.4.1), corrosion typically involves reactions of acidic PM (*i.e.,* acidic sulfate or nitrate) with material surfaces, but gases like SO_2 and nitric acid (HNO_3) also contribute. Because ''the impacts of gaseous and particulate N and S wet deposition cannot be clearly distinguished'' (U.S. EPA, 2019a, p. 13–1), the assessment of the evidence in the 2019 ISA considers the combined impacts.

associated limitations and uncertainties and a lack of evidence to inform quantitative relationships between PM and materials effects, therefore leading to similar conclusions about the PM-related effects on materials.

3. Summary of Air Quality and Quantitative Information

Beyond the consideration of the scientific evidence, as discussed in section V.A.2 above, quantitative analyses of PM air quality, when available, can also inform conclusions on the adequacy of the public welfare protection provided by the current secondary PM standards.

a. Visibility Effects

In the 2012 and 2020 reviews, quantitative analyses for PM-related visibility effects focused on daily visibility impairment, given the short-term nature of PM-related visibility effects. The evidence and information available in this reconsideration continues to provide support for the short-term (*i.e.,* hourly or daily) nature of PM-related visibility impairment. As such, the quantitative analyses presented in the 2022 PA continue to focus on daily visibility impairment and utilize a two-phase assessment approach for visibility impairment, consistent with the approaches taken in past reviews. First, the 2022 PA considers the appropriateness of the elements (indicator, averaging time, form, and level) of the visibility index for providing protection against PM-related visibility effects. Second, recent air quality was used to evaluate the relationship between the current secondary 24-hour $PM_{2.5}$ standard and the visibility index. The information available since the 2012 review includes an updated equation for estimating light extinction, summarized in the 2022 PA (U.S. EPA, 2022b, section 5.3.1.1) and described in the 2019 ISA (U.S. EPA, 2019a, section 13.2.3.3), as well as more recent air monitoring data, that together allow for development of an updated assessment of PM-related visibility impairment in study locations in the U.S.

i. Target Level of Protection in Terms of a $PM_{2.5}$ Visibility Index

In evaluating the adequacy of the current secondary PM standards, the 2022 PA first evaluates the appropriateness of the elements (indicator, averaging time, form, and level) identified for a visibility index to protect against visibility effects. In previous reviews, the visibility index as set at a level of 30 dv, with estimated light extinction as the indicator, a 24-hour averaging time, and a 90th percentile form, averaged over three years.

With regard to an indicator for the visibility index, the 2022 PA recognizes the lack of availability of methods and an established network for directly measuring light extinction (U.S. EPA, 2022b, section 5.3.1.1). Therefore, consistent with previous reviews, the 2022 PA concludes that a visibility index based on estimates of light extinction by $PM_{2.5}$ components derived from an adjusted version of the original IMPROVE algorithm to be the most appropriate indicator for the visibility index in this reconsideration. As described in section 5.3.1.1 of the 2022 PA, the IMPROVE algorithm estimates light extinction using routinely monitored components of $PM_{2.5}$ and $PM_{10-2.5}$, along with estimates of relative humidity (U.S. EPA, 2022b, section 5.3.1.1).

With regard to averaging time, the 2022 PA notes that the evidence continues to provide support for the short-term nature of PM-related visibility effects. Given that there is no new information available regarding the time periods during which visibility impairment occurs or public preferences related to specific time periods for visibility impairment, the 2022 PA concludes that it is appropriate to continue to focus on daily visibility impairment. In so doing, the 2022 PA relies on analyses that were conducted in the 2012 review that showed relatively strong correlations between 24-hour and subdaily (*i.e.,* 4-hour average) $PM_{2.5}$ light extinction that indicated that a 24-hour averaging time is an appropriate surrogate for the subdaily time periods relevant for visual perception (U.S. EPA, 2011, Figures G–4 and G–5; Frank, 2012). These analyses continue to provide support for a 24-hour averaging time for the visibility index in this reconsideration. Consistent with previous reviews, the 2022 PA also notes that the 24-hour averaging time may be less influenced by atypical conditions and/or atypical instrument performance than a subdaily averaging time (85 FR 82740, December 18, 2020; 78 FR 3226, January 15, 2013).

With regard to the form for the visibility index, the available information continues to provide support for a 3-year average of annual 90th percentile values. Given that there is no new information to inform selection of an alternate form, as in previous reviews, the 2022 PA notes that the 3-year average form provides stability from the occasional effect of inter-annual meteorological variability that can result in unusually high pollution levels for a particular year (85 FR 82741, December 18, 2020; 78 FR 3198, January 15, 2013; U.S. EPA, 2011, p. 4–58). In so doing, the 2022 PA considers the evaluation in the 2010 Urban-Focused Visibility Assessment (UFVA) of three different statistical forms: 90th, 95th, and 98th percentiles (U.S. EPA, 2010b, Chapter 4).). In considering this evaluation of statistical forms from the 2010 UFVA, consistent with the 2011 PA, the 2022 PA notes that the Regional Haze Program targets the 20 percent most impaired days for visibility improvements in visual air quality in Federal Class I areas and that the median of the distribution of these 20 percent most impaired days would be the 90th percentile. The 2011 PA also noted that strategies that are implemented so that 90 percent of days would have visual air quality that is at or below the level of the visibility index would reasonably be expected to lead to improvements in visual air quality for the 20 percent most impaired days. Additionally, as in the 2011 PA, the 2022 PA recognizes that the available public preference studies do not address frequency of occurrence of different levels of visibility (U.S. EPA, 2022b, section 5.3.1.2). Therefore, the analyses and consideration for the form of a visibility index from the 2011 PA continue to provide support for a 90th percentile form, averaged across three years, in defining the characteristics of a visibility index in this reconsideration.

With regard to the level for the visibility index, the 2022 PA recognizes that there is an additional public preference study (Malm et al., 2019) available in this reconsideration. As noted above, however, this study differs from the previously available public preference studies in several ways, which makes it difficult to integrate this newly available study with the previously available studies. Most significantly, this study was evaluated public preferences for visibility in the Grand Canyon, perhaps the most notable Class I area in the country for visibility purposes. Therefore, the 2022 PA concludes that the Grand Canyon study is not directly comparable to the other available preferences studies and public preferences of visibility impairment in the Malm et al. (2019) study are not appropriate to consider in identifying a range of levels for the target level of protection against visibility impairment for this reconsideration of the secondary PM NAAQS.

Therefore, the 2022 PA continues to rely on the same studies [157] and the range of 20 to 30 dv identified from those studies in previous reviews. With regard to selecting the appropriate target level of protection for visibility impairment within this range, the 2022 PA notes that in previous reviews, a level at the upper end of the range (*i.e.,* 30 dv) was selected given the uncertainties and limitations associated with the public preference studies (U.S. EPA, 2022b, section 5.3.1.1). However, the 2022 PA also recognizes that (1) the degree of protection provided by a secondary PM NAAQS is not determined solely by any one element of the standard but by all elements (*i.e.,* indicator, averaging time, form, and level) being considered together, and (2) decisions regarding the adequacy of the current secondary standards is a public welfare policy judgment to be made by the Administrator. As such, the Administrator may judge that a target level of protection below the upper end of the range (*i.e.,* less than 30 dv) is appropriate, depending on his public welfare policy judgments, which draw upon the available scientific evidence for PM-related visibility effects and on analyses of visibility impairment, as well as judgments about the appropriate weight to place on the range of uncertainties inherent in the evidence and analyses.

In considering the available public preference studies, consistent with past reviews, the 2022 PA concludes that it is reasonable to consider a range of 20 to 30 dv for selecting a target level of protection, including a high value of 30 dv, a midpoint value of 25 dv, and a low value of 20 dv. A target level of protection at or in the upper end of the range would focus on the Washington, DC, preference study results (Abt Associates, 2001; Smith and Howell, 2009), which identified 30 dv as the level of impairment that was determined to be ''acceptable'' by at least 50 percent of study participants. The public preferences of visibility impairment in the Washington, DC, study are likely to be generally representative of urban areas that do not have valued scenic elements (*e.g.,* mountains) in the distant background. This would be more representative of areas in the middle of the country and many areas in the eastern U.S., as well as possibly some areas in the western U.S.

A target level of protection in the middle of the range would be most closely associated with the level of impairment that was determined to be ''acceptable'' by at least 50 percent of study participants in the Phoenix, AZ, study (BBC Research & Consulting, 2003), which was 24 dv. This study, while methodologically similar to the other public preference studies, included participants that were selected as a representative sample of the Phoenix area population [158] and used computer-generated images to depict specific uniform visibility impairment conditions. This study yielded the best results of the four public preference studies in terms of the least noisy preference results and the most representative selection of participants. Therefore, based on this study, the use of 25 dv to represent a midpoint within the range of target levels protection is well supported.

A target level of protection at or just above the lower end of the range would focus on the Denver, CO, study, but may not be as strongly supported as higher levels within the range (Ely et al., 1991). Older studies, such as those conducted in Denver, CO (Ely et al., 1991), and British Columbia, Canada (Pryor, 1996), used photographs that were taken at different times of the day and on different days to capture a range of light extinction levels needed for the preference studies. Compared to studies that used computer-generated images (*i.e.,* those in Phoenix, AZ, and Washington, DC) there was more variability in scene appearance in these older studies that could affect preference rating and includes uncertainties associated with using ambient measurements to represent sight path-averaged light extinction values rather than superimposing a computer-generated amount of haze onto the images. When using photographs, the intrinsic appearance of the scene can change due to meteorological conditions (*i.e.,* shadow patterns and cloud conditions) and spatial variations in ambient air quality that can result in ambient light extinction measurement not being representative of the sight-path-averaged light extinction. Computer-generated images, such as those generated with WinHaze, do not introduce such uncertainties, as the same base photograph is used (*i.e.,* there is no intrinsic change in scene appearance) and the modeled haze that is superimposed on the photograph is determined based on uniform light extinction throughout the scene.

In addition to differences in preferences that may arise from photographs versus computer-generated images, urban visibility preference may differ by location, and such differences may arise from differences in the cityscape scene that is depicted in the images. These differences are related to the perceived value of objects and scenes that are included in the image, as objects at a greater distance have a greater sensitivity to perceived visibility changes as light extinction is changed compared to similar scenes with objects at shorter distances. For example, a person (regardless of their location) evaluating visibility in an image with more scenic elements such as mountains or natural views may value better visibility conditions in these images compared to the same level of visibility impairment in an image that only depicts urban features such as buildings and roads. That is, if a person was shown the same level of visibility impairment in two images depicting different scenes—one with mountains in the background and urban features in the foreground and one with no mountains in the background and nearby buildings in the image without mountains in the distance—may find the amount of haze to be unacceptable in the image with the mountains in the distance because of a greater perceived value of viewing the mountains, while finding the amount of haze to be acceptable in the image with the buildings because of a lesser value of viewing the cityscape or an expectation that such urban areas may generally have higher levels of haze in general. This is consistent when comparing the differences between the Denver, CO, study results (which found the 50% acceptance criteria occurred at the best visual air quality levels among the four cities) and the Washington, DC, results (which found the 50% acceptability criteria occurred at the worst visual air quality levels among the four cities). These results may occur because the most prominent and picturesque feature of the cityscape of Denver is the visible snow-covered mountains in the distance, while the prominent and

[157] As noted above, the available public preference studies include those conducted in Denver, Colorado (Ely et al., 1991), Vancouver, British Columbia, Canada (Pryor, 1996), Phoenix, Arizona (BBC Research & Consulting, 2003), and Washington, DC (Abt Associates, 2001; Smith and Howell, 2009).

[158] The other preference studies did not include populations that were necessarily representative of the population in the area for which the images being judged. For example, in the Denver, CO, study, participants were from intact groups (*i.e.,* those who were meeting for other reasons) and were asked to provide a period of time during a regularly scheduled meeting to participate in the study (Ely et al., 1991). As another example, in the British Columbia, Canada, study, participants were recruited from undergraduate and graduate students enrolled in classes at the University of British Columbia's Department of Geography (Pryor, 1996).

picturesque features of the Washington, DC, cityscape are buildings relatively nearby without prominent and/or valued scenic features that are more distant. Given these variabilities in preferences it is unclear to what extent, the available evidence provides strong support for a target level of protection at the lower end of the range. Future studies that reduce sources of noisiness and uncertainty in the results could provide more information that would support selection of a target level of protection at or just above the lower end of the range.

Taken together, the 2022 PA concludes that available information continues to support a visibility index with estimated light extinction as the indicator, a 24-hour averaging time, and a 90th percentile form, averaged over three years, with a level within the range of 20 to 30 dv.

ii. Relationship Between the $PM_{2.5}$ Visibility Index and the Current Secondary 24-Hour $PM_{2.5}$ Standard

The 2022 PA presents quantitative analyses based on recent air quality that evaluate the relationship between recent air quality and calculated light extinction. As in previous reviews, these analyses explored this relationship as an estimate of visibility impairment in terms of the 24-hour $PM_{2.5}$ standard and the visibility index. Generally, the results of the updated analyses are similar to those based on the data available at the time of the 2012 and 2020 reviews (U.S. EPA, 2022b, section 5.3.1.2). As discussed in section V.C.1.a above, the 2022 PA concludes that the available evidence continues to support a visibility index with estimated light extinction as the indicator, a 24-hour averaging time, and a 90th percentile form, averaged over three years, with a level within the range of 20 to 30 dv. These analyses evaluate visibility impairment in the U.S. under recent air quality conditions, particularly those conditions that meet the current standards, and the relative influence of various factors on light extinction. Given the relationship of visibility with short-term PM, we focus particularly on the short-term PM standards.[159] Compared to the 2012 review, updated analyses incorporate several refinements, including (1) the evaluation of three versions of the IMPROVE equation to calculate light extinction (U.S. EPA, 2022b, Appendix D, Equations D–1 through D–3) in order to better understand the influence of variability in equation inputs;[160] (2) the use of 24-hour relative humidity data, rather than monthly average relative humidity as was used in the 2012 review (U.S. EPA, 2022b, section 5.3.1.2, Appendix D); and (3) the inclusion of the coarse fraction in the estimation of light extinction (U.S. EPA, 2022b, section 5.3.1.2, Appendix D). The analyses in the reconsideration are updated from the 2012 and 2020 reviews and include 60 monitoring sites that measure $PM_{2.5}$ and PM_{10} and are geographically distributed across the U.S. in both urban and rural areas (U.S. EPA, 2022b, Appendix D, Figure D–1).

When light extinction was calculated using the revised IMPROVE equation, in areas that meet the current 24-hour $PM_{2.5}$ standard for the 2017–2019 time period, all sites have light extinction estimates at or below 26 dv (U.S. EPA, 2022b, Figure 5–3). For the four locations that exceed the current 24-hour $PM_{2.5}$ standard, light extinction estimates range from 22 dv to 27 dv (U.S. EPA, 2022b, Figure 5–3). These findings are consistent with the findings of the analyses using the same IMPROVE equation in the 2012 review with data from 102 sites with data from 2008–2010 and in the 2020 review with data from 67 sites with data from 2015–2017. The analyses presented in the 2022 PA indicate similar findings to those from the analyses in the 2012 and 2020 reviews, *i.e.,* the updated quantitative analysis shows that the 3-year visibility metric was no higher than 30 dv[161] at sites meeting the current secondary PM standards, and at most such sites the 3-year visibility index values are much lower (*e.g.,* an average of 20 dv across the 60 sites).[162]

When light extinction was calculated using the revised IMPROVE equation,[163] the resulting 3-year visibility metrics are nearly identical to light extinction estimates calculated using the original IMPROVE equation (U.S. EPA, 2022b, Figure 5–4), but some sites are just slightly higher. Using the revised IMPROVE equation, for those sites that meet the current 24-hour $PM_{2.5}$ standard, the 3-year visibility metric is at or below 26 dv. For the four locations that exceed the current 24-hour $PM_{2.5}$ standard, light extinction estimates range from 22 dv to 29 dv (U.S. EPA, 2022b, Figure 5–4). These results are similar to those for light extinction calculated using the original IMPROVE equation,[164] and those from previous reviews.

When light extinction was calculated using the refined equation from Lowenthal and Kumar (2016), the resulting 3-year visibility metrics are slightly higher at all sites compared to light extinction estimates calculated using the original IMPROVE equation (U.S. EPA, 2022b, Figure 5–5).[165] These higher estimates are to be expected, given the higher OC multiplier included in the IMPROVE equation from Lowenthal and Kumar (2016), which reflects the use of data from remote areas with higher concentrations of organic PM when validating the equation. As such, it is important to note that the Lowenthal and Kumar (2016) version of the equation may overestimate light extinction in non-remote areas, including the urban areas in the updated analyses in this reconsideration.

Nevertheless, when light extinction is calculated using the Lowenthal and

[159] The analyses presented in the 2022 PA focus on the visibility index and the current secondary 24-hour $PM_{2.5}$ standard with a level of 35 $\mu g/m^3$. However, we recognize that all three secondary PM standards influence the PM concentrations associated with the air quality distribution. As noted in section V.A.1 above, the current secondary PM standards include the 24-hour $PM_{2.5}$ standard, with its level of 35 $\mu g/m^3$, the annual $PM_{2.5}$ standard, with its level of 15.0 $\mu g/m^3$, and the 24-hour PM_{10} standard, with its level of 150 $\mu g/m^3$. With regard to the annual $PM_{2.5}$ standard, we note that all 60 areas included in the analyses meet the current secondary annual PM standard (U.S. EPA, 2022b, Table D–7).

[160] While the $PM_{2.5}$ monitoring network has an increasing number of continuous FEM monitors reporting hourly $PM_{2.5}$ mass concentrations, there continue to be data quality uncertainties associated with providing hourly $PM_{2.5}$ mass and component measurements that could be input into IMPROVE equation calculations for subdaily visibility impairment estimates. As detailed in the 2022 PA, there are uncertainties associated with the precision and bias of 24-hour $PM_{2.5}$ measurements (U.S. EPA, 2022b, p. 2–18), as well as to the fractional uncertainty associated with 24-hour PM component measurements (U.S. EPA, 2022b, p. 2–21). Given the uncertainties present when evaluating data quality on a 24-hour basis, the uncertainty associated with subdaily measurements may be even greater. Therefore, the inputs to these light extinction calculations are based on 24-hour average measurements of $PM_{2.5}$ mass and components, rather than subdaily information.

[161] A 3-year visibility metric with a level of 30 dv would be at the upper end of the range of levels identified from the public preference studies.

[162] When light extinction is calculated using the original IMPROVE equation, all 60 sites have 3-year visibility metrics below 30 dv, 58 sites are at or below 25 dv, and 26 sites are at or below 20 dv (see U.S. EPA, 2022b, Appendix D, Table D–3).

[163] As described in more detail in the 2022 PA, the revised IMPROVE equation divides PM components into smaller and larger sizes of particles in $PM_{2.5}$, with separate mass scattering efficiencies and hygroscopic growth functions for each size category (U.S. EPA, 2022b, section 5.3.1.1).

[164] When light extinction is calculated using the revised IMPROVE equation, all 60 sites have 3-year visibility metrics below 30 dv, 56 sites are at or below 25 dv, and 26 sites are at or below 20 dv (see U.S. EPA, 2022b, Appendix D, Table D–3).

[165] When light extinction is calculated using the Lowenthal and Kumar IMPROVE equation, 59 sites have 3-year visibility metrics below 30 dv, 45 sites are at or below 25 dv, and 15 sites are at or below 20 dv. The one site with a 3-year visibility metric of 32 dv exceeds the secondary 24-hour $PM_{2.5}$ standard, with a design value of 56 $\mu g/m^3$ (see U.S. EPA, 2022b, Appendix D, Table D–3).

Kumar (2016) equation for those sites that meet the current 24-hour $PM_{2.5}$ standard, the 3-year visibility metric is generally at or below 28 dv. For those sites that exceed the current 24-hour $PM_{2.5}$ standard, three of these sites have a 3-year visibility metric ranging between 26 dv and 30 dv, while one site in Fresno, California that exceeds the current 24-hour $PM_{2.5}$ standard and has a 3-year visibility index value of 32 dv (compared to 29 dv when light extinction is calculated with the original IMPROVE equation) (see U.S. EPA, 2022b, Appendix D, Table D–3). At this site, it is likely that the 3-year visibility metric using the Lowenthal and Kumar (2016) equation would be below 30 dv if $PM_{2.5}$ concentrations were reduced such that the 24-hour $PM_{2.5}$ level of 35 $\mu g/m^3$ was attained.

In considering visibility impairment under recent air quality conditions, the 2022 PA recognizes that the differences in the inputs to equations estimating light extinction can influence the resulting values. For example, given the varying chemical composition of emissions from different sources, the 2.1 multiplier for converting OC to organic matter (OM) in the Lowenthal and Kumar (2016) equation may not be appropriate for all source types. At the time of the 2012 review, the EPA judged that a 1.6 multiplier was more appropriate, for the purposes of estimating visibility index at sites across the U.S., than the 1.4 or 1.8 multipliers used in the original and revised IMPROVE equations, respectively. A multiplier of 1.8 or 2.1 would account for the more aged and oxygenated organic PM that tends to be found in more remote regions than in urban regions, whereas a multiplier of 1.4 may underestimate the contribution of organic PM found in remote regions when estimating light extinction (78 FR 3206, January 15, 2013; U.S. EPA, 2012, p. IV–5). The available scientific information and results of the air quality analyses indicate that it may be appropriate to select inputs to the IMPROVE equation (*e.g.,* the multiplier for OC to OM) on a regional basis rather than a national basis when calculating light extinction. This is especially true when comparing sites with localized PM sources (such as sites in urban or industrial areas) to sites with PM derived largely from biogenic precursor emissions (that contribute to widespread secondary organic aerosol formation), such as those in the southeastern U.S. The 2022 PA notes, however, that conditions involving PM from such different sources have not been well studied in the context of applying a multiplier to estimate light extinction, contributing uncertainty to estimates of light extinction for such conditions.

At the time of the 2012 review, the EPA noted that $PM_{2.5}$ is the size fraction of PM responsible for most of the visibility impairment in urban areas (77 FR 38980, June 29, 2012). Data available at the time of the 2012 review suggested that, generally, $PM_{10–2.5}$ was a minor contributor to visibility impairment most of the time (U.S. EPA, 2010b) although the coarse fraction may be a major contributor in some areas in the desert southwestern region of the U.S. Moreover, at the time of the 2012 review, there were few data available from $PM_{10–2.5}$ monitors to quantify the contribution of coarse PM to calculated light extinction. Since that time, an expansion in $PM_{10–2.5}$ monitoring efforts has increased the availability of data for use in estimating light extinction with both $PM_{2.5}$ and $PM_{10–2.5}$ concentrations included as inputs in the equations. The analysis in the 2020 PA addressed light extinction at 20 of the 67 $PM_{2.5}$ sites where collocated $PM_{10–2.5}$ monitoring data were available. Since that time, $PM_{10–2.5}$ monitoring data are available at more locations and the analyses presented in the 2022 PA include those for light extinction estimated with coarse and fine PM at all 60 sites. Generally, the contribution of the coarse fraction to light extinction at these sites is minimal, contributing less than 1 dv to the 3-year visibility metric (U.S. EPA, 2020b, section 5.2.1.2). However, the 2022 PA notes that in the updated quantitative analyses, only a few sites were in locations that would be expected to have high concentrations of coarse PM, such as the Southwest. These results are consistent with those in the analyses in the 2019 ISA, which found that mass scattering from $PM_{10-2.5}$ was relatively small (less than 10%) in the eastern and northwestern U.S., whereas mass scattering was much larger in the Southwest (more than 20%) particularly in southern Arizona and New Mexico (U.S. EPA, 2019a, section 13.2.4.1, p. 13–36).

Overall, the findings of these updated quantitative analyses are generally consistent with those in the 2012 and 2020 reviews. The 3-year visibility metric was generally below 26 dv in most areas that meet the current 24-hour $PM_{2.5}$ standard. Small differences in the 3-year visibility metric were observed between the variations of the IMPROVE equation, which may suggest that it may be more appropriate to use one version over another in different regions of the U.S. based on PM characteristics such as particle size and composition to more accurately estimate light extinction.

b. Non-Visibility Effects

Consistent with the evidence available at the time of the 2012 and 2020 reviews, and as described in detail in the 2022 PA (U.S. EPA, 2022b, section 5.3.2.2), the data remain insufficient to conduct quantitative analyses for PM effects on climate and materials. For PM-related climate effects, as explained in more detail in the proposal (88 FR 5654, January 27, 2023), our understanding of PM-related climate effects is still limited by significant key uncertainties. The recently available evidence does not appreciably improve our understanding of the spatial and temporal heterogeneity of PM components that contribute to climate forcing (U.S. EPA, 2022b, sections 5.3.2.1.1 and 5.5). Significant uncertainties also persist related to quantifying the contributions of PM and PM components to the direct and indirect effects on climate forcing, such as changes to the pattern of rainfall, changes to wind patterns, and effects on vertical mixing in the atmosphere (U.S. EPA, 2022b, sections 5.3.2.1.1 and 5.5). Additionally, while improvements have been made to climate models since the completion of the 2009 ISA, the models continue to exhibit variability in estimates of the PM-related climate effects on regional scales (*e.g.,* ~100 km) compared to simulations at the global scale (U.S. EPA, 2022b, sections 5.3.2.1.1 and 5.5). While our understanding of climate forcing on a global scale is somewhat expanded since the 2012 review, significant limitations remain to quantifying potential adverse PM-related climate effects in the U.S. and how they would vary in response to incremental changes in PM concentrations across the U.S. As such, while recent research is available on climate forcing on a global scale, the remaining limitations and uncertainties are significant, and the recent global scale research does not translate directly for use at regional spatial scales. Therefore, the evidence does not provide a clear understanding at the necessary spatial scales for quantifying the relationship between PM mass in ambient air and the associated climate-related effects in the U.S. that would be necessary to evaluate or consider a level of air quality to protect against such effects and for informing consideration of a national PM standard on climate in this reconsideration (U.S. EPA, 2022b, section 5.3.2.2.1; U.S. EPA, 2019a, section 13.3).

For PM-related materials effects, as explained in more detail in the 2022 PA (U.S. EPA, 2022b, section 5.3.2.2), the available evidence has been somewhat expanded to include additional information about the soiling process and the types of materials impacted by PM. This evidence provides some limited information to inform dose-response relationships and damage functions associated with PM, although most of these studies were conducted outside of the U.S. where PM concentrations in ambient air are typically above those observed in the U.S. (U.S. EPA, 2022b, section 5.3.2.1.2; U.S. EPA, 2019a, section 13.4). The evidence on materials effects characterized in the 2019 ISA also includes studies examining effects of PM on the energy efficiency of solar panels and passive cooling building materials, although the evidence remains insufficient to establish quantitative relationships between PM in ambient air and these or other materials effects (U.S. EPA, 2022b, section 5.3.2.1.2). While the available evidence assessed in the 2019 ISA is somewhat expanded since the time of the 2012 review, quantitative relationships have not been established for PM-related soiling and corrosion and frequency of cleaning or repair that further the understanding of the public welfare implications of materials effects (U.S. EPA, 2022b, section 5.3.2.2.2; U.S. EPA, 2019a, section 13.4). Therefore, there is insufficient information to inform quantitative analyses assessing materials effects to inform consideration of a national PM standard on materials in this reconsideration (U.S. EPA, 2022b, section 5.3.2.2.2; U.S. EPA, 2019a, section 13.4).

B. Conclusions on the Secondary PM Standards

In drawing conclusions on the adequacy of the current secondary PM standards, in view of the advances in scientific knowledge and additional information now available, the Administrator has considered the evidence base, information, and policy judgments that were the foundation of the 2020 decision and reflects upon the body of information and evidence available in this reconsideration. In so doing, the Administrator has taken into account both evidence-based and quantitative information-based considerations, as well as advice from the CASAC and public comments. Evidence-based considerations draw upon the EPA's assessment and integrated synthesis of the scientific evidence from studies evaluating welfare effects related to visibility, climate, and materials associated with PM in ambient air as discussed in the 2022 PA (summarized in sections V.B and V.D.2 of the proposal, section V.A.2 above). The quantitative information-based considerations draw from the results of the quantitative analyses of visibility impairment presented in the 2022 PA (as summarized in section V.C of the proposal and V.A.3 above) and consideration of these results in the 2022 PA.

Consideration of the scientific evidence and quantitative information in the 2022 PA and by the Administrator is framed by consideration of a series of policy-relevant questions. Section V.B.2 below summarizes the rationale for the Administrators proposed decision, drawing from section V.D.3 of the proposal. The advice and recommendations of the CASAC and public comments on the proposed decision are addressed below in sections V.B.1 and V.B.3, respectively. The Administrator's conclusions in this reconsideration regarding the adequacy of the secondary PM standards and whether any revisions are appropriate are described in section V.D.4.

1. CASAC Advice

In comments on the 2019 draft PA, the CASAC concurred with the staff's overall preliminary conclusions that it is appropriate to consider retaining the current secondary standards without revision (Cox, 2019b). The CASAC ''finds much of the information . . . on visibility and materials effects of $PM_{2.5}$ to be useful, while recognizing that uncertainties and controversies remain about the best ways to evaluate these effects'' (Cox, 2019b, p. 13 of consensus responses). Regarding climate, while the CASAC agreed that research on PM-related effects has expanded since the 2012 review, it also concluded that ''there are still significant uncertainties associated with the accurate measurement of PM to the direct and indirect effects of PM on climate'' (Cox, 2019b, pp. 13–14 of consensus responses). The committee recommended that the EPA summarize the ''current scientific knowledge and quantitative modeling results for effects of reducing $PM_{2.5}$'' on several climate-related outcomes (Cox, 2019b, p. 14 of consensus responses), while also recognizing that ''it is appropriate to acknowledge uncertainties in climate change impacts and resulting welfare impacts in the United States of reductions in $PM_{2.5}$ levels'' (Cox, 2019b, p. 14 of consensus responses). When considering the overall body of scientific evidence and technical information for PM-related effects on visibility, climate, and materials, the CASAC agreed with the EPA's preliminary conclusions in the 2019 draft PA, stating that ''the available evidence does not call into question the protection afforded by the current secondary PM standards and concurs that they should be retained'' (Cox, 2019b, p. 3 of letter).

In this reconsideration, the CASAC provided its advice regarding the current secondary PM standards in the context of its review of the 2021 draft PA (Sheppard, 2022a). In its comments on the 2021 draft PA, the CASAC first recognized that the scientific evidence is sufficient to support a causal relationship between PM and visibility effects, climate effects and materials effects.

With regard to visibility effects, the CASAC recognized that the identification of a target level of protection for the visibility index is based on a limited number of studies and suggested that ''additional region- and view-specific visibility preference studies and data analyses are needed to support a more refined visibility target'' (Sheppard, 2022a, p. 21 of consensus responses). While the CASAC did not recommend revising either the target level of protection for the visibility index or the level of the current 24-hour $PM_{2.5}$ standard, they did state that a visibility index of 30 deciviews ''needs to be justified'' and ''[i]f a value of 20–25 deciviews is deemed to be an appropriate visibility target level of protection, then a secondary 24-hour $PM_{2.5}$ standard in the range of 25–35 $\mu g/m^3$ should be considered'' (Sheppard, 2022a, p. 21 of consensus responses).

The CASAC also recognized the limited availability of monitoring methods and networks for directly measuring light extinction. As such, they suggest that ''[a] more extensive technical evaluation of the alternatives for visibility indicators and practical measurement methods (including the necessity for a visibility FRM) is need for future reviews'' (Sheppard, 2022a, p. 22 of consensus letter). The majority of the CASAC ''recommend[ed] that an FRM for a directly measured $PM_{2.5}$ light extinction indicator be developed'' to inform the consideration of the protection afforded by the secondary PM standards against visibility impairment, the minority of the CASAC ''believe that a light extinction FRM is not necessary to set a secondary standard protective of visibility'' (Sheppard, 2022a, p. 22 of consensus responses).

With regard to climate, the CASAC noted that ''there is a causal relationship between PM and climate change, but large uncertainties remain'' and recommended additional research (Sheppard, 2022a, p. 22 of consensus responses). With respect to materials damage, the CASAC noted that ''[q]uantitative information on the relationship between PM and material damage is lacking'' and suggested some additional studies and research approaches that could provide additional information on the effects of PM on materials and the quantitative assessment of the relationship between materials effects and PM in ambient air (Sheppard, 2022a, p. 23 of consensus responses).

2. Basis for the Proposed Decision

In reaching his proposed conclusions, the Administrator first recognized that, consistent with the scope of this reconsideration, his decision in this reconsideration will be focused only and specifically on the adequacy of public welfare protection provided by the secondary PM standards from effects related to visibility, climate, and materials. He then considered the assessment of the current evidence and conclusions reached in the 2019 ISA and ISA Supplement; the currently available quantitative information, including associated limitations and uncertainties, described in detail and characterized in the 2022 PA; considerations and staff conclusions and associated rationales presented in the 2022 PA; and the advice and recommendations from the CASAC (88 FR 5655, January 27, 2023).

With respect to visibility, the Administrator noted the longstanding body of evidence that demonstrates a causal relationship between ambient PM and effects on visibility (U.S. EPA, 2019a, section 13.2). and that visibility impairment can have implications for people's enjoyment of daily activities and for their overall sense of well-being. Therefore, as in previous reviews, he considered the degree to which the current secondary standards protect against PM-related visibility impairment. In so doing, and consistent with previous reviews, the Administrator considered the protection provided by the current secondary standards against PM-related visibility impairment in conjunction with the Regional Haze Program [166] for protecting visibility in Class I areas,[167] which together would be expected to achieve appropriate visual air quality across all areas (88 FR 5658, January 27, 2023). The Administrator proposed to conclude that addressing visibility impairment in Class I areas is beyond the scope of the secondary PM NAAQS and that setting the secondary PM NAAQS at a level that would remedy visibility impairment in Class I areas would result in standards that are more stringent than is requisite.

In further considering what standards are requisite to protect against adverse public welfare effects from visibility impairment, the Administrator adopted an approach consistent with the approach used in previous reviews (88 FR 5645, January 27, 2023). That is, he first identified an appropriate target level of protection in terms of a PM visibility index that accounts for the factors that influence the relationship between particles in the ambient air and visibility (*i.e.,* size fraction, species composition, and relative humidity). He then considered air quality analyses examining the relationship between this PM visibility index and the current secondary 24-hour $PM_{2.5}$ standard in locations meeting the current 24-hour $PM_{2.5}$ and PM_{10} standards (U.S. EPA, 2022b, section 5.3.1.2; 88 FR 5650, January 27, 2023).

To identify a target level of protection, the Administrator first considered the characteristics of the visibility index and defines its elements (indicator, averaging time, form, and level). With regard to the indicator for the visibility index, the Administrator recognized that there is a lack of availability of methods and an established network for directly measuring light extinction, consistent with the conclusions reached in the 2022 PA (U.S. EPA, 2022b, section 5.3.1.1) and with the CASAC's recommendation for additional research on direct measurement methods for light extinction in their review of the 2021 draft PA (Sheppard, 2022a, p. 22 of consensus responses). Consistent with the approaches used in reaching decisions in 2012 and 2020, given the lack of such monitoring data, the Administrator preliminarily judged that estimated light extinction, as calculated using one or more versions of the IMPROVE algorithms, continues to be the most appropriate indicator for the visibility index in this reconsideration (88 FR 5659, January 27, 2023).

In further defining the characteristics of a visibility index based on estimates of light extinction, the Administrator considered the appropriate averaging time, form, and level of the index. With regard to the averaging time and form, the Administrator noted that in previous reviews, a 24-hour averaging time was selected and the form was defined as the 3-year average of annual 90th percentile values. The Administrator recognized that the evidence available in this reconsideration and described in the 2022 PA continue to provide support for the short-term nature of PM-related visibility effects. Considering the available analyses of 24-hour and subdaily $PM_{2.5}$ light extinction, and noting that the CASAC did not provide advice or recommendations with regard to the averaging time of the visibility index, the Administrator preliminarily judged that the 24-hour averaging time continues to be appropriate for the visibility index (88 FR 5659, January 27, 2023).

With regard to the form of the visibility index, the Administrator noted that, consistent with the approach taken in other NAAQS, including the current secondary 24-hour $PM_{2.5}$ NAAQS, a multi-year percentile form offers greater stability to the air quality management process by reducing the possibility that statistically unusual indicator values will lead to transient violations of the standard. Using a 3-year average provides stability from the occasional effects of inter-annual meteorological variability that can result in unusually high pollution levels for a particular year (88 FR 5659, January 27, 2023). In considering the percentile that would be appropriate with the 3-year average, the Administrator first noted that the Regional Haze Program targets the 20% most impaired days for improvements in visual air quality in Class I areas.[168] Based on analyses examining 90th, 95th, and 98th percentile forms, the Administrator preliminarily judged that a focus similar to the Regional Haze Program focused on improving the 20% most impaired days suggest that the 90th percentile, which represents the median of the 20% most impaired days, such that 90% of days have visual air quality that is at or below the target level of protection of the visibility

[166] The Regional Haze Program was established by Congress specifically to achieve ''the prevention of any future, and the remedying of existing, impairment of visibility in mandatory Class I areas, which impairment results from man-made air pollution,'' and that Congress established a long-term program to achieve that goal (CAA section 169A).

[167] In adopting section 169A, Congress set a goal of eliminating anthropogenic visibility impairment at Class I areas, as well as a framework for achieving that goal which extends well beyond the planning process and timeframe for attaining secondary NAAQS. Thus, the Regional Haze Program will continue to contribute to reductions in visibility impairment in Class I areas.

[168] As noted above, the Administrator viewed the Regional Haze Program as a complement to the secondary PM NAAQS, and thus took into consideration its approach to improving visibility in considering how to address visibility outside of Class I areas.

index, would be reasonably expected to lead to improvements in visual air quality for the 20% most impaired days (88 FR 5659, January 27, 2023). In the analyses of percentiles, the results suggest that a higher percentile value could have the effect of limiting the occurrence of days with peak PM-related light extinction in areas outside of Federal Class I areas to a greater degree. However, the Administrator preliminarily concluded that it is appropriate to balance concerns about focusing on the group of most impaired days with concerns about focusing on the days with peak visibility impairment. Additionally, the Administrator noted that the CASAC did not provide advice or recommendations related to the form of the visibility index. Therefore, the Administrator preliminarily judged that it remains appropriate to define a visibility index in terms of a 24-hour averaging time and a form based on the 3-year average of annual 90th percentile values (88 FR 5659, January 27, 2023).

With regard to the level of the visibility index, the Administrator first noted that the scientific evidence that is available to inform the level of the visibility index is largely the same as in previous reviews, and continues to provide support for a level within the range of 20 to 30 dv (88 FR 5659–5660, January 27, 2023). The Administrator recognized that significant uncertainties and limitations remained, in particular those related to the public preference studies, including methodological differences between the studies, and that the available studies may not capture the full range of visibility preferences in the U.S. population (88 FR 5659–5660, January 27, 2023). The Administrator also noted that, in their review of the 2021 draft PA, the CASAC recognized that a judgment regarding the appropriate target level of protection for the visibility index is based on a limited number of visibility preference studies, with studies conducted in the western U.S. reporting public preferences for visibility impairment associated with the lower end of the range of levels, while studies conducted in the eastern U.S. reporting public preferences associated with the upper end of the range (Sheppard, 2022a, p. 21 of consensus responses). The Administrator noted that there have long been significant questions about how to set a national standard for visibility that is not overprotective for some areas of the U.S. In establishing the Regional Haze Program to improve visibility in Class I areas, Congress noted that ''as a matter of equity, the national ambient air quality standards cannot be revised to adequately protect visibility in all areas of the country.'' H.R. Rep. 95–294 at 205. Thus, in reaching his proposed conclusion, the Administrator recognized that there are substantial uncertainties and limitations in the public preference studies that should be considered when selecting a target level of protection for the visibility index and took the uncertainties and variability inherent in the public preference studies into account. In so doing, the Administrator first preliminarily judged that, consistent with similar judgments in past reviews, it is appropriate to recognize that the secondary 24-hour $PM_{2.5}$ standard is intended to address visibility impairment across a wide range of regions and circumstances, and that the current standard works in conjunction with the Regional Haze Program to improve visibility, and therefore, it is appropriate to establish a target level of protection based on the upper end of the range of levels. In considering the information available in this reconsideration and the CASAC's advice, the Administrator proposed to conclude that the protection provided by a visibility index based on estimated light extinction, a 24-hour averaging time, and a 90th percentile form, averaged over 3 years, set at a level of 30 dv (the upper end of the range of levels) would be requisite to protect public welfare with regard to visibility impairment (88 FR 5660, January 27, 2023).

In preliminarily concluding that it remains appropriate in this reconsideration to define the target level of protection in terms of a visibility index based on estimated light extinction as described above (*i.e.,* with a 24-hour averaging time; a 3-year, 90th percentile form; and a level of 30 dv), the Administrator next considered the degree of protection from visibility impairment afforded by the existing secondary standards. He considered the updated analyses of PM-related visibility impairment presented in the 2022 PA (U.S. EPA, 2022b, section 5.3.1.2), which reflect several improvements over the analyses conducted in the 2012 review. Specifically, the updated analyses examine multiple versions of the IMPROVE algorithm, including the version incorporating revisions since the 2012 review (section V.B.1.a), which provides an improved understanding of how variation in equation inputs impacts calculated light extinction (U.S. EPA, 2022b, Appendix D). In addition, unlike the analyses in the 2012 review and the 2020 PA, all of the sites included in the analyses had $PM_{10–2.5}$ data available, which allows for better characterization of the influence of the coarse fraction on light extinction (U.S. EPA, 2022b, section 5.3.1.2).

The Administrator noted that the results of these updated analyses are consistent with the results from the 2012 and 2020 reviews (88 FR 5660, January 27, 2023). Regardless of the IMPROVE equation used, these analyses demonstrate that the 3-year visibility metric is at or below 28 dv in all areas meeting the current 24-hour $PM_{2.5}$ standard (section V.C.1.b). Given the results of these analyses, the Administrator preliminarily concluded that the updated scientific evidence and technical information support the adequacy of the current secondary $PM_{2.5}$ and PM_{10} standards to protect against PM-related visibility impairment. While the inclusion of the coarse fraction had a relatively modest impact on calculated light extinction in the analyses presented in the 2022 PA, he nevertheless recognized the continued importance of the PM_{10} standard given the potential for larger impacts in locations with higher coarse particle concentrations, such as in the southwestern U.S., for which only a few sites met the criteria for inclusion in the analyses in the 2022 PA (U.S. EPA, 2019a, section 13.2.4.1; U.S. EPA, 2022b, section 5.3.1.2).

With regard to the adequacy of the secondary 24-hour $PM_{2.5}$ standard, the Administrator noted that the CASAC stated that ''[i]f a value of 20–25 deciviews is deemed to be an appropriate visibility target level of protection, then a secondary 24-hour $PM_{2.5}$ standard in the range of 25–35 $\mu g/m^3$ should be considered'' (Sheppard, 2022a, p. 21 of consensus responses). The Administrator recognized that the CASAC recommended that the Administrator provide additional justification for a visibility index target of 30 dv but did not specifically recommend that he choose an alternative level for the visibility index. The Administrator considered the CASAC's advice, together with the available scientific evidence and quantitative information, in reaching his proposed conclusions. He recognized conclusions regarding the appropriate weight to place on the scientific and technical information examining PM-related visibility impairment including how to consider the range and magnitude of uncertainties inherent in that information is a public welfare policy judgment left to the Administrator. As such, the Administrator noted his conclusion on

the appropriate visibility index (*i.e.,* with a 24-hour averaging time; a 3-year, 90th percentile form; and a level of 30 dv) and his conclusions regarding the quantitative analyses of the relationship between the visibility index and the current secondary 24-hour $PM_{2.5}$ standard. In so doing, he proposed to conclude that the current secondary standards provide requisite protection against PM-related visibility effects (88 FR 5661, January 27, 2023).

In reaching his proposed conclusions, the Administrator also recognized that the available evidence on visibility impairment generally reflects a continuum and that the public preference studies did not identify a specific level of visibility impairment that would be perceived as ''acceptable'' or ''unacceptable'' across the whole U.S. population. However, he noted that a judgment regarding the appropriate target level of protection would take into consideration the appropriate weight to place on the individual public preference studies. In so doing, he noted that placing more weight on the public preference study from Washington, DC, could provide support for a target level of protection at or near 30 dv, whereas placing more weight on the public preference study performed in the Phoenix, AZ, study could provide support for a target level of protection below 30 dv and down to 25 dv. While the Administrator noted that, in their review of the 2021 draft PA, the CASAC did not recommend revising the level of the current 24-hour $PM_{2.5}$ standard, the Administrator recognized that they did recommend greater justification for a target level of protection of 30 dv, and noted that if a target level of protection of 20–25 dv was identified, then a secondary 24-hour $PM_{2.5}$ standard in the range of 25–35 $\mu g/m^3$ should be considered (Sheppard, 2022a, p. 21 of consensus responses). For these reasons, the Administrator solicited comment on his proposed decision to retain the current secondary 24-hour $PM_{2.5}$ standard, as well as the appropriateness of a target level of protection for visibility below 30 dv and as low as 25 dv, and on revising the level of the current secondary 24-hour $PM_{2.5}$ standard to a level as low as 25 $\mu g/m^3$.

With respect to climate effects, the Administrator recognized that a number of improvements and refinements have been made to climate models since the time of the 2012 review. However, despite continuing research and the strong evidence supporting a causal relationship with climate effects (U.S. EPA, 2019a, section 13.3.9), the Administrator noted that there are still significant limitations in quantifying the contributions of the direct and indirect effects of PM and PM components on climate forcing (U.S. EPA, 2022b, sections 5.3.2.1.1 and 5.5). He also recognized that models continue to exhibit considerable variability in estimates of PM-related climate impacts at regional scales (*e.g.,* ~100 km), compared to simulations at the global scale (U.S. EPA, 2022b, sections 5.3.2.1.1 and 5.5). As noted above, the CASAC recognized a causal relationship between PM and climate effects but also the large uncertainties associated with quantitatively assessing such effects, particularly on a national level in the context of a U.S.-based standard. These uncertainties led the Administrator to preliminarily conclude that the scientific information available in this reconsideration remains insufficient to quantify, with confidence, the impacts of ambient PM on climate in the U.S. (U.S. EPA, 2022b, section 5.3.2.2.1) and that there is insufficient information at this time to revise the current secondary PM standards or to promulgate a distinct secondary standard to address PM-related climate effects (88 FR 5661, January 27, 2023).

With respect to materials effects, the Administrator noted that the available evidence continues to support the conclusion that there is a causal relationship with PM deposition (U.S. EPA, 2019a, section 13.4). He recognized that deposition of particles in the fine or coarse fractions can result in physical damage and/or impaired aesthetic qualities. Particles can contribute to materials damage by adding to the effects of natural weathering processes and by promoting the corrosion of metals, the degradation of painted surfaces, the deterioration of building materials, and the weakening of material components. While some recent evidence on materials effects of PM is available in the 2019 ISA, the Administrator noted that this evidence is primarily from studies conducted outside of the U.S. in areas where PM concentrations in ambient air are higher than those observed in the U.S. (U.S. EPA, 2019a, section 13.4). The CASAC also noted the lack of quantitative information relating PM and material effects. Given the limited amount of information on the quantitative relationships between PM and materials effects in the U.S., and uncertainties in the degree to which those effects could be adverse to the public welfare, the Administrator preliminarily judged that the scientific information available in this reconsideration remains insufficient to quantify, with confidence, the public welfare impacts of ambient PM on materials and that there is insufficient information at this time to revise the current secondary PM standards or to promulgate a distinct secondary standard to address PM-related materials effects (88 FR 5661, January 27, 2023).

Taken together, the Administrator proposed to conclude that the scientific and technical information for PM-related visibility impairment, climate impacts, and materials effects, with its attendant uncertainties and limitations, supports the current level of protection provided by the secondary PM standards as being requisite to protect against known and anticipated adverse effects on public welfare. For visibility impairment, this proposed conclusion reflected his consideration of the evidence for PM-related light extinction, together with his consideration of updated analyses of the protection provided by the current secondary $PM_{2.5}$ and PM_{10} standards. For climate and materials effects, this conclusion reflected his preliminary judgment that, although it remains important to maintain secondary $PM_{2.5}$ and PM_{10} standards to provide some degree of control over long- and short-term concentrations of both fine and coarse particles, it is generally appropriate not to change the existing secondary standards at this time and that it is not appropriate to establish any distinct secondary PM standards to address PM-related climate and materials effects at this time. As such, the Administrator recognized that current suite of secondary standards (*i.e.,* the 24-hour $PM_{2.5}$, 24-hour PM_{10}, and annual $PM_{2.5}$ standards) together provide such control for both fine and coarse particles and long- and short-term visibility and non-visibility (*e.g.,* climate and materials) [169] effects related to PM in ambient air. His proposed conclusions on the secondary standards were consistent with advice from the CASAC, which noted substantial uncertainties remain in the scientific evidence for climate and materials effects. Thus, based on his consideration of the evidence and analyses for PM-related welfare effects, as described above, and his consideration of CASAC advice on the secondary standards, the Administrator proposed not to change those standards (*i.e.,* the current 24-hour and annual $PM_{2.5}$ standards, 24-hour PM_{10} standard) at this time (88 FR 5662, January 27, 2023).

[169] As noted earlier, other welfare effects of PM, such as ecological effects, are being considered in the separate, on-going review of the secondary NAAQS for oxides of nitrogen, oxides of sulfur and PM.

3. Comments on the Proposed Decision

Of the public comments received on the proposal, very few were specific to the secondary PM standards. Of those commenters who did provide comments on the secondary PM standards, the majority support the Administrator's proposed decision to retain the current standards. Some commenters disagree with the Administrator's proposed conclusion to retain the current secondary standards, primarily focusing their comments on the need for a revised standard to protect against visibility impairment. In addition to the comments addressed in this notice, the EPA has prepared a Response to Comments document that addresses other specific comments related to setting the secondary PM standards. This document is available for review in the docket for this rulemaking and through the EPA's NAAQS website (*https://www.epa.gov/naaqs/particulate-matter-pm-air-quality-standards*).

We first note that some commenters raise questions about the protection provided by the secondary PM standards for ecological effects (*e.g.,* effects on ecosystems, ecosystem services, or species). However, consistent with the 2016 IRP and as described in the proposal (88 FR 5643, January 27, 2023), other welfare effects of PM, such as the ecological effects identified by commenters, are being considered as part of the separate, ongoing review of the secondary standards for oxides of sulfur, oxides of nitrogen and PM, and thus, those comments are beyond the scope of this action.

Of the comments addressing the proposed decision for the secondary PM standards, many of the commenters support the Administrator's proposed decision to retain the current secondary PM standards, without revision. This group includes industries and industry groups and State and local governments and organizations. All of these commenters generally note their agreement with the rationale provided in the proposal, with a focus on the strength of the available scientific evidence for PM-related welfare effects. Most also recognize that the scientific evidence and quantitative information available in this reconsideration have not substantially altered our previous understanding of PM-related effects on non-ecological welfare effects (*i.e.,* visibility, climate, and materials) and do not call into question the adequacy of the current secondary standards. They find the proposed decision not to change the standards at this time to be well supported and a reasonable exercise of the Administrator's public welfare policy judgment under the CAA. The EPA agrees with these comments regarding the adequacy of the current secondary PM standards and the lack of support for revision of these standards at this time.

The EPA received relatively few comments on the proposed decision that it is not appropriate to establish any distinct secondary PM standards to address PM-related climate effects. Several commenters agree that the available scientific evidence provides support for the 2019 conclusion that there is a causal relationship between PM and climate effects, and the commenters also agree with the EPA that the currently available information is not sufficient for supporting quantitative analyses for the climate effects of PM in ambient air. These commenters support the Administrator's proposed decision not to set a distinct standard for climate.

There were also very few commenters who commented on the proposed decision that it is not appropriate to establish any distinct secondary PM standards to address PM-related materials effects. As with comments on climate effects, commenters generally agree with the EPA that the evidence is not sufficient to support quantitative analyses for PM-related materials effects. However, some commenters contend that EPA failed to explain in the proposal how the current standard is appropriate to protect materials from the effects of PM. These commenters disagree with the EPA's conclusion that quantitative relationships have not been established for PM-related soiling and corrosion and frequency of cleaning or repair of materials, and cite to several studies conducted outside the U.S. that they contend that the EPA should consider since the same materials are present in the U.S. They further contend that, in discussing the available scientific evidence in the 2019 ISA for studies conducted outside of the U.S., the EPA did not provide references to these studies and, therefore, the public is unable to comment on these studies. They further State that EPA failed to consider the following information: (1) Recent work related to soiling of photovoltaic modules and other surfaces, and; (2) damage and degradation resulting from oxidant concentrations and solar radiation for a number of materials, including polymeric materials, plastic, paint, and rubber. These commenters further assert that the EPA failed to propose a standard that provides requisite protection against materials effects attributable to PM.

As an initial matter, we note that the commenters submitted the same comments related to materials effects during the 2020 review. Consistent with our response in the 2020 notice of final rulemaking (85 FR 82737, December 18, 2020), we disagree with the commenters that the EPA failed to consider the relevant scientific information about materials effects available in this reconsideration. The 2019 ISA considered and included studies related to materials effects of PM, including studies conducted in and outside of the U.S., on newly studied materials including photovoltaic modules that were published prior to the cutoff date for the literature search.[170] These include the Besson et al. (2017) study referenced by the commenters (U.S. EPA, 2019a, section 13.4.2). The Grøntoft et al. (2019) study referenced by the same commenters was published after the cutoff date for the literature search for the 2019 ISA. However, the EPA provisionally considered new studies in responding to comments in the 2020 review, including the new studies highlighted by the commenters in their comments on the 2020 notice of proposed rulemaking, in the context of the findings of the 2019 ISA (see Appendix in U.S. EPA, 2020a).[171] Based on the provisional consideration, the EPA concluded in the 2020 review that the new studies are not sufficient to alter the conclusions reached in the 2019 ISA regarding PM and materials effects. For example, the Grøntoft et al. (2019) study was based on European air pollution which as the EPA has noted has higher concentrations (as well as diversity in sources, such as light duty diesel engines) compared to the U.S.. Thus, the EPA did not find it necessary or appropriate to reopen the air quality criteria to consider this study because it would not have been an adequate basis on which to set a NAAQS. As discussed in section I, when the EPA decided to reconsider the standards, it also decided to reopen the air quality criteria to a limited degree, based on its judgment that certain new studies were likely to be useful in reconsidering the standards.

[170] As noted earlier in section V, the 2019 ISA ''identified and evaluated studies and reports that that have undergone scientific peer review and were published or accepted for publication between January 1, 2009, and March 31, 2017. A limited literature update identified some additional studies that were published before December 31, 2017'' (U.S. EPA, 2019a, Appendix, p. A–3).

[171] As discussed in section I.D, the EPA has provisionally considered studies that were highlighted by commenters and that were published after the 2019 ISA. These studies are generally consistent with the evidence assessed in the 2019 ISA, and they do not materially alter our understanding of the scientific evidence or the Agency's conclusions based on that evidence.

Based on the provisional consideration in the 2020 review and the significant data gaps that existed at that time, the EPA did not include these studies within the scope of the 2022 ISA Supplement because, although these studies provide additional support for PM-related materials, the studies would not support quantitative analyses or alternative conclusions regarding these effects. As described in section I.C.5.b above, the ISA Supplement focuses on a thorough evaluation of some studies that became available after the literature cutoff date of the 2019 ISA that could either further inform the adequacy of the current PM NAAQS or address key scientific topics that have evolved since the literature cutoff date for the 2019 ISA. In developing the ISA Supplement, the EPA focused on the non-ecological welfare effects for which the evidence supported a ''causal relationship'' and for which quantitative analyses could be supported by the evidence because those were the welfare effects that were most useful in informing conclusions in the 2020 PA. While the 2020 PA considered the broader set of evidence for materials effects, it concluded that there remained 'substantial uncertainties with regard to the quantitative relationships with PM concentrations and concentration patterns that limit[ed] [the] ability to quantitatively assess the public welfare protection provided by the standards from these effects' (U.S. EPA, 2020b).'' Therefore, the ISA Supplement did not include an evaluation of scientific evidence for PM-related materials effects. However, the EPA has once again provisionally considered new studies in this reconsideration, including the studies highlighted by the commenters, in the context of the 2019 ISA and concludes that, as in the 2020 review, these studies are not sufficient to alter the conclusions reached in the 2019 ISA regarding PM and materials effects or to provide sufficient information on which to base a secondary NAAQS. The EPA agrees there is a causal relationship between the presence of PM in the ambient air and materials effects, but to set a standard, the EPA needs not only to understand at what point materials effects become adverse to public welfare but to be able to relate specific concentrations of ambient PM to those levels of materials effects. Given the significant gaps in the evidence, particularly given that the majority of the recent evidence has been conducted outside of the U.S., establishing any quantitative relationships between particle size, concentration, chemical components, and specific measures of materials damage, such as frequency of painting or repair of materials, the EPA finds the evidence is insufficient to support a secondary NAAQS to protect against materials effects.

With regard to studies conducted outside of the U.S., including those referenced by the commenters, as described in the proposal, in reaching his proposed conclusion, the Administrator recognized that while there was some newly available information related to materials effects of PM included in the 2019 ISA, ''this evidence is primarily from studies conducted outside of the U.S. in areas where PM concentrations in ambient air are higher than those observed in the U.S. (U.S. EPA, 2019a, section 13.4)'' (88 FR 5661, January 27, 2023). We disagree with the commenters that EPA did not provide references for these studies, nor that the lack of references inhibited the public's ability to provide comment on this proposed conclusion. First, the reference to section 13.4 in the 2019 ISA is a direct citation to the evaluation of newly available studies on PM-related materials effects, which includes citations for all materials effects evidence considered in the 2020 review and in this reconsideration. Second, section 5.3.2.1.2 of the 2022 PA considers the available scientific evidence for PM-related materials effects—including citations to the studies newly available in the 2019 ISA—and how that evidence informs conclusions regarding the adequacy of the standard (U.S. EPA, 2022b, section 5.3.2.1.2). Therefore, the EPA disagrees that the proposal failed to provide the proper references to the studies conducted outside of the U.S., and that the public was not provided the opportunity to provide comment on these studies.

Moreover, we disagree with the commenters that the EPA failed to consider quantitative information from studies available in this reconsideration. As detailed in sections 5.3.2.1.2 and 5.3.2.2 of the 2022 PA, and consistent with the information available in the 2020 review, a number of new studies are available that apply new methods to characterize PM-related effects on previously studied materials; however, the evidence remains insufficient to relate soiling or damage to specific levels of PM in ambient air or to establish quantitative relationships between PM and materials degradation. The uncertainties in the evidence identified in the 2012 review persist in the evidence in the 2020 review and in this reconsideration, with significant uncertainties and limitations to establishing quantitative relationships between particle size, concentration, chemical components, and frequency of painting or repair of materials. While some new evidence is available in the 2019 ISA, overall, the data are insufficient to conduct quantitative analyses for PM-related materials effects. Quantitative relationships have not been established between characteristics of PM and frequency of repainting or cleaning of materials, including photovoltaic panels and other energy-efficient materials, that would help inform our understanding of the public welfare implications of soiling in the U.S. (U.S. EPA, 2022b, section 5.3.2.2.2; U.S. EPA, 2019a, section 13.4). Similarly, the information does not support quantitative analyses between microbial deterioration of surfaces and the contribution of carbonaceous PM to the formation of black crusts that contribute to soiling (U.S. EPA, 2022b, section 5.3.2.2.2; U.S. EPA, 2019a, section 13.4). We also note that quantitative relationships are difficult to assess, in particular those characterized using damage functions as these approaches depend on human perception of the level of soiling deemed to be acceptable and evidence in this area remains limited in this reconsideration (U.S. EPA, 2022b, section 5.3.2.1.2). Additionally, we note the CASAC's concurrence with conclusions in the 2020 PA (Cox, 2019b, p. 13 of consensus responses) and the 2022 PA (Sheppard, 2022a, p. 23 of consensus responses) that uncertainties remain about the best way to evaluate materials effects of PM in ambient air. Further, no new studies are available in this reconsideration to link human perception of reduced aesthetic appeal of buildings and other objects to materials effects and PM in ambient air. Finally, uncertainties remain about deposition rates of PM in ambient air to surfaces and the interaction of PM with copollutants on these surfaces (U.S. EPA, 2022b, section 5.6).

With respect to the commenters' assertion that the EPA failed to consider information related to materials damage and degradation from oxidant concentrations and solar radiation for a variety of materials, we first note that, even assuming these sources of materials damage are within the scope of this review of the PM NAAQS, the commenter did not provide any references to the scientific studies that they suggest that the EPA did not consider. Despite the lack of a list of specific references from the commenter, we note that the 2019 ISA considered a number of studies that examined the

relationships between PM and several of the materials listed by the commenters (*e.g.,* paint, plastic, rubber). However, as described in the 2022 PA, these studies did not provide additional information regarding quantitative relationships between PM and materials that could inform quantitative analyses (U.S. EPA, 2022b, sections 5.3.2.1.2 and 5.3.2.2.2), nor did they alter conclusions regarding the adequacy of the current standard (U.S. EPA, 2022b, section 5.5).

As summarized above and in the proposal, the evidence in the 2020 review and in this reconsideration for PM-related effects on materials is not substantively changed from that in the 2012 review. There continues to be a lack of evidence related to materials effects that establishes quantitative relationships and supports quantitative analyses of PM-related materials soiling or damage. While the information available in the 2020 review and in this reconsideration continues to support a causal relationship between PM in ambient air and materials effects (U.S. EPA, 2019a, section 13.4), the EPA is unable to relate soiling or damage to specific levels of PM in ambient air and is unable to evaluate or consider a level of air quality to protect against such materials effects. Although the EPA did not propose a distinct level of air quality or a national standard based on air quality impacts (88 FR 5662, January 27, 2023), we did identify data gaps that prevented us from doing so. The EPA identified a number of key uncertainties and areas of future research (U.S. EPA, 2022b, section 5.6) that may inform consideration of the materials effects of PM in ambient air in future reviews of the PM NAAQS. The EPA notes that one commenter objected to the Administrator's proposed conclusion in the proposal (88 FR 5661, January 27, 2023) that in light of the available evidence for PM-related impacts on climate and on materials that it is appropriate not to change the existing secondary standards at this time. The EPA has explained, in both the proposal and this final action, the basis for its conclusion that there is insufficient evidence to identify any particular secondary standard or standards that would provide requisite protection against climate effects or materials damage. The EPA acknowledges that, as a result, the adoption of any distinct secondary PM standards for those effects would be inconsistent with the requirements of the CAA. The EPA is clarifying that it is not basing its decisions on secondary standards in this reconsideration to address these welfare effects because it has concluded that the available scientific evidence is insufficient to allow the Administrator to make a reasoned judgment about what specific standard(s) would be requisite to protect against known or anticipated adverse effects to public welfare from PM-related materials damage or climate effects.

Some commenters agree with the Administrator's proposed conclusion that a target level of protection for visibility of 30 dv and the level of the secondary 24-hour $PM_{2.5}$ standard of 35 $\mu g/m^3$ continues to be adequate to protect visibility, highlighting improvements in visibility in the U.S. Other commenters who disagree with the proposed decision indicated support for a more stringent standard for visibility impairment, although some of these commenters did not necessarily specify the alternative standard that would, in their judgment, address their concerns related to various aspects of the EPA's proposal, including the available public preference studies, specific aspects of the visibility index, and the target level of protection identified by the Administrator. Rather, most commenters focused on particular aspects of the visibility metric underlying the current secondary 24-hour $PM_{2.5}$ standard, including the form, averaging time, and target level of protection necessary to protect against visibility impairment.

With regard to the commenters' assertion that the current secondary standards are inadequate to protect the public welfare from PM-related visibility impairment, the EPA disagrees that the currently available information is sufficient to suggest that a more stringent standard is warranted. The EPA identified and addressed in great detail the limitations and uncertainties associated with the public preference studies as a part of the 2012 review (78 FR 3210, January 15, 2013). Given that the evidence related to public preferences has not substantially changed since the 2012 review, the EPA reiterated the limitations and uncertainties inherent in the evidence as a part of the 2020 PA (U.S. EPA, 2020b, section 5.5), as well as in the 2022 PA for this reconsideration (U.S. EPA, 2022b, section 5.6). The 2022 PA highlights key uncertainties associated with public perception of visibility impairment and identifies areas for future research to inform future PM NAAQS reviews, including those raised by the commenters (U.S. EPA, 2022b, section 5.6). Specifically, the EPA agrees with commenters that there are several areas where additional information would reduce uncertainty in our interpretation of the available information for purposes of characterizing visibility impairment. As described in more detail in the 2020 PA (U.S. EPA, 2020b, p. 5–41) and the 2022 PA (U.S. EPA, 2022b, p. 5–53), briefly, these areas include: (1) Expanding the number and geographic coverage of preference studies in urban, rural, and Class I areas; (2) evaluating visibility preferences of the U.S. population today, given that the preference studies were conducted more than 15 years ago, during which time air quality in the U.S. has improved; (3) accounting for the influence of varying study methods may have on an individual's response as to what level of visibility impairment is acceptable, and; (4) information on people's judgments on acceptable visibility based on factors that can influence their perception of visibility (*e.g.,* duration of impairment experiences, time of day, frequency of impairment).

However, the EPA disagrees with the commenters that the current secondary PM standards are inadequate and should be made more stringent because of the limitations and uncertainties associated with the available public preference studies. The EPA does not view the limitations of the preference studies and other available evidence as so significant as to render the EPA unable to identify a secondary standard to protect against the adverse effects of PM on visibility, but the EPA also does not believe that the limitations themselves mean that the standards are inadequate. In fact, there is a limited amount of recently available scientific evidence to further inform our understanding of public preferences and visibility impairment is recognized by the Administrator in reaching his proposed decision not to change the current secondary PM standards at this time, given that the evidence base is largely the same as at the time of the 2012 and 2020 reviews.

These same commenters further contend that the EPA failed to use the latest science to develop a visibility index, stating that the EPA failed to consider the contrast of distance methodology employed in a recent meta-analysis of available preference studies (Malm et al., 2019). Commenters claim that the EPA draws conclusions from the Malm et al. (2019) study about how to relate contrast to acceptable visibility preferences in the 2022 ISA Supplement, yet ignores the findings of the study and fails to consider the ''contrast of distance'' methodology in the 2022 PA and the proposal, thereby, in their view, departing from the CASAC's advice to consider this evidence in setting the secondary

standard. Finally, the commenters assert that the EPA did not explain why the available public preference studies are adequate for analysis using a light extinction approach but not using the contrast of distance approach, and that such differential treatment is arbitrary.

We disagree with the commenters that the EPA did not use the latest science in evaluating the visibility index, and that the EPA failed to consider the contrast of distance methodology used in Malm et al. (2019). As the commenters state, the Malm et al. (2019) study was included in the ISA Supplement (U.S. EPA, 2022a, section 4.2.1). However, the EPA disagrees with the assertion that the ISA Supplement reached conclusions about how to relate contrast to acceptable visibility preferences. The ISA Supplement provided an overview of the Malm et al. (2019) study, stating that ''[t]he main conclusion of this study was that the level of acceptable visual air quality is more consistent across studies using metrics that evaluate the distinction of an object from a background than using metrics that evaluate the greatest distance at which an object can be observed.'' Furthermore, the statements that the commenters are referencing in support of this statement (*i.e.,* U.S. EPA, 2022b, pp. 4–5–4–6) are in fact the conclusions of the study itself, rather than conclusions of the EPA. For example, the ISA Supplement notes that ''Malm et al. (2019) suggested that scene-dependent metrics like contrast, which integrate the effects of b_{ext} along the sight paths between observers and landscape features, are better predictors of preference levels than universal metrics like light extinction.'' The suggestion that the contrast of distance methodology is a better predictor than light extinction is one of the study authors, not the EPA. The EPA has not reached a conclusion on whether contrast of distance methodology would be a more appropriate indicator for a visibility index than estimated light extinction because the EPA finds that there is insufficient information in the record at this time to support that it is practical to evaluate, much less adopt, the contrast of distance methodology on a national basis. Specifically, the Malm et al. (2019) study does not provide as a part of their publication the specific input values to the equation to calculate the contrast of distance associated with the available public preference studies (*e.g.,* sight paths from the images), nor do the preference studies present or make publicly available these data in their publications. In the absence of additional studies or publicly available data to further evaluate the contrast of distance methodology, the EPA is unable to consider contrast of distance as an alternative to estimated light extinction in this reconsideration, although we note that it may be appropriate to evaluate it more closely in future reviews.

In reaching conclusions regarding the appropriate indicator for the visibility index, the 2022 PA specifically notes ''that limited new research is available on methods of characterizing visibility or on how visibility is valued by the public, such as visibility preference studies. Thus, while limited new research has further informed our understanding of the influence of atmospheric components of $PM_{2.5}$ on light extinction, the available evidence to inform consideration of the public welfare implications of PM-related visibility impairment remains relatively unchanged'' (U.S. EPA, 2022b, p. 5–50). The EPA again notes in the proposal that ''there are very few studies available that use scene-dependent metrics (*i.e.,* contrast) to evaluate public preference information, which makes it difficult to evaluate them as an alternative to the light extinction approach'' (88 FR 5649–5650, January 27, 2023). To further expand on this statement, the Malm et al. (2019) study does not provide enough information to replicate the results of their contrast of distance approach to allow for a comprehensive evaluation of the potential use of this methodology in considering the results of the public preference studies for determining the target level of protection for visibility.

Some commenters suggests that the methodology could be approximated by simply ensuring that people could always see distant scenic elements, and that characterizing typical average and/or maximal viewing distances cross different geographical areas and regions would be a straightforward Geographical Information Systems (GIS) exercise. The EPA disagrees that this assessment would be straightforward, given the lack of data establishing viewing distances in the available scientific record and the diversity of distance to scenic elements across different areas and regions of the U.S., and finds that this approach is also not practical to adopt in this reconsideration. Finally, while the Malm et al. (2019) study is using an alternative approach for evaluating public preferences and acceptability, we note that this study is evaluating the same public preference studies that have been available for the past several decades. For these reasons, the EPA disagrees with the commenters' allegation that the EPA ignored the findings of the Malm et al. (2019) study and failed to consider the contrast of distance methodology in the 2022 PA and the proposal, and ignored the CASAC's advice to consider this study. The ISA Supplement and the 2022 PA considered the Malm et al. (2019) study, along with the full body of available scientific evidence, and took into account the uncertainties and limitations associated with the evidence for visibility preferences, in reaching conclusions regarding the adequacy of the secondary 24-hour $PM_{2.5}$ standard (U.S. EPA, 2022b, pp. 5–24–5.25, 5–50).

Several comments in support of revising the secondary 24-hour $PM_{2.5}$ standard to protect against visibility generally recommend revisions to the elements of the standard and visibility index (indicator, averaging time, form, and level) consistent with those supported by the CASAC and public comments in previous PM NAAQS reviews. Some commenters assert that the EPA's approach in the 2022 PA and in the proposal for this reconsideration did not evaluate options for alternative secondary PM standards and thereby is flawed. We address comments on the elements of a visibility index and a revised standard for visibility effects below.

As an initial matter, the EPA disagrees to the extent commenters are suggesting that the PA is legally required to analyze options for alternative standards. The PA is a document developed by the EPA in order to assist the Administrator and the CASAC in reaching conclusions regarding the adequacy of the current standards, and its scope is determined by the EPA. Moreover, the 2022 PA did assess a wide range of information relevant to the Administrator's decision and considered a range of potential standards.

First, in developing the 2022 PA and in responding to CASAC's advice and recommendations during its review of the 2021 draft PA, the EPA expanded upon its discussion of determining the target level of protection for the visibility index and considered the extent to which the available scientific information would alter regarding the visibility index and the appropriate target level of protection against PM-related visibility effects (U.S. EPA, 2022b, pp. 5–27–5–29). This detailed discussion expands the consideration of the target level of protection for the visibility index presented in the 2020 PA (U.S. EPA, 2020b) and the 2021 draft PA (U.S. EPA, 2021c), neither of which specifically considered the elements of the visibility index in determining the appropriate target level of protection. In

considering the available information in the 2022 PA, the EPA concluded that the available information continued to provide support for a visibility index with a level of 30 dv, with estimated light extinction as the indicator, a 24-hour averaging time, and a 90th percentile form, averaged over three years.

Additionally, in summarizing the air quality and quantitative information in the proposal for this reconsideration, the EPA further expands upon the discussion added to the 2022 PA related to the target level of protection in terms of a $PM_{2.5}$ visibility index. In so doing, the EPA considers even more extensively the available public preference studies and quantitative analyses (88 FR 5651–5652, January 27, 2023). In particular, there is a more detailed discussion of the public preference studies, including the levels of impairment determined to be ''acceptable'' by at least 50 percent of study participants and the methodologies used in the studies, including uncertainties and limitations associated with the methodologies (88 FR 5652, January 27, 2023). In reaching a proposed decision regarding the adequacy of the secondary PM standards, as well as the appropriate target level of protection for the visibility index, the Administrator considered the available scientific evidence and quantitative analyses, as well as judgments about how to consider the range and magnitude of uncertainties that are inherent in the scientific evidence and analyses. In so doing, the Administrator proposed to conclude that the protection provided by a visibility index based on estimated light extinction, a 24-hour averaging time, and a 90th percentile form, averaged over 3 years, set at a level of 30 dv would be requisite to protect public welfare with regard to visibility impairment (88 FR 5660, January 27, 2023).

Having provisionally concluded that it was appropriate to define the target level of protection in terms of a visibility index based on estimated light extinction as described above (*i.e.,* with a 24-hour averaging time; a 3-year, 90th percentile form; and a level of 30 dv), the Administrator next considered the degree of protection from visibility afforded by the current secondary PM standards. In so doing, he considered the updated analyses of PM-related visibility impairment presented in the 2022 PA (U.S. EPA, 2022b, section 5.3.1.2) and described in more detail in the proposal (88 FR 5656, January 27, 2023), which included estimating light extinction using multiple versions of the IMPROVE algorithm and inclusion of $PM_{10-2.5}$ data at all sites to allow for better characterization of the influence of the coarse fraction of PM on light extinction. The Administrator noted that the results of the analyses in the 2022 PA were consistent with those from the 2012 and 2020 reviews. He also recognized that, regardless of the IMPROVE equation that was used, the analyses demonstrated that the 3-year visibility metric is at or below 28 dv in all areas meting the current 24-hour $PM_{2.5}$ standard (88 FR 5657, January 27, 2023). The Administrator also noted that, in their review of the 2021 draft PA, the CASAC stated that ''[i]f a value of 20–25 deciviews is deemed to be an appropriate visibility target level of protection, then a secondary 24-hour standard in the range of 25–35 $\mu g/m^3$ should be considered (Sheppard, 2022a, p. 21 of consensus responses). The Administrator recognized that while the CASAC recommended that additional justification be provided for a visibility index target level of protection of 30 dv, they did not specifically recommend that he choose an alternative level for the visibility index. Therefore, the Administrator considered the available scientific evidence, quantitative information, and the CASAC's advice in reaching his proposed conclusions. The Administrator recognized conclusions regarding the appropriate weight to place on the scientific and technical information, including how to consider the range and magnitude of uncertainties inherent in that information, is a public welfare policy judgment left to the Administrator. As such, the Administrator noted his preliminary conclusion on the appropriate visibility index (*i.e.,* with a 24-hour averaging time; a 3-year, 90th percentile form; and a level of 30 dv) and his preliminary conclusions regarding the quantitative analyses of the relationship between the visibility index and the current secondary 24-hour $PM_{2.5}$ standard. In so doing, he proposed to conclude that the current secondary standards provide requisite protection against PM-related visibility effects (88 FR 5661, January 27, 2023).

However, the Administrator additionally recognized that the available evidence on visibility impairment generally reflects a continuum and that the public preference studies did not identify a specific level of visibility impairment that would be perceived as ''acceptable'' or ''unacceptable'' across the whole U.S. population. He noted a judgment of a target level of protection, below 30 dv and down to 25 dv, could be supported if more weight was put on the public preference study performed in the Phoenix, AZ, study (BBC Research & Consulting, 2003). As described above, while the Administrator noted that the CASAC did not recommend revising the level of the current 24-hour $PM_{2.5}$ standard in their review of the 2021 draft PA, they did state that, should an alternative level be considered for the visibility index, revisions to the secondary 24-hour $PM_{2.5}$ standard should also be considered (Sheppard, 2022a, p. 21 of consensus responses). Thus, the Administrator solicited comment on the appropriateness of a target level of protection for visibility below 30 dv and down as low as 25 dv, and of revising the level of the current secondary 24-hour $PM_{2.5}$ standard to a level as low as 25 $\mu g/m^3$ (88 FR 5662, January 27, 2023), and the Administrator considered these public comments in reaching his final decision on the secondary standards. Thus, the EPA disagrees that the 2022 PA and the proposal did not adequately consider options for revising the secondary PM NAAQS.

With regard to the elements of the visibility index, in considering the adequacy of the current secondary 24-hour $PM_{2.5}$ standard to protect against visibility impairment, as described in the proposal (88 FR 5658–5660, January 27, 2023), the Administrator first defined an appropriate target level of protection in terms of a PM visibility index. In considering the information available in this reconsideration and the CASAC's advice, the Administrator proposed to conclude that the protection provided by a visibility index based on estimated light extinction, a 24-hour averaging time, and 90th percentile form, averaged over 3 years, set at a level of 30 dv, would be requisite to protect public welfare with regard to visibility impairment (88 FR 5660, January 27, 2023).

In defining this target level of protection, the Administrator first considered the indicator of such an index. He noted that, given the lack of availability of methods and an established network for directly measuring light extinctions, a visibility index based on estimates of light extinction by $PM_{2.5}$ components derived from an adjusted version of the original IMPROVE algorithm would be most appropriate, consistent with the 2012 and 2020 reviews. As described in the proposal (88 FR 5649, January 27, 2023) and above (section V.A.2), the IMPROVE algorithm estimates light extinction using routinely monitored components of $PM_{2.5}$ and $PM_{10-2.5}$, along with estimates of relative humidity. The

Administrator, while recognizing that some revisions to the IMRPOVE algorithm were newly available in the 2020 review, noted that the fundamental relationship between ambient PM and light extinction has changed very little and the different versions of the IMPROVE algorithms can appropriately reflect this relationship across the U.S. (88 FR 5658–5659, January 27, 2023). As such, he judged that defining a target level of protection in terms of estimated light extinction continues to be a reasonable approach in this reconsideration.

Some commenters who criticized the EPA's interpretation and application of the Malm et al. (2019) study also contend that an indicator based on the contrast of distance would be a significant improvement over the current indicator for the visibility index and would more accurately evaluate public preferences. However, as described in the 2022 PA (U.S. EPA, 2022b, section 5.3.1.1), while scene-dependent metrics, such as contrast, may be useful alternative predictors of preferences compared to universal metrics like light extinction, there are a very limited number of studies that use such metrics to evaluate public preferences of visibility impairment and there is a lack of scientific evidence that supports one metric over another. Moreover, the EPA finds that even if the Administrator agreed that the contrast of distance methodology was an improvement over light extinction, there is insufficient information available to evaluate and adopt contrast of distance as an indicator for a national visibility target at this time. While, in its review of the 2021 draft PA the CASAC suggested that the EPA consider this method in developing the secondary PM standards, the CASAC also noted that ''more extensive technical evaluation of the alternatives for visibility indicators and practical measurement methods'' is needed to inform future reviews of the secondary PM standards (Sheppard, 2022a, p. 22 of consensus responses). The CASAC did not recommend using a different indicator for this reconsideration, with the majority of CASAC members reiterated past advice recommending development of a visibility FRM for a directly measured $PM_{2.5}$ light extinction indicator (Sheppard, 2022a, p. 22 of consensus responses), a recommendation that was supported by other public commenters as well, and the minority of the CASAC suggested that such an FRM is not necessary. For these reasons, the EPA does not consider it feasible or appropriate to define the visibility index in terms of a contrast of distance indicator at this time.

With regard to averaging time, some commenters suggested to the EPA that a secondary standard with a different form than the primary standard may be a more relevant for welfare effects. While they do not recommend a specific alternative form, the commenters point to CASAC advice in past reviews where the CASAC stated that a subdaily standard based on daylight hours better reflects visibility impairment.

In defining the characteristics of a visibility index, the EPA continues to believe that a 24-hour averaging time is reasonable. This is in part based on analyses conducted in the 2012 review that showed relatively strong correlations between 24-hour and subdaily (*i.e.,* 4-hour average) $PM_{2.5}$ light extinction (88 FR 5659, January 27, 2023; 85 FR 82740, December 18, 2020; 78 FR 3226, January 15, 2013), indicating that a 24-hour averaging time is an appropriate surrogate for the subdaily time periods relevant for visual perception. The EPA believes that these analyses continue to provide support for a 24-hour averaging time for the visibility index in this reconsideration. The EPA also recognizes that the longer averaging time may be less influenced by atypical conditions and/or atypical instrument performance (88 FR 5659, January 27, 2023; 85 FR 82740, December 18, 2020; 78 FR 3226, January 15, 2013). When taken together, the available scientific information and updated analyses of calculated light extinction available in this reconsideration continue to support that a 24-hour averaging time is appropriate when defining a target level of protection against visibility impairment in terms of a visibility index.

Moreover, the EPA disagrees with commenters that a secondary $PM_{2.5}$ standard with a 24-hour averaging time does not provide requisite protection against the public welfare impacts of visibility impairment. At the time of the 2012 review, the EPA recognized that hourly or subdaily (*i.e.,* 4- to 6-hour) averaging times, within daylight hours and excluding hours with high relative humidity, are more directly related to the short-term nature of visibility impairment and the relevant viewing periods for segments of the viewing public than a 24-hour averaging time. At the time of the 2012 review, the EPA agreed that a subdaily averaging time would generally be preferable. However, the Agency noted significant data quality uncertainties associated with the instruments that would provide hourly $PM_{2.5}$ mass concentrations necessary to inform a subdaily averaging time. These uncertainties, as described in the 2012 review, included short-term variability in hourly data from available continuous monitoring methods, which would prohibit establishing a subdaily averaging time (78 FR 3209, January 15, 2013). For all of these reasons, and consistent with the 2020 review, the EPA continues to believe that a subdaily averaging time is not supported by the information available in this reconsideration.

With regard to the form of the visibility index, some commenters contend that the form used in evaluating visibility impairment is not appropriate. First, commenters contend that the EPA incorrectly stated that the CASAC did not provide advice on the 3-year, 90th percentile form of the visibility index and that the CASAC specifically recommended that the EPA further justify the metric and form, and by not doing so, the proposal arbitrarily departs from the CASAC's recommendations. The commenters also contend that the EPA fails to explain how averaging the form over three years is protective given that the public does not perceive visibility in three-year averages.

We disagree with the commenters that the EPA departed from the CASAC's recommendations that ''[t]he final PA should provide a robust justification for the daily light extinction percentile used in the analysis'' (Sheppard, 2022a, p. 22 of consensus responses). In this statement, the CASAC did not make explicit recommendations for revisions to the form of the visibility index, as the commenters assert, but rather requested additional justification for the percentile selected for the visibility index in the 2022 PA. In response to the CASAC's recommendation after reviewing the 2021 draft PA, the EPA included a new section in the 2022 PA that explicitly discusses the elements (*i.e.,* indicator, averaging time, form, and level) of the visibility index, including additional justification for the conclusions regarding the appropriate elements for the index (U.S. EPA, 2022b, pp. 5–27–5–29). In so doing, the 2022 PA recognizes that there is no new information available in this reconsideration to inform selection of an alternative form of the visibility index, and therefore, relied on the analyses presented in the 2010 UFVA that evaluated the different statistical forms of the visibility index. The 2022 PA also discusses the approach to improving visual air quality in Federal Class I areas as a part of the Regional Haze Program (U.S. EPA, 2022b, p. 5–28). Furthermore, as reflected in responding to public comments below, and in

reaching his final conclusions in section V.B.4 below, the Administrator further considers the available scientific and quantitative information, the CASAC's advice, and public comments in informing his final conclusions regarding the appropriate target level of protection for the visibility index. With regard to the commenters' assertion that the EPA did not justify why averaging the form over three years is protective, we agree with the commenters that people do not perceive visibility impairment in three year averages. As described in the 2022 PA, visibility-related effects and perceived impairment are often associated with short-term PM concentrations, and therefore, the focus of the visibility analyses is centered on the adequacy of the 24-hour $PM_{2.5}$ standard (U.S. EPA, 2022b, p. 5–29). However, as described in the 2022 PA, the 3-year average form provides stability from the occasional effect of inter-annual meteorological variability that can result in unusually high pollution levels for a particular year (U.S. EPA, 2022b, p. 5–28). Occasional meteorological variability is of particular concern for the visibility index, which can be impacted by not only PM concentrations in ambient air but also relative humidity. The D.C. Circuit has previously recognized that it is legitimate for the EPA to consider overall stability of the standard and its resulting promotion of overall effectiveness of NAAQS control programs in setting a standard. See *American Trucking Ass'ns* v. *Whitman,* 283 F.3d 355, 375–76 (D.C. Cir. 2002). The 2022 PA concluded that the available information continues to provide support for a 90th percentile form, averaged over three years, and the inclusion of additional justification for the elements of the visibility index responds to the CASAC's recommendation (U.S. EPA, 2022b, section 5.3.1.2).

Some commenters suggest that the 90th percentile form is too low and would result in 36 days being excluded annually, presuming that the public only finds it objectionable when visibility is worse than the standard on 37 or more days per year. The commenters also contend that the EPA's approach of using a 90th percentile form for the visibility index is inconsistent with the goals of the Regional Haze Program. In so doing, the commenters note that the Regional Haze Rule focuses on improving conditions on the worst days, while they argue that a 90th percentile form for the visibility index would ignore the 36 worst visibility days, rather than identifying them and reducing pollution on those days.

In reaching conclusions regarding the appropriate form of the visibility index, the EPA is following the same approach employed in past reviews of the secondary PM NAAQS, including those in the 2012 and 2020 rulemakings. In reaching conclusions regarding the appropriate form of the visibility index in the 2011 PA, the EPA considered the percentile forms of the visibility index assessed in the 2010 PA (*i.e.,* 90th, 95th, 98th) along with the approach for improving visual air quality under the Regional Haze Program. In so doing, the 2011 PA notes that the Regional Haze Program targets the 20% most impaired days for improvements in visual air quality in Federal Class I areas (*i.e.,* the days more impaired than the 80th percentile). The 2011 PA recognized that to increase the likelihood of improving visual air quality on the worst days, the form of the visibility index should be set well above the 80th percentile. The 2011 PA further concluded that a 90th percentile form would represent the median of the distribution of the 20% most impaired days, and meeting a visibility index with a 90th percentile form would mean that 90% of the days have visual air quality that is at or below the level of the visibility index and would reasonably expected to lead to improvements in visual air quality for the 20% most impaired days (U.S. EPA, 2011, p. 4–59). The 2022 PA noted that there is no new information from public preference studies that would inform the Administrator's consideration of the appropriate form for the visibility target index, and reached conclusions consistent with those of 2011 PA. However, as discussed below, the EPA disagrees that a focus on the 90th percentile ''ignores'' any days with worse visibility. It is possible to examine past patterns of air quality to judge the relationship between the 90th percentile and higher percentiles, and to assess whether achieving a 90th percentile visibility target will also result in air quality improvements, where necessary, at higher percentiles. Based on its assessment of past air quality and potential alternative percentiles for the form, the EPA judged that a 90th percentile would appropriately achieve improved air quality both above and below that percentile.

Some commenters suggest that the analyses conducted in the 2010 UFVA are based on a different metric than the 24-hour average being considered in the reconsideration, that the analyses are outdated and irrelevant. Therefore, the commenters assert that relying on the analyses in the 2010 UFVA is not a rational justification for the use of a 90th percentile for the visibility index in this reconsideration. Moreover, these commenters state that, in past reviews, both the EPA and the CASAC have considered and recommended a 98th percentile form, but the proposal does not consider the 98th percentile.

These commenters assert that the 2010 UFVA was not considering the same metric under consideration here. However, the EPA was citing to the 2010 UFVA for the conclusion that there are correlations between different statistical forms of the visibility index. To confirm whether these correlations occur under recent air quality, we conducted additional air quality analyses evaluating the visibility index using the current percentile form (*i.e.,* 90th) and two alternative forms (*i.e.,* 95th and 98th).[172] While a higher percentile form would further limit the number of days with peak PM-related light extinction, the analyses confirm that a 90th percentile form is effective in limiting visibility impairment at higher percentiles. Based on these analyses, depending on which version of the IMPROVE equation is used to estimate light extinction, the differences in the 3-year averages of estimated light extinction for the 90th, 95th, and 98th percentile forms are small. For example, in areas that meet the current 24-hour $PM_{2.5}$ standard, for light extinction estimated using the original IMPROVE equation, all sites have light extinction estimates for a 90th percentile form at or below 26 dv, for a 95th or 98th percentile form at or below 29 dv.[173] In most locations, when estimating light extinction based on the original IMPROVE equation, the difference between a 95th or 98th percentile form and a 90th percentile form is generally less than 3 dv.[174] As noted in previous reviews, a change of 1 to 2 dv in light extinction under many viewing conditions will be perceived as a small, but noticeable, change in the appearance of a scene, regardless of the initial amount of visibility impairment (88 FR 5657, January 27, 2023; U.S. EPA, 2004b; U.S. EPA, 2010b). Thus, differences between a 90th percentile form and a 95th or 98th percentile form remain small, and for any of these forms of the visibility index, the estimated light extinction based on the original IMPROVE equation in areas meeting the current secondary 24-hour $PM_{2.5}$ standard is below the upper end of the range of the levels considered for the visibility index (*i.e.,* below 30 dv).

Some commenters disagree with the EPA's proposed conclusion that a level of 30 dv is appropriate for the visibility index and support a lower level in order to provide increased protection against visibility impairment. Commenters who support a revised level for the visibility index state that a target level of protection of 30 dv would mean that less than 10% of participants in the public preference studies, other than the Washington, DC, study, would accept visibility conditions above 29 dv. These commenters further suggest that a 75% acceptability, rather than 50% acceptability, is requisite to protect visibility sources, which would be on average a level of 21 dv when using the light extinction method or 18 dv when using the contrast of distance method. These commenters argue that, based on the available information, a target level of protection for the visibility index of approximately 20 dv would be more appropriate, and therefore, the level of the secondary 24-hour $PM_{2.5}$ standard should be strengthened to 25 $\mu g/m^3$. Other commenters who support a revised level for the visibility index suggest that public preference studies with longer sight paths to distant landscape features or with lower target levels than those in the Washington, DC study, such as the Phoenix study, would support a lower level. These commenters support revising the target level of protection for the visibility index to a 25 dv, and revising the level of the secondary 24-hour $PM_{2.5}$ standard to a level as low as 25 $\mu g/m^3$, suggesting that in low relative humidity environments, 25 dv is consistent with $PM_{2.5}$ concentrations of less than 25 $\mu g/m^3$.

Some commenters state that EPA's justification for setting a target level of protection at the upper end of the 20 to 30 dv range is arbitrary. These commenters state that the EPA's reliance on the standard operating in many regions and circumstances as support for the upper end of the range is irrational and illegal. Moreover, these commenters contend that EPA provided no rational connection between the Regional Haze Program and the proposed decision to set the target level of protection at the upper end of the range. They suggest that the EPA proposed to rely exclusively on the Regional Haze Program to protect visibility in Class I areas and to give visibility in these areas no weight in considering the secondary PM standard and that it is not rational to entirely ignore visibility in Class I areas when setting the secondary standard. These commenters assert that the Regional Haze Program provides no rational basis for a target level of protection at the upper end of the range, nor does the EPA identify one.

Some commenters contend that the EPA failed to justify the adequacy of the current secondary annual $PM_{2.5}$ standard, noting that the secondary 24-hour and annual $PM_{2.5}$ standards work together to provide protection against short- and long-term effects of $PM_{2.5}$. These commenters point to CASAC comments on the 2021 draft PA and the comments of an individual CASAC member's support for strengthening the secondary annual $PM_{2.5}$ standard to provide increased protection against climate and materials effects over time. They contend that EPA arbitrarily failed to discuss the secondary annual $PM_{2.5}$ standard not only in the proposal, but also in the 2022 PA and in the 2020 final decision.

The EPA recognizes that the selection of the target level of protection for the visibility index is fundamentally a public welfare policy judgment for the Administrator. The Administrator is tasked by the CAA to judge when visibility impairment becomes an adverse effect on public welfare. It is clear that visibility impairment can become adverse to public welfare, but the Administrator does not consider that every deciview of impairment is adverse to public welfare. In considering the point at which visibility impairment becomes adverse to public welfare, such that the attainment of the secondary PM NAAQS would prevent the adverse effect, the Administrator gives weight to the public preference studies as to when visibility impairment is unacceptable. At the same time, the Administrator recognizes the limitations of these studies, which have been detailed in the proposal and the 2022 PA. Similarly, the EPA discussed the Regional Haze program in the proposal to highlight that there is a distinct program to protect against visibility impairment in Class I areas, and the existence of that program is relevant to the Administrator's judgment about the level of visibility impairment that is adverse to public welfare under CAA 109(d), because in determining what is requisite the Administrator is primarily considering visibility impairment outside of Class I areas.

[172] Gantt, B., and Hagan, N. (2023). Analysis of Percentile Forms of the Visibility Index. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072*.

[173] Gantt, B., and Hagan, N. (2023). Analysis of Percentile Forms of the Visibility Index. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072*.

[174] Gantt, B., and Hagan, N. (2023). Analysis of Percentile Forms of the Visibility Index. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072*.

In considering how to use the results of the public preference studies, the Administrator concludes that a 50th acceptability criterion is an appropriate tool. The Administrator's task is to set standards that are neither more stringent nor less stringent than necessary, and a 50% acceptability criterion seems most appropriate to use in judging when visibility impairments become adverse, because it should more closely represent when the median person would find the impairment to be adverse. The Administrator notes this conclusion is consistent with the approach adopted in the Denver study by Ely et al. (1991) where the 50% acceptability criterion for urban visibility was first presented. This study discussed the use of the 50% acceptability criteria as a reasonable basis for setting a standard to protect visibility in urban areas. In doing so, Ely et al. (1991) noted that the 50% acceptability criterion divided the slides into two groups—those judged acceptable and those judged unacceptable by a majority of people in the study—and therefore, was reasonable since it defines the point where the majority of the study participants began to judge levels of visibility impairment as unacceptable (Ely et al., 1991).

In considering the appropriate target level of protection, we next look to the available public preference studies, noting that the selecting of the range of 20 to 30 dv for the target level of protection for the visibility index is informed by the 50% acceptability values from these studies. The Denver, CO, (Ely et al., 1991) and British Columbia, Canada, (Pryor, 1996) studies met the 50% acceptability criteria at 20 dv and 19–23 dv, respectively (U.S. EPA, 2022b, Table D–8). As described in the proposal, these studies used photographs that were taken at different times of the day and on different days to capture a range of light extinction levels needed for the preference studies (88 FR 5652, January 27, 2023). Compared to studies that used computer-generated images (*i.e.,* those in Phoenix, AZ, and Washington, DC) there was more variability in scene appearance in these older studies that could affect preference rating and includes uncertainties associated with using ambient measurements to represent sight path-averaged light extinction values rather than superimposing a computer-generated amount of haze onto the images. When using photographs, the intrinsic appearance of the scene can change due to meteorological conditions (*i.e.,* shadow patterns and cloud conditions) and spatial variations in ambient air quality that can result in ambient light extinction measurement not being representative of the sight-path-averaged light extinction. Computer-generated images, such as those generated with WinHaze, do not introduce such uncertainties, as the same base photograph is used (*i.e.,* there is no intrinsic change in scene appearance) and the modeled haze that is superimposed on the photograph is determined based on uniform light extinction throughout the scene. Because of the uncertainties and limitations associated with the Denver, CO, and British Columbia, Canada, the EPA concludes that it is appropriate to place less weight on these studies, and to instead focus on the public preference studies that were designed to reduce these uncertainties and limitations.

In so doing, we focus on the public preference studies that use computer-generated images (*i.e.,* those in the Phoenix, AZ, and Washington, DC) studies. As described in the proposal, the use of computer-generated images have less variability in scene appears than in those studies that use photographs taken on different days and at different times of the days (*i.e.,* those in the Denver, CO, study) that would be likely to influence preference rating and introduces uncertainties associated with using ambient measurements to present sight path-averaged light extinction values rather than superimposing a computer-generated amount of haze onto the images (88 FR 5652, January 27, 2023).

The Phoenix, AZ, public preference study (BBC Research & Consulting, 2003) had several strengths compared to some of the other public preference studies. The Phoenix, AZ, study had the largest number of participants (385 in 27 separate focus group sessions) of all of the public preference studies, with a sample group designed to be demographically representative of the Phoenix population at that time. The age range in the Phoenix study was also more inclusive (18–65+), with the distribution of the study participants corresponding reasonably well to the overall age distribution in the 2000 U.S. Census for the Phoenix area (BBC Research & Consulting, 2003). Furthermore, the 21 images used in the Phoenix, AZ, study were developed using the WinHaze software with visual air quality ranging from 15 to 35 dv, and the view was toward the southwest, including downtown Phoenix, with the Sierra Estrella Mountains in the background at a distance of 25 miles. This study had the least noisy preference results, perhaps because a larger, more representative group of participants combined with the use of computer-generated images resulted in the smoother distribution of responses of ''acceptable'' visual air quality. Based on the EPA's evaluation of the public preference studies in the 2012 review, the 50% ''acceptable'' criteria was met at approximately 24 dv (U.S. EPA, 2010, Table 2–3).

We also consider the public preferences for the Washington, DC, studies (Abt Associates, 2001; Smith and Howell, 2009). The 2001 Washington, DC study included nine participants, and the 2009 Washington, DC, study replicated the 2001 study with 26 additional participants. Similar to the Phoenix study, the Washington, DC, studies also had the strength of having the 20 images included in the study generated using WinHaze with visual air quality ranging from 9 to 45 dv. The study depicted a scene of a panoramic view of the Potomac River, the National Mall, and downtown Washington, DC. All of the distinct buildings in the scene were within four miles and the higher elevations in the background were less than 10 miles from where the image was taken from the Arlington National Cemetary in Virginia. The 50% ''acceptable'' criteria was met at approximately 29 dv (U.S. EPA, 2010, Table 2–3).

As described in more detail in the proposal, visibility preferences can vary by location, and such differences may arise based on the differences in the cityscape scene that is depicted in the images (88 FR 5652, January 27, 2023). In considering the geographical differences between the public preference studies, we recognize that the methodological differences between the studies may influence the resulting ''acceptable'' level of visibility impairment. In the Phoenix, AZ, study, the image depicted mountains in the background and urban features in the foreground, whereas the Washington, DC, study depicted nearby buildings in the image without mountains in the distance. As an initial matter, we note that the object of interest to the study participant could differ across the studies based on the scenes included in the images being evaluated—with the mountains being of greater interest in the images in the Phoenix, AZ, study, despite also depicting buildings that are similar to those shown and presumed to be of interest in the images in the Washington, DC, study (88 FR 5652, January 27, 2023). We also agree with the commenters that the distance between the object of interest and the camera is an important consideration in

evaluating the public preference studies. Objects at greater distances from the camera location (such as those in the Phoenix, AZ, study which had a maximum distance of 42 km (U.S. EPA, 2022b, Table D–8)) have a greater sensitivity to light extinction, which alone could explain differences in preferences but coupled with an object of greater interest results in lower acceptable levels of visibility impairment. Conversely, objects at closer distances from the camera location (such as those in the Washington, DC, study which had a maximum distance of 8 km (U.S. EPA, 2022b, Table D–8)) have less sensitivity to light extinction, which coupled with objects of interest (compared to the mountainous views in the Phoenix, AZ, study) result in higher acceptable levels of visibility impairment. These studies clearly demonstrate that there are differences in the public preferences across the studies depending on the images that are used, in particular the object of interest to the study participant depicted in the image and the distance of the sight path to the object, and that such differences can influence preference results.

However, we note that these uncertainties and limitations have persisted from past reviews, and there is very little new information to inform conclusions regarding the interpretation of these results with regard to the target level of protection. In selecting a target level of protection, and in considering the CASAC's advice in their review of the 2021 draft PA and public comments, we conclude that it is appropriate to consider the information from the public preference studies in Washington, DC, and Phoenix, AZ, and in so doing, that it is appropriate to place weight on both of these studies in reaching conclusions on the appropriate target level of protection. The EPA recognizes that the scenes depicted in these two studies are different and may influence public preferences of visibility impairment, but notes these studies can be considered together as providing information about different areas across the U.S. with variations in the scenes that people are likely to most commonly encounter. The scene depicted in the images used in the Washington, DC, study have a mix of buildings, landmarks, and open space. On the other hand, the scene depicted in the Phoenix, AZ, study included a mix of buildings in the foreground and with more distant mountains in the background. The Administrator considers it appropriate to consider these studies together because in combination, they provide a greater diversity of scenes, which is more likely to be representative of scenes people typically experience around the country (*e.g.,* not only in eastern metropolitan statistical areas, but also in western areas with different vistas). In considering these two studies together, the EPA recognizes that, first, the ''object of interest'' is a subjective judgment left to the participants of the public preference studies, and second, the images in these two studies may differ in terms of sensitivity to changes in light extinction because of the distance between the object of interest in the scene and the camera. As noted by the public commenters, the sight path for the images in the public preference studies is an important consideration in reaching conclusions regarding the appropriate target level of protection for the visibility index. In addition, the Administrator judges that giving weight to multiple studies is a more appropriate approach than focusing on a single study, particularly where the study design (including the representativeness of the participants and the scenes depicted in the images) may be important for interpreting the results of the public preference studies for informing conclusions regarding the visibility index. Given these considerations and taking into consideration public comments on the target level of protection for the visibility index, the Administrator recognizes that it is more appropriate to consider a broader range of public preferences, reflecting a broader range of scenes, by putting significant weight on both the Washington, DC, and Phoenix, AZ, studies. In so doing, he reaches the conclusion that it would be appropriate to identify secondary PM standards that generally limit visibility impairment to a level between the two studies.

The Administrator next considers what target level of protection would be appropriate based on the available information from these public preference studies. He first recognizes that, in the 2012 and 2020 final decisions, the then-Administrators selected a target level of protection of 30 dv, based on the upper end of the range. In so doing, the then-Administrators judged that it was appropriate to place more weight on the uncertainties associated with the public preference studies in reaching their conclusions. However, in this reconsideration, the current Administrator, while continuing to recognize that substantial uncertainties remain and that there is relatively limited new information regarding public preferences of visibility impairment, judges that it is important to balance the weight placed on uncertainties with the strength of the scientific evidence. As such, the Administrator concludes that it is appropriate to consider a target level of protection within the range of 20 to 30 dv. He further concludes that in selecting a target level within that range it is appropriate to place weight on both the mid-point of the range, as supported by the study in Phoenix, AZ, as well as the upper end, as supported by the Washington, DC, study. The Administrator notes that these two studies both employ similar methodologies that are subject to fewer uncertainties than older public preference studies (including their use of WinHaze to reduce uncertainties in the preference solicitations) although he notes that the Phoenix, AZ, study yielded the best results of the four public preference studies in terms of the least noisy preference results and the most representative selection of participants. Furthermore, he notes the differences between the scenes used for each study and finds that consideration of these studies together is more appropriate in selecting a national target for visibility protection than considering either study alone. Thus, in considering this information, along with the uncertainties and limitations of the public preference studies, the Administrator judges that it would be appropriate to select a target level of protection based on placing equal weight on the upper end of the range (*i.e.,* 30 dv) and the middle of the range (*i.e.,* 24 dv based on the Phoenix, AZ, study) in order to identify a nationwide target for protection against visibility impairment. In so doing, the Administrator concludes that a visibility index with a target level of protection of 27, defined in terms of estimated light extinction, with a 24-hour averaging time and a 3-year, 90th percentile form, would provide adequate protection against PM-related visibility effects on public welfare. Such a target level of protection balances the information from two key studies reflecting different participant preferences for different vistas in different parts of the country, appropriately weighting both near-field and more distant landscape features that may be of importance to public perceptions of visibility.

The Administrator notes that the available evidence indicates that the relationship between PM and light extinction is complex, depending on factors such as PM composition, size fraction, and age of the particles in ambient air, as well as relative

humidity. These factors can vary across the country based on differences in regional influences, as well as meteorological conditions that can vary spatially and temporally in different areas. The Administrator also recognizes that this variability, coupled with the age of the PM depending on the distance from the source to the monitor location, also complicates the selection of which IMPROVE equation is most appropriate in different areas, although he notes that different IMPROVE equations will yield similar, but not identical, results. In so doing, the Administrator takes note of the figures presented in the 2022 PA, which depict the comparisons using the original IMPROVE equation (Figure 5–3), the revised IMPROVE equation (Figure 5–4), and the Lowenthal & Kumar equation (Figure 5–6), as well as the estimated light extinction values for the three different equations presented in Table D–7.

The Administrator notes that when light extinction is calculated using the original IMPROVE equation, all 60 sites have 3-year visibility metrics below 28 dv, 58 sites are at or below 25 dv, 26 sites are at or below 20 dv, and of the two sites above 25 dv one is at 26 dv and the other has a 24-hour $PM_{2.5}$ design value of 56 μg/m³ (*i.e.,* well above the current 24-hour standard). Results are similar for other IMPROVE equations.[175] Based on these analyses, and consistent with the results of similar analyses in the 2012 review and the 2020 PA, the Administrator concludes that the current secondary 24-hour $PM_{2.5}$ standard, with its level of 35 μg/m³, maintains the visibility index below 27 dv, and in fact, the current standard maintains air quality such that many areas have visibility index values that range between 15 and 25 dv for all three IMPROVE equations. In the areas that meet the secondary 24-hour $PM_{2.5}$ standard, all locations were below 27 dv when using the original and revised IMPROVE equation and all but three locations were at or below 27 dv when using the Lowenthal & Kumar IMPROVE equation. Three locations (two in California and one in Utah) had air quality that was at 28 dv when the Lowenthal & Kumar IMPROVE equation was used. As described in more detail in section V.A.1.3, we recognize that there are differences in the inputs for the three IMPROVE equations that can influence the resulting estimated light extinction values. The higher multiplier for converting OC to OM in the Lowenthal & Kumar IMPROVE equation (*i.e.,* a multiplier of 2.1) may be more appropriate in more remote locations where there is more aged and oxygenated organic PM than in urban locations. The three locations with air quality at 28 dv are all in urban areas (downtown Los Angeles, CA; Rubidoux, CA; Salt Lake City, UT) and tend to have higher levels of nitrate and OC, especially during the wintertime when peak $PM_{2.5}$ concentrations typically occur. In these locations, it may be more appropriate to use either the original or revised IMPROVE equation, which have multipliers of 1.4 and 1.8, respectively, in order to refine the inputs such that estimated light extinction in these locations is more accurately characterized based on site-specific characteristics.

We also note that the four areas that exceed the secondary 24-hour $PM_{2.5}$ standard also generally had air quality that was below 27 dv in terms of the visibility index, with only two locations experiencing a visibility index above 27 dv. One location that exceeds the secondary 24-hour $PM_{2.5}$ standard had a visibility index of 29 dv using the original IMPROVE equation, while two locations were 30 and 32 dv using the Lowenthal & Kumar IMPROVE equation. We believe attainment and maintenance of the secondary 24-hour $PM_{2.5}$ standard will result in improved air quality in these areas, such that the visibility index values for these areas will decrease even further.

The Administrator recognizes that in concluding that it is appropriate to identify secondary PM standards that generally limit visibility impairment to as low as 27 dv in terms of the visibility index, the current secondary PM standards continue to provide protection against visibility impairment associated with a visibility index as low as, or even lower than, 27 dv. In so doing, he notes that when meeting the current 24-hour $PM_{2.5}$ standard, all sites have a visibility index at or below 27 dv with the original and revised IMPROVE equations, and all but three sites at or below 27 dv with the Lowenthal and Kumar IMPROVE equation. Furthermore, the Administrator notes that this conclusion is consistent with the CASAC's advice who, in their review the 2021 draft PA, stated that ''[i]f a value of 20–25 deciviews is deemed to be an appropriate visibility target level of protection, then a secondary 24-hour $PM_{2.5}$ standard in the range of 25–35 μg/m³ should be considered'' (Sheppard, 2022a, p. 21 of consensus responses).

Thus, the Administrator concludes that weight on both the upper end of the range of target levels of protection for the visibility index identified in previous reviews and the mid-point of the range, as presented by the Phoenix, AZ, public preference study, and focusing on a target level of protection of 27 dv, he still judges the current secondary 24-hour $PM_{2.5}$ standard requisite to achieve that target because the standard generally maintains the visibility index at or below 27 dv such that more stringent standards are not warranted.

The EPA agrees with the commenters that the secondary PM standards work together to provide protection against short- and long-term effects of both fine and coarse particles (U.S. EPA, 2022b, section 5.5; 88 FR 5661, January 27, 2023). However, the EPA disagrees with commenters that we failed to discuss the secondary annual $PM_{2.5}$ standard in the proposal, 2022 PA, and the 2020 final notice and that we failed to justify the adequacy of the secondary annual $PM_{2.5}$ standard. As described in the 2022 PA and the proposal, we recognize that $PM_{2.5}$ is the size fraction of PM responsible for most of the visibility impairment in urban areas (U.S. EPA, 2022b, section 5.3.1.2; 88 FR 5654, January 27, 2023). Analyses in the 2019 ISA found that mass scattering from $PM_{10-2.5}$ was relatively small (less than 10%) in the eastern and northwestern U.S., whereas mass scattering was much larger in the Southwest (more than 20%), particularly in southern Arizona and New Mexico (U.S. EPA, 2019, section 13.2.4.1, p. 13–36). Given the relationship between visibility and $PM_{2.5}$ along with the short-term nature of visibility effects, we focus more on the adequacy of the secondary 24-hour $PM_{2.5}$ standard for providing protection against visibility impairment (U.S. EPA, 2022b, section 5.3.1.2; 88 FR 5653, January 27, 2023). In reaching his proposed conclusions, the Administrator clearly states that he ''recognizes that the current suite of secondary standards (*i.e.,* the 24-hour $PM_{2.5}$, 24-hour PM_{10}, and annual $PM_{2.5}$ standards) together provide . . . control for both fine and coarse particulates and long- and short-term visibility and non-visibility (*e.g.,* climate and materials) effects related to PM in ambient air'' (88 FR 5661, January 27, 2023). Thus, by explaining how the secondary standards work together to provide protection from adverse effects, why we focus on the secondary 24-hour $PM_{2.5}$ standard as

[175] When light extinction is calculated using the revised IMPROVE equation, all 60 sites have 3-year visibility metrics below 28 dv, 56 sites are at or below 25 dv, and 26 sites are at or below 20 dv. When light extinction is calculated using the Lowenthal and Kumar IMPROVE equation, 59 sites have 3-year visibility metrics below 28 dv, 45 sites are at or below 25 dv, and 15 sites are at or below 20 dv. The one site with a 3-year visibility metric of 32 dv exceeds the secondary 24-hour $PM_{2.5}$ standard, with a design value of 56 μg/m³ (see U.S. EPA, 2022b, Appendix D, Table D–3).

most relevant to visibility impairment, and how the Administrator selected the target level of protection for the visibility index, we have addressed the CASAC's request to support the proposed decision to revise the secondary 24-hour $PM_{2.5}$ standard while retaining the secondary annual $PM_{2.5}$ standard. The commenters also cite to an individual CASAC member's comments for the review of the 2021 draft PA who stated ''[f]or the limited scope of this reconsideration review, I see no reason to not simply set the Secondary equal to the Primary PM Standards, whatever they may be'' (Sheppard, 2022a, p. A–3). This CASAC member did not provide a supporting rationale for revising the secondary standards to levels equal to the primary standards. Although areas across the country are required to attain both the primary and secondary $PM_{2.5}$ standards so air quality is unaffected by the Administrator's decision not to revise the secondary standards to be equal to the primary standards, as described in responding to comments above, the CAA provisions require the Administrator to establish secondary standards that, in the judgment of the Administrator, are requisite to protect public welfare from known or anticipated adverse effects associated with the presence of the pollutant in ambient air. In so doing, the Administrator seeks to establish standards that are neither more nor less stringent than necessary for this purpose. The Act does not require that standards be set at a zero-risk level, but rather at a level that reduces risk sufficiently so as to protect the public welfare from known or anticipated adverse effects. The final decision on the adequacy of the current secondary standards is a public welfare policy judgment to be made by the Administrator. In reaching his proposed and final decisions regarding the adequacy of the current secondary PM standards, the Administrator considered the available scientific information and analyses about welfare effects, and associated public welfare significance, as well as judgments about how to consider the range and magnitude of uncertainties that are inherent in the scientific evidence and analyses. In so doing, the Administrator concluded that the currently available scientific evidence and quantitative analyses, including uncertainties and limitations, do not call into question the adequacy of the current secondary PM standards and that the current secondary PM standards should be retained, without revision. The Administrator's judgments and decisions on the primary and secondary standards are independent and consider different aspects of the available scientific evidence and information in reaching conclusions regarding the adequacy of the standards in protecting against PM-related health and welfare effects.

4. Administrator's Conclusions

This section summarizes the Administrator's considerations and conclusions related to the current secondary $PM_{2.5}$ and PM_{10} standards and presents the rationale for his decision that no change is required for those standards at this time. The CAA provisions require the Administrator to establish secondary standards that, in the judgment of the Administrator, are requisite to protect public welfare from known or anticipated adverse effects associated with the presence of the pollutant in the ambient air. In so doing, the Administrator seeks to establish standards that are neither more nor less stringent than necessary for this purpose. The Act does not require that standards be set at a zero-risk level, but rather at a level that reduces risk sufficiently so as to protect the public welfare from known or anticipated adverse effects. The final decision on the adequacy of the current secondary standards is a public welfare policy judgment to be made by the Administrator. The decision should draw on the scientific information and analyses about welfare effects, and associated public welfare significance, as well as judgments about how to consider the range and magnitude of uncertainties that are inherent in the scientific evidence and analyses. This approach is based on the recognition that the available evidence generally reflects a continuum that includes ambient air exposures at which scientists agree that effects are likely to occur through lower levels at which the likelihood and magnitude of responses become increasingly uncertain. This approach is consistent with the requirements of the provisions of the Clean Air Act related to the review of NAAQS and with how the EPA and the courts have historically interpreted the Act.

Given these requirements, the Administrator's final decision in this reconsideration is a public welfare policy judgment that draws upon the scientific and technical information examining PM-related visibility impairment, climate effects and materials effects, including how to consider the range and magnitude of uncertainties inherent in that information. The Administrator recognizes that his final decision is based on an interpretation of the scientific evidence and technical analyses that neither overstates nor understates their strengths and limitations, or the appropriate inferences to be drawn. In particular, the Administrator notes that the assessment of when visibility impairment is adverse to public welfare requires a public welfare policy judgment informed by available scientific and quantitative information.

In considering the adequacy of the current secondary PM standards in this reconsideration, the Administrator has carefully considered the: (1) Policy-relevant evidence and conclusions contained in the 2019 ISA and 2022 ISA Supplement; (2) the quantitative information presented and assessed in the 2022 PA; (3) the evaluation of this evidence, the quantitative information, and the rationale and conclusions presented in the 2022 PA; (4) the advice and recommendations from the CASAC; and (5) public comments. In the discussion below, the Administrator gives weight to the 2022 PA conclusions, with which the CASAC generally concurred during their review of the 2019 draft PA and 2021 draft PA, as summarized in section IV.B.1 of the 2020 final notice and section V.D.1 of the 2022 proposal, and takes note of key aspects of the rationale for those conclusions that contribute to his decision in this reconsideration. After giving careful consideration to all of this information, the Administrator judges that no change is required for the secondary PM standards at this time.

In considering the 2022 PA evaluations and conclusions, the Administrator takes note of the overall conclusions that the non-ecological welfare effects evidence and quantitative information are generally consistent with what was considered in the 2020 final decision and in the 2012 review (U.S. EPA, 2022b, section 5.5). The scientific evidence for non-ecological welfare effects in this reconsideration is largely the same as that available in the 2019 ISA and 2020 PA. As described in section I.C.5.b above, the 2022 ISA Supplement included a limited number of newly available studies on PM-related visibility effects. This newly available evidence on visibility effects, along with the full body of non-ecological welfare effects evidence assessed in the 2019 ISA, reaffirms conclusions on the visibility, climate, and materials effects recognized in the 2020 final decision and in the 2012 review, including key conclusions on which the standards are based. Further, as discussed in more

detail above, the updated quantitative analyses of visibility impairment for areas meeting the current standards in the 2022 PA support the adequacy of the current secondary PM standards to protect against PM-related visibility impairment. The Administrator also recognizes that uncertainties and limitations continue to be associated with the available scientific evidence and quantitative information.

With regard to the current evidence on visibility effects, as summarized in the 2022 PA and discussed in detail in the 2019 ISA and ISA Supplement, the Administrator notes the long-standing body of evidence for PM-related visibility impairment. As in previous reviews, this evidence continues to demonstrate a causal relationship between PM in ambient air and effects on visibility (U.S. EPA, 2019a, section 13.2). The Administrator recognizes that visibility impairment can have implications for people's enjoyment of daily activities and for their overall sense of well-being. Therefore, as in previous reviews, he considers the degree to which the current secondary standards protect against PM-related visibility impairment and the degree to which PM-related visibility impairment is adverse to public welfare. In particular, in recognizing the short-term nature of visibility impairment along with the fact that $PM_{2.5}$ is the size fraction that contributes most to light extinction, the Administrator especially focuses on the adequacy of the current secondary 24-hour $PM_{2.5}$ standard in providing protection against PM-related visibility effects judged to be adverse. The Administrator also considers the protection provided by the current secondary 24-hour $PM_{2.5}$ standard against PM-related visibility impairment in conjunction with the Regional Haze Program as a means of achieving appropriate levels of protection against PM-related visibility impairment in urban, suburban, rural, and Federal Class I areas across the U.S. Programs implemented to meet the secondary PM standards, along with the requirements of the Regional Haze Program established for protecting against visibility impairment in Class I areas, would be expected to improve visual air quality across all areas of the country.

As described in the proposal (88 FR 5658, January 27, 2023), the Administrator recognizes that the Regional Haze Program was established by Congress specifically to achieve ''the prevention of any future, and the remedying of existing, impairment of visibility in mandatory Class I areas, which impairment results from man-made air pollution,'' and that Congress established a long-term program to achieve that goal (CAA section 169A). In adopting section 169, Congress set a goal of eliminating anthropogenic visibility impairment at Class I areas, as well as a framework for achieving that goal which extends well beyond the planning process and timeframe for attaining the secondary PM NAAQS. Recognizing that the Regional Haze Program will continue to contribute to reductions in visibility impairment in Class I areas, consistent with his proposed conclusions, the Administrator concludes that addressing visibility impairment in Class I areas is largely beyond the scope of the secondary PM standards and that setting the secondary 24-hour $PM_{2.5}$ standard at a level that would remedy visibility impairment in Class I areas would result in standards that are more stringent than is requisite.

In further considering what standards are requisite to protect against adverse public welfare effects from visibility impairment, the Administrator concludes that it is appropriate to use an approach consistent with the approach used past reviews (88 FR 5650, January 27, 2023). He first identifies an appropriate target level of protection in terms of a PM visibility index that takes into account the factors that influence the relationship between PM in ambient air and visibility (*i.e.,* size fraction, species composition, and relative humidity). He then considers the air quality analyses conducted in the 2022 PA that examine the relationship between the PM visibility index and the current secondary 24-hour $PM_{2.5}$ standard in locations that meet the current 24-hour $PM_{2.5}$ and PM_{10} standards (U.S. EPA, 2022b, section 5.3.1.2).

In reaching conclusions regarding the target level of protection, the Administrator first considers the characteristics of the visibility index and defines its elements (indicator, averaging time, form, and level). With regard to the indicator for the visibility index, the Administrator continues to recognize that, consistent with the conclusions of the 2022 PA and the CASAC's advice in their review of the 2021 draft PA, there is a lack of availability of methods and an established network for directly measuring light extinction. Therefore, the Administrator concludes that it continues to be appropriate to using an index based on estimates of light extinction by $PM_{2.5}$ components based on the IMPROVE algorithm. In so doing, the Administrator recognizes that the fundamental understanding of the relationship between ambient PM and light extinction has generally changed very little over time; however, several versions of the IMPROVE equation have been developed and evaluated that could be used to estimate light extinction. As at the time of the proposal, the Administrator recognizes that the results of the quantitative analyses in the 2022 PA that examined three versions of the IMPROVE equation indicate that there are very small differences in estimates of light extinction between the equations, and that it is not always clear that one version of the IMPROVE equation is more appropriate for estimating light extinction across the U.S. than other versions of the IMPROVE algorithm (88 FR 5659, January 27, 2023). He also recognizes that the selection of inputs to the IMPROVE equation (*e.g.,* the multiplier for OC to OM) may be more appropriate on a regional basis rather than a national basis when calculating light extinction, and notes the CASAC's advice that PM-visibility relationships are region specific (Sheppard, 2022a, p. 21 of consensus responses). The Administrator further notes that neither the CASAC nor public commenters recommended a specific IMPROVE equation or an approach for using different IMPROVE equations across the U.S. Therefore, given the absence of a robust monitoring network to directly measure light extinction, the Administrator concludes that light estimated light extinction, as calculated using one or more versions of the IMPROVE algorithms, continues to be the most appropriate indicator for the visibility index.

Having reached the conclusion that estimated light extinction is the appropriate indicator for the visibility index, the Administrator next considers the appropriate averaging time and form of the index. With regard to the averaging time and form, the Administrator notes that in previous reviews, a 24-hour averaging time was selected and the form was defined as the 3-year average of annual 90th percentile values. As at the time of proposal, the Administrator recognizes that the available information continues to provide support for the short-term nature of visibility effects. He further recognizes that no new information is available in this reconsideration to inform his conclusions regarding averaging time, and therefore, he considers past analyses of 24-hour and subdaily $PM_{2.5}$ light extinction to inform his conclusions on averaging time. As described in the proposal (88 FR 5659, January 27, 2023) and in responding to comments in section V.B.3 above, prior

analyses demonstrated that there are strong correlations between 24-hour and subdaily (*i.e.,* 4-hour average) $PM_{2.5}$ light extinction, indicating that a 24-hour averaging time is an appropriate surrogate for the subdaily time periods associated with when individuals experience visibility impairment and that a longer averaging time may also be less influenced by atypical conditions and/or atypical instrument performance. The Administrator also notes that the CASAC did not provide advice or recommendations with regard to the averaging time of the visibility index, although some public commenters referenced CASAC advice in past reviews that a subdaily standard based on daylight hours would better reflect the public welfare effects of public perceptions of visibility impairment than a 24-hour standard. However, in considering the available scientific and quantitative information, as well as the CASAC's advice in their reviews of the 2019 draft PA and 2021 draft PA, the Administrator concludes that the 24-hour averaging time continues to be appropriate for the visibility index because it is an appropriate surrogate for subdaily time periods and results in a more stable target.

With regard to the form of the visibility index, the Administrator notes the approach in other NAAQS that a multi-year percentile form offers greater stability to the air quality management process by reducing the possibility that statistically unusual indicator values will lead to transient violations of the standard. He recognizes that using a 3-year average provides stability from the occasional effects of inter-annual meteorological variability (including relative humidity) that can result in unusually high pollution levels for a particular year (88 FR 5659, January 27, 2023) and recognizes that a stable standard contributes to the benefits of the NAAQS by ensuring that attainment strategies are designed to address non-transient problems and achieve durable air quality improvements. For these reasons, he concludes that a 3-year average continues to be appropriate.

In considering the percentile that would be appropriate with the 3-year average, the Administrator recognizes that there is very little new information available in this reconsideration to inform selection of an alternative form of the visibility index and that the appropriate form requires the exercise of public welfare policy judgment. In selecting the appropriate target level of protection for the visibility index, the Administrator is required to assess when visibility impairment becomes adverse to public welfare, weighing both the degree of visibility impairment (in dv) and the frequency of such impairment (through the form). As with the mass-based PM air quality standard, the target level of protection for the visibility index must be selected in conjunction with the form to determine the appropriate stringency. In so doing, consistent with approaches in past reviews, the Administrator first notes that the Regional Haze Program targets the 20% most impaired days for improvements in visual air quality in Class I areas, which are the days above the 80th percentile form of the visibility index. The Administrator concludes that a percentile form set at the 80th percentile would not be likely to sufficiently improve visual air quality on the worst days based on the visibility index. In considering the information available in past reviews regarding the form of the visibility index, as well as the analysis of alternative forms based on recent air quality discussed above, the Administrator notes that a 90th percentile form would represent the median of the distribution of the 20% most impaired days, and meeting a visibility index with a 90th percentile form would reasonably be expected to lead to improvements in visual air quality for days both above and below the 90th percentile (88 FR 5660, January 27, 2023). In reaching his conclusion that a 90th percentile would appropriately achieve improved air quality both above and below that percentile, the Administrator took into consideration assessments of air quality data and potential alternative percentiles for the form. The Administrator further notes that, consistent with the conclusions in the 2011 PA and 2020 PA, the 2022 PA concluded that there is no new information from public preference studies that would suggest that a 90th percentile form is not appropriate. The Administrator also considers air quality analyses described above in responding to public comments regarding the percentile form of the visibility index. In particular, the Administrator notes that while a higher percentile form (*i.e.,* 95th or 98th) would somewhat further limit the number of days with peak PM-related light extinction, the differences in the 3-year averages of estimated light extinction for the 90th, 95th, and 98th percentile forms are small. For example, he notes that for the original IMPROVE equation, in areas that meet the current 24-hour $PM_{2.5}$ standard, all sites have light extinction estimates for a 90th percentile form at or below 26 dv, and for a 95th or 98th percentile form light extinction estimates are at or below 29 dv.[176] He further notes that, in most locations when estimating light extinction based on the original IMPROVE equation, the difference between a 95th or 98th percentile form and a 90th percentile form is generally less than 3 dv.[177] Moreover, the Administrator concludes that a 90th percentile form achieves a very high degree of control but appropriately targets the group of worst days, rather than the few very worst days. Based on the available information and these analyses, the Administrator concludes that the information does not indicate that it would be appropriate to consider limiting the occurrence of days with peak PM-related light extinction to a greater degree, nor did the CASAC provide advice or recommendations related to the form of the visibility index. Therefore, the Administrator judges that it remains appropriate to define a visibility index in terms of a 24-hour averaging time and form based on the 3-year average of annual 90th percentile values.

With regard to the level of the visibility index, as at the time of proposal, the Administrator continues to recognize that there is very little new information available to inform his judgment regarding the range of levels of visibility impairment judged to be acceptable by at least 50% of study participants in the visibility preference studies,[178] and therefore, the range of 20 to 30 dv identified in the 2022 PA remains appropriate for considering the level of the visibility index. The Administrator also recognizes that the uncertainties and limitations associated with the public preferences identified in the 2012 and 2020 reviews continue to persist, and that these limitations and uncertainties contributed to the decisions in 2012 and 2020 that a level at the upper end of the range (*i.e.,* 30 dv) was selected. The Administrator specifically notes that, while the studies

[176] Gantt, B., and Hagan, N. (2023). Analysis of Percentile Forms of the Visibility Index. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

[177] Gantt, B., and Hagan, N. (2023). Analysis of Percentile Forms of the Visibility Index. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

[178] For reasons stated above and described in the 2022 PA and proposal, the Administrator does not find it appropriate to use the most recent preference study based on the Grand Canyon study area (Malm et al., 2019) for purposes of identifying a target level of protection for the visibility index.

are methodologically similar, there are a number of factors that can influence comparability across the studies and that the available studies may not capture the full range of visibility preferences in the U.S. population, as described in more detail in section V.D.3 of the 2022 proposal (88 FR 5659–5660, January 27, 2023). The Administrator also notes the CASAC's advice in their review of the 2021 draft PA that there are a limited number of visibility preference studies available to inform the Administrator's judgment regarding the appropriate target level of protection for the visibility index (Sheppard, 2022a, p. 21 of consensus responses). In considering the available information, including uncertainties and limitation, and the CASAC's advice, the Administrator proposed to conclude that it is appropriate to consider a target level of protection for the visibility index within the range of 20 to 30 dv, and that establishing a target level of protection at the upper end of the range was appropriate. In so doing, the Administrator proposed to conclude that the protection provided by a visibility index based on estimated light extinction, a 24-hour averaging time, and a 90th percentile form, averaged over 3 years, set to a level of 30 dv would be requisite to protect public welfare with regard to visibility impairment.

However, at the time of proposal, the Administrator recognized that the available evidence on visibility impairment generally reflects a continuum and that the public preference studies do not provide information about the specific level for which visibility impairment would be ''acceptable'' or ''unacceptable'' across the country, and that alternative target levels of protection could be supported. At that time, in soliciting public comments, the Administrator recognized that other interpretations, assessments, and judgments based on the available welfare effects evidence for this reconsideration could be possible (88 FR 5662, January 27, 2023).

With regard to the appropriate target level of protection for the visibility index, the Administrator first notes that while the public preference studies were conducted in several geographical areas across the U.S., and they provide insight into regional preferences for visibility impairment, none of the studies identify a specific level of visibility impairment that would be perceived as ''acceptable'' or ''unacceptable'' across the whole U.S. population. He also noted that there have been significant questions about how to set a standard for visibility that is neither overprotective nor underprotective for some areas of the U.S. As described in the proposal (88 FR 5660, January 27, 2023), in establishing the Regional Haze Program to improve visibility in Class I areas, Congress noted that ''as a matter of equity, the national ambient air quality standards cannot be revised to adequately protect visibility in all areas of the country.'' H.R. Rep. 95–294 at 205. For the reasons noted above, in reaching his proposed decision regarding visibility impairment, the Administrator recognized that he is not seeking to set a standard that would eliminate visibility impairment in Class I areas, but significant uncertainties remain regarding how to judge when visibility impairment becomes adverse to public welfare across the range of daily outdoor activities for Americans across the country.

In reaching final conclusions regarding the available information, along with the CASAC's advice and public comments, the Administrator again considers what constitutes an appropriate target level of protection, and in particular considers whether a target level of protection below 30 dv is warranted. In so doing, he first notes the variability in public preferences of visibility impairment as demonstrated by the available public preferences, which support a range of potential target levels of protection for the visibility index from 20 to 30 dv. He also notes that this range informed the 2012 and 2020 then-Administrators final decisions that a target level of protection at the upper end of the range (*i.e.,* 30 dv) would be most appropriate, given the uncertainties and limitations associated with the public preference studies. As described in in section V.B.3 above in responding to public comments, the Administrator recognizes that a number of factors can influence public preferences across studies, in particular due to the types of scenes depicted in the images as well as the distances at which the objects of interest are located from the camera. Furthermore, the Administrator recognizes the small number of public preference studies currently available makes precise interpretations of their results challenging for determining a nationally appropriate target level of visibility protection. The Administrator also recognizes that the CASAC, in their review of 2021 draft PA, reiterated that PM-visibility relationships are region-specific based on aerosol composition, and that several public commenters emphasized the importance of the sight path distance in the images when considering how to interpret the public preference studies.

In this reconsideration, the Administrator judges that in determining when visibility impairment becomes adverse to public welfare for purposes of the secondary NAAQS, while continuing to recognize that substantial uncertainties remain and that there is relatively limited new information regarding public preferences of visibility impairment, it is important to balance the weight placed on uncertainties with the strength of the scientific evidence. In so doing, the Administrator first concludes that, consistent with previous reviews and his proposed decision, it remains appropriate to consider a target level of protection within the range of 20 to 30 dv. However, in further considering the available scientific and quantitative information, CASAC advice, and public comments, he further concludes that in selecting a target level within that range it is appropriate to place weight on both the middle of the range, as supported by the study in Phoenix, AZ, as well as the upper end, as supported by the Washington, DC, study. In so doing, he notes that the Washington, DC, and Phoenix, AZ, studies employ similar methodologies that are subject to fewer uncertainties than older public preference studies (including their use of WinHaze to reduce uncertainties in the preference solicitations) although he does note that the Phoenix, AZ, study yielded the best results of the four public preference studies in terms of the least noisy preference results and the most representative selection of participants. Further, the Administrator judges that this approach would take into account scenes that are similar to both the Washington, DC, study and Phoenix, AZ, study, which would be more representative of the ''typical'' scenes encountered across more areas of the U.S. than an approach that places weight on just one study or on studies conducted in certain geographical areas of the country. In considering this information, along with the uncertainties and limitations of the public preference studies, the Administrator judges that it would be appropriate to select a target level of protection based on placing equal weight on the upper end of the range (*i.e.,* 30 dv) and the middle of the range (*i.e.,* 24 dv based on the Phoenix, AZ, study) in order to provide protection against visibility impairment in different geographical areas of the U.S. For these reasons, the Administrator concludes that a visibility index with a target level of protection of 27 dv,

defined in terms of estimated light extinction, with a 24-hour averaging time and a 3-year, 90th percentile form, would provide adequate protection against PM-related visibility effects. In reaching this conclusion, the Administrator judges that such a target level of protection balances the information from these two key public preference studies in such a way appropriately weighs both near-field and more distant landscape features that may be of importance to public perceptions of visibility.

In further considering the appropriate target level of protection for the visibility index, the Administrator again recognizes the complexity of the relationship between PM and light extinction which is dependent on a number of factors, including PM composition, size fraction, and age of the particles in ambient air, as well as relative humidity. As noted in responding to comments above, these factors can vary geographically across the U.S. and local or regional meteorological conditions can also vary spatially and temporally. These factors are critical inputs to the IMPROVE equation and can influence the resulting estimated light extinction such that it is not a straightforward comparison between estimated light extinction in one area of the country versus another. Moreover, the Administrator recognizes that there is variability in estimated light extinction depending on the version of the IMPROVE equation that is used. As described in more detail in the 2022 PA and the proposal, and in reaching his decisions on the indicator of the visibility index above, the Administrator notes that the 2022 PA concluded that one version of the IMPROVE equation is not more accurate or precise in estimating light extinction, and that difference in locations may support the selection of inputs into the IMPROVE equation or of the appropriate IMPROVE equation to estimate light extinction on a regional basis rather than on a national basis.

In considering the available information, including variations in both public preferences of visibility impairment and estimates of light extinction using one or more IMPROVE equation, as well as the CASAC's advice in their review of the 2019 draft PA and 2021 draft PA and public comments, the Administrator judges that a target level of protection of 27 dv would be appropriate. In so doing, he concludes that a target level of protection above 27 dv would not provide adequate protection against PM-related visibility impairment based on the 50% acceptability values when both the Washington, DC, and Phoenix, AZ, studies are considered. However, he also notes that when considering the 50% acceptability values from studies conducted in different areas of the U.S. and with different scenes and images depicted, the available public preference studies do not provide a ''bright line'' at and above which visibility impairment is considered adverse to public welfare. He further recognizes that, as discussed just above, there are a number of region-specific factors that can influence light extinction, and thereby influence visibility impairment, as well as variations in public preferences of visibility impairment based on the available studies, that complicate selection of a single target level of protection that would be appropriate for a national visibility index. While the Administrator recognizes that the uncertainties and limitations associated with public preferences of visibility and estimating light extinction have persisted over the last several PM NAAQS reviews, he also recognizes that in reaching conclusions regarding the appropriate target level of protection for the visibility index also involves public welfare policy judgments regarding how to appropriately consider the particular uncertainties around identifying when visibility impairment becomes adverse to public welfare, and the limitations on relying on the public preference studies.

The Administrator also places weight on the high degree of spatial and temporal variability in PM composition and relative humidity across the U.S. in considering a target level of protection. This approach of establishing a target level of protection that takes into account 50% acceptability values from both eastern and western sites is a more appropriate basis for determining the requisite level of protection against known or anticipated adverse effects on public welfare across diverse locations, *i.e.,* a standard that is neither more nor less stringent than necessary nationwide. Specifically, the Administrator judges that a target level of protection for the visibility index focused on maintaining estimated light extinction between the upper end of the range of the target levels of protection (*i.e.,* 30 dv based on the Washington, DC, study) and the middle of the range (*i.e.,* 24 dv based on the Phoenix, AZ, study) to be more appropriate for a nationwide standard to protect against visibility impairment compared to a value derived from one location or one type of scene alone. For these reasons, in selecting a target level of protection, the Administrator concludes that a target level of protection somewhere between the upper end and middle of the range is appropriate because he judges that this approach, in conjunction with the Regional Haze program, is sufficient, but not more stringent than necessary, to protect against adverse effects on public welfare. Thus, he concludes a secondary 24-hour $PM_{2.5}$ NAAQS should be evaluated based on its ability to provide protection against visibility impairment associated with estimated light extinction of 27 dv based on estimated light extinction, a 24-hour averaging time, and a 90th percentile form, averaged over 3 years.

Having concluded that it is appropriate to identify a target level of protection in terms of a visibility index based on estimated light extinction as described above, the Administrator next considers the degree of protection from visibility impairment afforded by the current secondary PM standards. He considers the updated analyses of PM-related visibility impairment presented in the 2022 PA (U.S. EPA, 2022b, section 5.3.1.2) and described in section V.B.1.a of the proposal, and notes that the results of the analyses are consistent with the results from the 2012 and 2020 reviews.

Taking into consideration the full body of scientific evidence and technical information concerning the known and anticipated effects of PM on visibility impairment, the Administrator concludes that the current secondary $PM_{2.5}$ and PM_{10} standards are requisite to protect against PM-related visibility impairment. While the inclusion of the coarse fraction had a relatively modest impact on calculated light extinction in the analyses presented in the 2022 PA, he recognizes the continued importance of the PM_{10} standard given the potential for larger impacts in locations with higher coarse particle concentrations, such as in the southwestern U.S., for which only a few sites met the criteria for inclusion in the analyses in the 2022 PA (U.S. EPA, 2019a, section 13.2.4.1; U.S. EPA, 2022b, section 5.3.1.2).

With regard to the adequacy of the secondary 24-hour $PM_{2.5}$ standard, the Administrator notes that, in their review of the 2021 draft PA, the CASAC stated that ''[i]f a value of 20–25 deciviews is deemed to be an appropriate visibility target level of protection, then a secondary 24-hour $PM_{2.5}$ standard in the range of 25–35 $\mu g/m^3$ should be considered'' (Sheppard, 2022a, p. 21 of consensus responses). The Administrator recognizes that the CASAC recommended that the Administrator provide additional justification for a visibility index target

of 30 dv but did not specifically recommend that he choose an alternative level for the visibility index. The Administrator carefully considered the advice of CASAC and the public comments and concluded that a lower target level of visibility was appropriate in order to properly reflect both a broader set of studies and a broader range of vistas that were the subject of those studies. However, in their review of the 2021 draft PA, the CASAC recognized that even a visibility index target in the range of 20–25 dv could still warrant retention of the current secondary 24-hour $PM_{2.5}$ standard. The Administrator also considers the advice from the CASAC in their review of the 2019 draft PA, who ''recogniz[ed] that uncertainties. . .remain about the best way to evaluate'' PM-related visibility effects (Cox, 2019b, p. 13 consensus responses). The Administrator considered the CASAC's advice, together with the available scientific evidence and quantitative information, in reaching his conclusions.

The Administrator recognizes that conclusions regarding the appropriate weight to place on the scientific and technical information examining PM-related visibility impairment, including how to consider the range and magnitude of uncertainties inherent in that information, is a public welfare policy judgment left to the Administrator. In reaching his final decision in 2020, the then-Administrator noted that the available evidence regarding visibility effects had changed very little since the 2012 review, specifically recognizing that, as evaluated in the 2019 ISA, there were no new visibility studies that were conducted in the U.S. and there was little new information available with regard to acceptable levels of visibility impairment in the U.S. (85 FR 82742, December 18, 2020). As such, the then-Administrator concluded that the protection provided by a standard defined in terms of a $PM_{2.5}$ visibility index, with a 24-hour averaging time, a 90th percentiles form averaged over three years, set at a level of 30 dv, was requisite to protect public welfare against visibility impairment (85 FR 82743, December 18, 2020). He also recognized that there was some new information to inform quantitative analyses of light extinction, but that the results of the analyses conducted in the 2020 PA were consistent with those from the 2012 review. The then-Administrator recognized that the analyses demonstrated that the 3-year visibility metric was at or below about 30 dv in all areas that met the current secondary 24-hour $PM_{2.5}$ standard, and was below 25 dv in most of those areas (85 FR 82743, December 18, 2020). Therefore, the Administrator judged that the secondary 24-hour $PM_{2.5}$ standard provided sufficient protection for visual air quality of 30 dv, which he judged appropriate (88 FR 82744, December 18, 2020). In this reconsideration, the ISA Supplement evaluated newly available studies on public preferences for visibility impairment and/or development methodologies or conducted quantitative analyses of light extinction. In considering the available scientific and quantitative information, including that newly available in this reconsideration, the current Administrator reached the same preliminary conclusions in the notice of proposed rulemaking regarding the 3-year visibility index and the current secondary PM standards as the then-Administrator in the 2020 final decision. However, in light of public comments on the proposal, the Administrator has further considered the available scientific evidence and information, as well as the CASAC's advice regarding visibility effects in their review of the 2021 draft PA. In so doing, the Administrator judges that it is appropriate to place more weight on certain aspects of the evidence that he had placed less weight on in reaching his proposed conclusions (*i.e.,* he focused on the both the middle and the upper end of the range of the 50% acceptability values from the available public preference studies). As such, the Administrator notes his conclusion on the appropriate visibility index (*i.e.,* with a 24-hour averaging time; a 3-year, 90th percentile form; and a level of 27 dv), which takes into account the regional variations in public preferences and equations for estimating light extinction, and his conclusions regarding the quantitative analyses of the relationship between the visibility index and the current secondary 24-hour $PM_{2.5}$ standard. In so doing, the Administrator concludes that the current secondary standards provide requisite protection against PM-related visibility effects.

With respect to climate effects, as at the time of proposal, the Administrator recognizes that a number of improvements and refinements have been made to climate models since the time of the 2012 review. However, despite continuing research and the strong evidence supporting a causal relationship with climate effects (U.S. EPA, 2019a, section 13.3.9), the Administrator notes that there are still significant limitations in quantifying the contributions of the direct and indirect effects of PM and PM components on climate forcing (U.S. EPA, 2022b, sections 5.3.2.1.1 and 5.5). He also recognizes that models continue to exhibit considerable variability in estimates of PM-related climate impacts at regional scales (*e.g.,* ~100 km), compared to simulations at the global scale (U.S. EPA, 2022b, sections 5.3.2.1.1 and 5.5). Moreover, the effects of PM on climate are diverse as well as uncertain. Depending on the circumstances, the radiative forcing effects of PM in the atmosphere can vary, such that positive forcing could result in warming of the Earth's surface, whereas a negative forcing could result in cooling (U.S. EPA, 2019a, section 13.3.2.2). The resulting uncertainty leads the Administrator to conclude that the scientific information available in this reconsideration remains insufficient to quantify, with confidence, the impacts of ambient PM on climate in the U.S. (U.S. EPA, 2022b, section 5.3.2.2.1) and that there is not an adequate scientific basis to link attainment of any particular PM concentration in ambient air in the U.S. to specific climate effects. Consequently, the Administrator judges that there is insufficient information at this time to revise the current secondary PM standards or to promulgate a distinct secondary standard to address PM-related climate effects.

With respect to materials effects, the Administrator notes that the available evidence continues to support the conclusion that there is a causal relationship with PM deposition (U.S. EPA, 2019a, section 13.4). He recognizes that deposition of particles in the fine or coarse fractions can result in physical damage and/or impaired aesthetic qualities. Particles can contribute to materials damage by adding to the effects of natural weathering processes and by promoting the corrosion of metals, the degradation of painted surfaces, the deterioration of building materials, and the weakening of material components. While some recent evidence on materials effects of PM is available in the 2019 ISA, the Administrator notes that this evidence is primarily from studies conducted outside of the U.S. in areas where PM concentrations in ambient air are higher than those observed in the U.S. (U.S. EPA, 2019a, section 13.4). Given the limited amount of information on the quantitative relationships between PM and materials effects in the U.S., and uncertainties in the degree to which those effects could be adverse to the public welfare, the Administrator judges that the available scientific information

remains insufficient to quantify, with confidence, the public welfare impacts of ambient PM on materials and that there is insufficient information at this time to revise the current secondary PM standards or to promulgate a distinct secondary standard to address PM-related materials effects.

Taken together, the Administrator concludes that the scientific and quantitative information for PM-related non-ecological welfare effects (*i.e.,* visibility, climate, and materials),[179] along with the uncertainties and limitations, supports the current level of protection provided by the secondary PM standards as being requisite to protect against known and anticipated adverse effects on public welfare. For visibility impairment, this conclusion reflects his consideration of the evidence for PM-related light extinction, together with his consideration of updated air quality analyses of the relationship between the visibility index and the current secondary 24-hour $PM_{2.5}$ standard and the protection provided by the current secondary $PM_{2.5}$ and PM_{10} standards. For climate and materials effects, this conclusion reflects his judgment that, although it remains important to maintain secondary $PM_{2.5}$ and PM_{10} standards to provide some degree of control over long- and short-term concentrations of both fine and coarse particles, it is appropriate not to change the existing secondary standards at this time and that it is not appropriate to establish any distinct secondary PM standards to address PM-related climate and materials effects at this time. As such, the Administrator recognizes that current suite of secondary standards (*i.e.,* the 24-hour $PM_{2.5}$, 24-hour PM_{10}, and annual $PM_{2.5}$ standards) together provide such control for both fine and coarse particles and long- and short-term visibility and non-visibility (*e.g.,* climate and materials) effects related to PM in ambient air. His conclusions on the secondary standards are consistent with advice from the CASAC, which noted substantial uncertainties remain in the scientific evidence for climate and materials effects, as well as the majority of public comments on the secondary PM standards. Thus, based on his consideration of the evidence and analyses for PM-related welfare effects, as described above, and his consideration of CASAC advice and public comments on the secondary standards, the Administrator concludes that it is appropriate not to change those standards (*i.e.,* the current 24-hour and annual $PM_{2.5}$ standards, 24-hour PM_{10} standard) at this time.

[179] As noted earlier, other welfare effects of PM, such as ecological effects, are being considered in the separate, on-going review of the secondary NAAQS for oxides of nitrogen, oxides of sulfur and PM.

C. Decision on the Secondary PM Standards

For the reasons discussed above and taking into account information and assessments presented in the 2019 ISA, ISA Supplement, and 2022 PA, advice from the CASAC, and consideration of public comments, the Administrator concludes that the current secondary PM standards are requisite to protect public welfare from known or anticipated adverse effects and is not changing the standards at this time.

VI. Interpretation of the NAAQS for PM

The EPA is finalizing revisions on data calculations in appendix K for PM_{10} and appendix N for $PM_{2.5}$. Revisions to appendix K make the PM_{10} data handling procedures for the 24-hour PM_{10} standards more consistent with those of other NAAQS pollutants and codify existing practices. Revisions to appendix N update references to the revision(s) of the standards and change data handling provisions related to combining data from nearby monitoring sites to codify existing practices that are currently being implemented as the EPA standard operating procedures.

A. Amendments to Appendix K: Interpretation of the NAAQS for Particulate Matter

The EPA proposed to modify its data handling procedures for the 24-hour PM_{10} standard in appendix K to part 50 (88 FR 5662, January 27, 2023). The proposed modifications include: (1) Revising design value calculations to be on a site-level basis, (2) codifying site combinations to maintain a continuous data record, and (3) clarifying daily validity requirements for continuous monitors. The purpose of these modifications is to make the data handling procedures for the 24-hour PM_{10} standard more consistent with those of other NAAQS pollutants and codify existing practices that are currently being implemented as EPA standard operating procedures.

The EPA received few comments on these proposed appendix K revisions, the majority of which were supportive.

One commenter was not supportive of the proposed appendix K revision to site-level PM_{10} design values, asserting that it would amount to an imposition of a more stringent PM_{10} standard due to the potential high bias of FEMs. The EPA disagrees with this assertion because site-level design values would combine data from any high biased FEM with other monitors at the site rather than calculate a monitor-level design value with data solely from that high-biased FEM. The EPA tested the impact of calculating site-level PM_{10} design values for the 2019–2021 period by assigning the lowest parameter occurrence code as the primary monitor and calculating site-level design values. Most resulting site-level design values were either identical to or in-between the multiple monitor-level design values at the site. Combining data from two or more monitors also has the benefit of increasing the number of valid sample days at many sites. For the 2019–2021 test period, approximately 10% of the sites with more than one monitor went from having multiple invalid design values to a single valid design value.

One commenter was not supportive of a footnote in the preamble of the NPRM stating that in the absence of a designated primary monitor at a given site, the default primary monitor would be one with the most complete data record (88 FR 5662, January 27, 2023). Because the procedure for calculating PM_{10} design values on a site-level basis being finalized here will require monitoring agencies to designate a primary monitor for each site in their annual network plans (88 FR 5694, January 27, 2023; App. K, 1.0(b)), the EPA agrees with the commenter that this footnote was unnecessary.

Therefore, the EPA is finalizing these appendix K revisions as proposed.

B. Amendments to Appendix N: Interpretation of the NAAQS for $PM_{2.5}$

The EPA proposed to modify its data handling procedures for the annual and 24-hour $PM_{2.5}$ standards in appendix N to part 50 (88 FR 5663, January 27, 2023). These proposed revisions include: (1) Updating references to the revisions of the standards rather than stating the specific level, and (2) codifying site combinations to maintain a continuous data record. The purpose of both modifications is to codify existing practices that are currently being implemented as the EPA standard operating procedures.

The EPA received few comments on these revisions in the proposed rule, with most supportive of the appendix N revisions.

Although the EPA did not propose or request comment on this issue, one commenter suggested that appendix N be revised to only allow data from the primary monitor to be used in $PM_{2.5}$ NAAQS designations asserting that it would add flexibility. The EPA disagrees with the commenter's assertion that this would add flexibility because it could force agencies to run

their FRMs on a daily schedule or potentially lead to invalid design values if manual sampling interruptions or laboratory issues impact FRM data completeness. This change would also be undesirable because it could reduce by two-thirds the number of days used in calculations for the annual and 24-hour $PM_{2.5}$ design values at many sites.

Therefore, the EPA is finalizing these appendix N revisions as proposed.

VII. Amendments to Ambient Monitoring and Quality Assurance Requirements

The EPA is finalizing revisions to ambient air monitoring requirements for PM to improve the usefulness of and appropriateness of data used in regulatory decision making. These changes focus on ambient monitoring requirements found in 40 CFR parts 50 (appendix L), 53, and 58 with associated appendices (A, B, C, D, and E). These changes include addressing updates in the approval of reference and equivalent methods, updates in quality assurance statistical calculations to account for lower concentration measurements, updates to support improvements in PM methods, a revision to the $PM_{2.5}$ network design to account for at-risk populations, and updates to the Probe and Monitoring Path Siting Criteria for NAAQS pollutants. The EPA also took comment on how to incorporate data from next generation technologies into Agency efforts. A summary of the comments received is included in this section.

A. Amendment to 40 CFR Part 50 (Appendix L): Reference Method for the Determination of Fine Particulate Matter as $PM_{2.5}$ in the Atmosphere—Addition of the Tisch Cyclone as an Approved Second Stage Separator

The EPA proposed a change to the FRM for $PM_{2.5}$ (40 CFR part 50, appendix L), the addition of an alternative $PM_{2.5}$ particle size separator to that of the Well Impactor Ninety-Six (WINS) and the Very Shape Cut Cyclone (VSCC) size separators (88 FR 5663, January 27, 2023). The new separator is the TE–$PM_{2.5}$C cyclone manufactured by Tisch Environmental Inc.,[180] Cleves Ohio, which has been shown to have performance equivalent to that of the originally specified WINS impactor with regards to aerodynamic cutpoint and $PM_{2.5}$ concentration measurement. In addition, the new TE–$PM_{2.5}$C has a significantly longer service interval than the WINS and is comparable to that of the VSCC separator. Generally, the TE–$PM_{2.5}$C is also physically interchangeable with the WINS and VSCC where both are manufactured for the same sampler. The proposed change would allow either the WINS, VSCC, or TE–$PM_{2.5}$C to be used in a $PM_{2.5}$ FRM sampler. As is the case for the WINS and VSCC, the TE–2.5C is now also an approved size separator for candidate $PM_{2.5}$ FEMs. Currently, the EPA has designated one $PM_{2.5}$ sampler configured with TE–$PM_{2.5}$C separator as a Class II $PM_{2.5}$ equivalent method and one as a $PM_{10\text{-}2.5}$ equivalent method. Upon promulgation of this change to appendix L, these instruments would be redesignated as $PM_{2.5}$ and $PM_{10\text{-}2.5}$ FRMs, respectively. Owners of such samplers should contact the sampler manufacturer to receive a new reference method label for the samplers.

The EPA received only one comment regarding this proposed change, which was supportive. Therefore, the EPA is finalizing this change to Appendix L as proposed.

B. Issues Related to 40 CFR Part 53 (Reference and Equivalent Methods)

The EPA proposed to clarify the regulations associated with FRM and FEM applications for review by the EPA (88 FR 5664, January 27, 2023). Revisions were also proposed in instances where current regulatory specifications are no longer pertinent and require updating. In addition, the EPA proposed to correct a compiled a list of noted minor errors in the regulations associated with the testing requirements and acceptance criteria for FRMs and FEMs in part 53. These errors are typically not associated with the content of **Federal Register** documents but often relate to transcription errors and typographical errors in the electronic CFR (eCFR) and printed versions of the CFR.

1. Update to Program Title and Delivery Address for FRM and FEM Applications

The EPA proposed a change to 40 CFR 53.4(a) to update the delivery address for FRM and FEM Applications and Modification Requests, as well as update the name of the program responsible for their review (88 FR 5664, January 27, 2023). These revisions are due solely to organizational changes and do not affect the structure or role of the Reference and Equivalent Methods Designation Program in reviewing new FRM and FEM application requests and requests to modify existing designated instruments. The EPA received no comments on this revision and, therefore, the EPA is finalizing this revision as proposed.

2. Requests for Delivery of a Candidate FRM or FEM Instrument

The EPA proposed a change to 40 CFR 53.4(d), which currently allows the EPA to request only candidate $PM_{2.5}$ FRMs and Class II or Class III equivalent methods for testing purposes as part of the applicant review process (88 FR 5664, January 27, 2023). The EPA proposed to revise this section to enable requesting any candidate FRM, FEM, or a designated FRM or FEM associated with a Modification Request, regardless of NAAQS pollutant type or metric. The EPA received no comments on these revisions; therefore, the EPA is finalizing this revision as proposed.

3. Amendments to Requirements for Submission of Materials in 40 CFR 53.4(b)(7) for Language and Format

The EPA proposed a change to 40 CFR 53.4(b)(7) to specify that all written FRM and FEM application materials must be submitted to the EPA in English in MS Word format and that submitted data must be submitted in MS Excel format (88 FR 5664, January 27, 2023). The EPA received no comments on these revisions; therefore, the EPA is finalizing this section as proposed.

4. Amendment to Designation of Reference and Equivalent Methods

The EPA proposed a change to 40 CFR 53.8(a) to clarify the terms of new FRM and FEM methods to ensure that candidate samplers and analyzers are not publicly announced, marketed, or sold until the EPA's approval has been formally announced in the **Federal Register** (88 FR 5664, January 27, 2023). The EPA received no comments on these revisions; therefore, the EPA is finalizing this section as proposed.

5. Amendment to One Test Field Campaign Requirement for Class III $PM_{2.5}$ FEMs

The EPA proposed a change to 40 CFR 53.35(b)(1)(ii)(D) that involves field comparability tests for candidate Class III $PM_{2.5}$ FEMs, including the requirement that a total of five field campaigns must be conducted at four separate sites, A, B, C, and D (88 FR 5664, January 27, 2023). The existing Site D specifications require that the site ''shall be in a large city east of the Mississippi River, having characteristically high sulfate concentrations and high humidity levels.'' However, dramatic decreases in ambient sulfate concentration make it difficult for applicants to routinely meet the high sulfate concentration requirement. Therefore, the EPA proposed to revise the Site D specifications to read ''shall be in a large

[180] Mention of commercial names does not constitute EPA endorsement.

city east of the Mississippi River, having characteristically high humidity levels.'' Only one comment was received on this proposed revision, which was supportive. Therefore, the EPA is finalizing the revision to 40 CFR 53.35(b)(1)(ii)(D), as proposed.

6. Amendment to Use of Monodisperse Aerosol Generator

The EPA proposed a change to 40 CFR 53.61(g), 53.62(e), and Table F–1 that involves the wind tunnel evaluation of candidate PM_{10} inlets and candidate $PM_{2.5}$ fractionators under static conditions, which requires the generation and use of monodisperse calibration aerosols of specified aerodynamic sizes (88 FR 5664, January 27, 2023). In the current regulations, the TSI Incorporated Vibrating Orifice Aerosol Generator (VOAG) is the only monodisperse generator that is approved for this purpose. However, TSI Incorporated no longer manufacturers nor supports the VOAG. Therefore, a commercially available monodisperse aerosol generator (Model 1520 Fluidized Monodisperse Aerosol Generator, MSP Corporation, Shoreview, MN) has been added to list of approved generators for this purpose. No comments were received on this revision; therefore, the EPA is finalizing this revision as proposed.

7. Corrections to 40 CFR Part 53 (Reference and Equivalent Methods)

Certain provisions of 40 CFR 53.14, Modification of a reference or equivalent method, incorrectly state an EPA response deadline of 30 days for receipt of modification materials in response to an EPA notice. Per a 2015 amendment (80 FR 65460, 65416, Oct. 26, 2015), all EPA response deadlines for modifications of reference or equivalent methods are 90 days from day of receipt. Thus, the EPA proposed a correction to specify the correct 90-day deadline (88 FR 5664, January 27, 2023).

Requirements for Reference and Equivalent Methods for Air Monitoring of Criteria Pollutants identifies the applicable 40 CFR part 50 appendices and 40 CFR part 53 subparts for each criteria pollutant. The four rows in the section for $PM_{10-2.5}$ erroneously do not include the footnote instruction that the aforementioned pollutant alternative Class III requirements may be substituted in regard to Appendix O to Part 50—Reference Method for the Determination of Coarse Particulate Matter as $PM_{10-2.5}$ in the Atmosphere.

Table B–1 specifies that the interference equivalent for each interferent is ±0.005 ppm for both the standard-range and lower-range limits, with the exception of nitric oxide (NO) for the lower-range limit per note 4. When testing the lower range of SO_2, the limit for NO is ±0.003 ppm, therefore, an incorrect lower limit (±0.0003) is currently stated in note 4 for this exception to the SO_2 lower range limit. Thus, the EPA proposed a correction to Table B–1 to specify the correct limit in note 4 (88 FR 5664, January 27, 2023).

After the EPA received an inquiry regarding the interaction of NO and O_3, the EPA investigated the interferent testing requirements stated by 40 CFR part 53, subpart B. The EPA has determined that during the 2011 SO_2 amendment and subsequent 2015 O_3 amendment, several typographical errors were introduced into Table B–3, the most significant of which is the omission of note 3, which instructs the applicant to not mix the pollutant with the interferent. Thus, the EPA proposed revisions to Table B–3 to correct these errors (88 FR 5664, January 27, 2023).

Additionally, appendix A to subpart B of part 53 provides figures depicting optional forms for reporting test results. Figure B–3 lists an incorrect formula: the lower detectible limit section is missing the proper operator in the LDL calculation formula and Figure B–5 lists an incorrect calculation metric, and there is a typesetting error in the calculation of the standard deviation. The EPA proposed to correct the typesetting errors and noted other errors to be corrected in several formulas provided throughout § 53.43 (88 FR 5664, January 27, 2023).

The EPA proposed a revision to 40 CFR 53.43(a)(2)(xvi), 53.43(b)(2)(iv), and 53.43(b)(2)(iv) to correct typographical errors in equations.

The EPA proposed a revision to Table C–4 of part 53 Subpart C (88 FR 5700). This change is related to field comparability tests of candidate $PM_{2.5}$, $PM_{10-2.5}$, and PM_{10} FEMs, which requires testing at wide range of ambient concentrations. For this reason, Table C–4 specifies a minimum number of valid sample sets to be conducted at specified high concentrations. However, due to the dramatic decrease in ambient PM concentrations in the past two decades, these number of valid test days at high concentrations has been difficult to achieve. Accordingly, the EPA proposed to revise the testing specifications for high concentration events in Table C–4 to reflect current levels of ambient PM for all three PM metrics. In addition to the revision of the ambient PM concentration specifications to Table C–4, there are also several entry errors that required correction.

The EPA received no comments on these proposed revisions; therefore, the EPA is finalizing the changes as proposed.

C. Changes to 40 CFR Part 58 (Ambient Air Quality Surveillance)

1. Quality Assurance Requirements for Monitors Used in Evaluations for National Ambient Air Quality Standards

In the proposal, the EPA described how we evaluated the quality system as part of the PM NAAQS reconsideration (88 FR 5665, January 27, 2023). In this section, the EPA identified several areas for improvement in steadily declining average ambient $PM_{2.5}$ concentrations across the country and the final decision to revise primary annual $PM_{2.5}$ NAAQS described in section II above. We assessed $PM_{2.5}$ concentration data across a range of values to determine if any changes to the statistical calculations used to evaluate the data quality in the $PM_{2.5}$ network were warranted. This section describes the EPA's assessment, comments received, and the EPA's final decisions on the proposed changes. Other changes in this section include clarifications and other improvements that will facilitate consistency and the operation of quality assurance programs by State, local, and Tribal (SLT) agencies nationwide.

a. Quality System Requirements

The EPA reconsidered the appendix A, section 2.3.1.1 goal for acceptable measurement uncertainty (88 FR 5665, January 27, 2023) for automated and manual $PM_{2.5}$ methods for total bias. The existing total bias goal is an upper 90 percent confidence limit for the coefficient of variation (CV) of 10 percent and ±10 percent for total bias. The intent of the proposal was to investigate if this bias goal is still realistic given updated precision and bias statistic. The EPA received one comment that bias reevaluation may be premature, since the final NAAQS standard had not yet been determined at the time of the proposal. The EPA acknowledges this comment but clarifies that the proposed new bias statistic was evaluated at a range of levels including the range of proposed $PM_{2.5}$ standards in the technical memorandum, ''Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network.'' [181] Considering the

[181] Noah, G. (2023). Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for

Continued

justification in the technical memorandum and the lack of adverse comments regarding this part of the proposal, the EPA is retaining the appendix A, section 2.3.1.1, goal for acceptable measurement uncertainty for automated and manual $PM_{2.5}$ methods for total bias.

The EPA also proposed to update and clarify ambient air monitoring requirements found in 40 CFR part 58, appendix A, section 2.6.1 pertaining to EPA Protocol Gas standards used for ambient air monitoring and the Ambient Air Protocol Gas Verification Program (PGVP) (88 FR 5665, January 27, 2023). The EPA proposed to revise appendix A to clarify that in order to participate in the Ambient Air PGVP, producers of Protocol Gases must adhere to the requirements of 40 CFR 75.21(g), and only regulatory ambient air monitoring programs may submit cylinders for assay verification to the EPA Ambient Air PGVP. The EPA received mixed comments in support of and in opposition to this proposed revision. The sole commenter opposing the proposed revision indicated that the proposed PGVP requirements would be additional and is concerned with an increased resource burden. But the EPA responds that the PGVP requirements that were proposed to be added are consistent with the existing PGVP requirements in 40 CFR 75.21(g), and PGVP has been defined as a regulatory requirement since 2016 (81 FR 17263, March 28, 2016), so the proposed part 58 changes are not ''additional'' to existing regulations. After consideration of the comments, the EPA is finalizing the update and clarification of ambient air monitoring requirements found in appendix A, section 2.6.1 pertaining to EPA Protocol Gas standards used for ambient air monitoring and the Ambient Air PGVP as proposed.

b. Measurement Quality Check Requirements

The EPA proposed to remove section 3.1.2.2 from appendix A, which allows NO_2 compressed gas standards to be used to generate audit standards (88 FR 5665, January 27, 2023). The EPA received one comment supporting this change. As a result of the comment received and other general supportive comments regarding quality assurance, the EPA is finalizing the removal of section 3.1.2.2 from appendix A as proposed.

The EPA proposed to revise the requirement in Appendix A, section 3.1.3.3 changing the National Performance Audit Program (NPAP) requirement for annual verification of gaseous standards to the ORD-recommended certification periods identified in Table 2–3 of the EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (appendix A, section 6.0(4)) (88 FR 5665). The EPA received one comment supporting this change. As a result of the comment received and other general supportive comments regarding quality assurance, the EPA is finalizing the updated NPAP gaseous certification requirement in section 3.1.3.3 as proposed.

The EPA proposed to adjust the minimum value required by appendix A, section 3.2.4, to be considered valid sample pairs for the $PM_{2.5}$ Performance Evaluation Program (PEP) from 3 $\mu g/m^3$ to 2 $\mu g/m^3$ (88 FR 5665, January 27, 2023). The EPA received comments in support and against the change. In the only opposing comment, the commenter expressed concern that the method detection limit (MDL) for $PM_{2.5}$ is 2 $\mu g/m^3$. The commenter also indicated that the MDL ''typically has minimal value per the definition of the MDL.'' 40 CFR part 50, appendix L states, ''The lower detection limit of the mass concentration measurement range is estimated to be approximately 2 $\mu g/m^3$, based on noted mass changes in field blanks in conjunction with the 24 m^3 nominal total air sample volume specified for the 24-hour sample.'' The EPA notes that field blanks currently average less than 10 µg nationally, and when divided by the 24 m^3 nominal total air sample volume specified for a 24-hour sample, the result is 0.4 $\mu g/m^3$. The appendix L MDL referenced by the commenter was part of the 1997 PM NAAQS rulemaking (62 FR 38652, July 18, 1997); current data shows that the MDL is substantially lower than the EPA's original estimate. After review of the comments, and in consideration of the recently calculated detection limit for the $PM_{2.5}$ FRM that is substantially lower than our original estimate,[182] the EPA is finalizing the revised minimum value for valid sample pairs for the $PM_{2.5}$ Performance Evaluation Program (PEP) from 3 $\mu g/m^3$ to 2 $\mu g/m^3$ in appendix A, section 3.2.4 as proposed.

c. Calculations for Data Quality Assessments

The EPA proposed to change Equations 6 and 7 of appendix A, section 4.2.1 that are used to calculate the *Collocated Quality Control Sampler Precision Estimate for PM_{10}, $PM_{2.5}$ and Pb* (88 FR 5666, January 27, 2023). The proposed new statistics are designed to address the high imprecision values that result from using these calculations to compare low concentrations that are now more routinely observed in the networks. The EPA received several comments in support of this change in general, but some commenters indicated that they believed there was an error in the new calculation that may result in high imprecision from the calculation of the equation. The EPA reviewed the technical memorandum and confirmed that a multiplier of 100 was unintentionally left in the proposed relative difference equation, Equation 6. Also, equation 6 was corrected from a normalized percent difference to a normalized relative percent difference that is appropriate for comparing collocated pairs at low concentrations. The technical memorandum titled ''Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network'' has been amended to correct the error and is included in the docket for this action.[183]

Equation 6 as proposed at 88 FR 5666 (January 27, 2023) was:

Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

[182] See the EPA's $PM_{2.5}$ Data Quality Dashboard available at *https://sti-r-shiny.shinyapps.io/QVA_Dashboard/.*

[183] Noah, G. (2023). Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

$$s_i = \frac{meas - audit}{\sqrt{audit}} \times 100$$

And the corrected Equation 6 is:

$$t_i = \frac{X_i - Y_i}{\sqrt{(X_i - Y_i)/2}}$$

Equation 7 is below and is unchanged.

$$CV90_{NAAQS} = 100 * \sqrt{\frac{k \times \sum_{i=1}^{k} t_i^2 - (\sum_{i=1}^{k} t_i)^2}{2k(k-1)}} \times \sqrt{\frac{k-1}{NAAQS\ Concentration * X^2_{0.1,k-1}}}$$

As a result of the positive comments received and the correction to the equation made in response to some comments, the EPA is finalizing the updated Equation 6 as described and is finalizing Equation 7 as proposed for the calculation of the *Collocated Quality Control Sampler Precision Estimate for PM_{10}, $PM_{2.5}$, and Pb* in section 4.2.1.

The EPA proposed to update the appendix A, section 4.2.5, Equation 8, calculation for the Performance Evaluation Program Bias Estimate for $PM_{2.5}$ (88 FR 5666–67, January 27, 2023). Because average ambient PM concentrations across the nation have steadily declined since the promulgation of the $PM_{2.5}$ standard, the EPA proposed to replace the current percent difference equation with a relative difference equation. The EPA received several comments in support of this change in general, but some commenters identified a potential error in the new calculation that resulted in an artificially high estimate, which they do not support. The EPA reviewed the technical memorandum and discovered that a multiplier of 100 was left in the new relative difference equation used in the bias equation. The technical memorandum, ''Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network'' has been amended to correct the error and is included in the docket.[184] The proposed Equation 8 proposed at 88 FR 5667 (January 27, 2023) was:

$$100 * \frac{\sum_{i=1}^{n} s_i}{n\sqrt{NAAQS\ concentration}} \quad \text{where} \quad s_i = \frac{meas - audit}{\sqrt{audit}} \times 100$$

and the corrected Equation 8 is:

$$100 \times \frac{\sum_{i=1}^{n} s_i}{n\sqrt{NAAQS\ concentration}} \quad \text{where} \quad s_i = \frac{meas - audit}{\sqrt{audit}}$$

As a result of the supportive comments received and the correction to the equation in response to some comments, the EPA is updating and finalizing Equation 8 as described for the calculation for the Performance Evaluation Program Bias Estimate for $PM_{2.5}$, in section 4.2.5.

d. References

The EPA proposed to update the references and hyperlinks in appendix A, section 6 (88 FR 5667, January 27, 2023) to provide accuracy in identifying and locating essential supporting documentation and delete references to historical documents that do not represent current practices. The EPA received only favorable comments, and as a result, the EPA is finalizing the updated the references and hyperlinks in appendix A, section 6, as proposed.

The EPA also proposed to add a footnote to Table A–1 of part 58, appendix A—Minimum Data Assessment Requirements for NAAQS Related Criteria Pollutant Monitors (88 FR 5669, January 27, 2023). The proposed footnote clarifies the allowable time (*i.e.,* every two weeks, once a month, once a quarter, once every six months, or distributed over all four quarters depending on the check) between checks and encourages monitoring organizations to perform data assessments at regular intervals. The EPA received two comments regarding this proposed footnote. One commenter indicated that this change is inconsistent with the QA Handbook for Air Pollution Measurement Systems: ''Volume II: Ambient Air Quality Monitoring Program QA Handbook.'' The EPA agrees with the commenter; because the QA Handbook is guidance,

[184] Noah, G. (2023). Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

the EPA will revise it after this action is finalized to be consistent with the updated CFR provision. Another commenter does not support the addition of the footnote due to concerns about limiting flexibility. In response, the EPA reiterates that the proposed revision is intended to clarify intent and does not make any changes to the required frequencies or acceptance criteria for data assessment. A ''weight of evidence'' narrative is still found in 40 CFR part 58, appendix A, section 1.2.3. As a result of the comments received and the rationale discussed above, the EPA is finalizing the addition of the new footnote to Table A–1 of part 58, appendix A—Minimum Data Assessment Requirements for NAAQS Related Criteria Pollutant Monitors as proposed.

2. Quality Assurance Requirements for Prevention of Significant Deterioration (PSD) Air Monitoring

The EPA proposed to revise appendix B, Quality Assurance Requirements for Prevention of Significant Deterioration (PSD) Air Monitoring (88 FR 5667, January 27, 2023), in parallel to the proposal to revise appendix A. Thus, this section of the proposal included similar detail and proposed revisions related to evaluating quality system statistical calculations for $PM_{2.5}$, clarifications and other improvements that would facilitate consistency and the operation of quality assurance programs for PSD by SLT agencies nationwide.

a. Quality System Requirements

The EPA reconsidered the goal in appendix B, section 2.3.1.1 for acceptable measurement uncertainty for automated and manual $PM_{2.5}$ methods for total bias (88 FR 5668, January 27, 2023).[185] The current total bias goal is an upper 90 percent confidence limit for the coefficient of variation (CV) of 10 percent and ±10 percent for total bias. The EPA's intent was to investigate if this goal is still realistic given updated precision and bias statistics. The EPA received one comment that bias reevaluation may be premature, since the final NAAQS standard had not yet been determined at the time of the proposal. The EPA acknowledges this comment but clarifies that the proposed new bias statistic was evaluated at a range of levels including the proposed range of $PM_{2.5}$ standards in the technical memorandum, ''Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network.'' [186] Considering the justification in the technical memorandum and the lack of adverse comments regarding the substantive proposal, the EPA is retaining the appendix B, section 2.3.1.1, goal for acceptable measurement uncertainty for automated and manual $PM_{2.5}$ methods for total bias.

The EPA also proposed to update and clarify ambient air monitoring requirements found in 40 CFR part 58, appendix B, section 2.6.1 pertaining to EPA Protocol Gas standards used for ambient air monitoring and the Ambient Air PGVP (88 FR 5668, January 27, 2023). The EPA proposed to revise appendix B to clarify that in order to participate in the Ambient Air PGVP, producers of Protocol Gases must adhere to the requirements of 40 CFR 75.21(g), and only regulatory ambient air monitoring programs may submit cylinders for assay verification to the EPA Ambient Air PGVP. The EPA received comments in support of and in opposition to this proposed revision. The commenter opposing the revision indicated that the proposed PGVP requirements would be additional and is concerned with an increased resource burden. However, the EPA disagrees with the commenter because that the proposed PGVP requirements are consistent with the existing PGVP requirements in 40 CFR 75.21(g). PGVP has been defined as a regulatory requirement since 2016 (81 FR 17263, March 28, 2016), so the proposed part 58 changes are not ''additional'' to existing regulations. After consideration of the comments, the EPA is finalizing the update and clarification of ambient air monitoring requirements found in appendix B, section 2.6.1 pertaining to EPA Protocol Gas standards used for ambient air monitoring and the Ambient Air PGVP as proposed.

b. Measurement Quality Check Requirements

The EPA proposed to remove section 3.1.2.2 from appendix B, which allows NO_2 compressed gas standards to be used to generate audit standards (88 FR 5668, January 27, 2023). The EPA received one comment supporting this change. As a result of the comment received and other general supportive comments regarding quality assurance, the EPA is finalizing the removal of section 3.1.2.2 from appendix B as proposed.

The EPA proposed to revise the requirement in Appendix B, section 3.1.3.3 changing the National Performance Audit Program (NPAP) requirement for annual verification of gaseous standards to the ORD-recommended certification periods identified in Table 2–3 of the EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (appendix B, section 6.0(4)) (88 FR 5668, January 27, 2023). The EPA received one comment supporting this change. As a result of the comment received and other general supportive comments regarding quality assurance, the EPA is finalizing the updated NPAP gaseous certification requirement in section 3.1.3.3 as proposed.

The EPA proposed to adjust the minimum value required by appendix B, section 3.2.4, to be considered valid sample pairs for the $PM_{2.5}$ Performance Evaluation Program (PEP) from 3 $\mu g/m^3$ to 2 $\mu g/m^3$ (88 FR 5668, January 27, 2023). The EPA received comments in support and against the change. In the only opposing comment, the commenter expressed concern that the method detection limit (MDL) for $PM_{2.5}$ is 2 $\mu g/m^3$. The commenter also indicated that the MDL ''typically has minimal value per the definition of the MDL.'' 40 CFR part 50, appendix L states, ''The lower detection limit of the mass concentration measurement range is estimated to be approximately 2 $\mu g/m^3$, based on noted mass changes in field blanks in conjunction with the 24 m^3 nominal total air sample volume specified for the 24-hour sample''. The EPA notes that field blanks currently average less than 10 µg nationally, and when divided by the 24 m^3 nominal total air sample volume specified for a 24-hour sample, the result is 0.4 $\mu g/m^3$. The appendix L MDL referenced by the commenter was part of the 1997 PM NAAQS rulemaking more than 20 years ago (62 FR 38652, July 18, 1997); current data shows that the MDL is substantially lower than EPA's original estimate. After review of the comments, and in consideration of the recently calculated

[185] In the proposal, in section VII.C.2 Quality Assurance Requirements for Prevention of Significant Deterioration (PSD) Air Monitoring (88 FR 5667–69), the EPA inadvertently referred to ''appendix A'' in the section rather than the correct ''appendix B.'' The EPA's intent to have proposed changes to appendix B on these pages is made clear by the section header, the Table of Contents on page 5559, and the proposed regulatory text for appendix B on pages 5707–08. See, *e.g.,* id. at p.5668 (preamble erroneously states that the EPA proposed to change appendix A, section 2.6.1); id. at p.5668 (preamble erroneously states that the EPA proposed to adjust the minimum value required by appendix A, section 3.2.4).

[186] Noah, G. (2023). Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072*.

detection limit for the $PM_{2.5}$ FRM that is substantially lower than our original estimate, the EPA is revising the minimum value for valid sample pairs for the $PM_{2.5}$ Performance Evaluation Program (PEP) from 3 $\mu g/m^3$ to 2 $\mu g/m^3$ in appendix B, section 3.2.4 as proposed.

c. Calculations for Data Quality Assessments

The EPA proposed to change Equations 6 and 7 of appendix B, section 4.2.1 used for calculating the *Collocated Quality Control Sampler Precision Estimate for PM_{10}, $PM_{2.5}$ and Pb* (88 FR 5707, January 27, 2023). These new statistics are designed to address the high imprecision values that result from using these calculations to compare low concentrations that are now more routinely observed in the networks. The EPA received several comments in support of this change in general, but a couple commenters indicated that there could be an error in the new calculation that resulted in high imprecision from the calculation of the equation. The EPA reviewed the technical memorandum and discovered that a multiplier of 100 was unintentionally left in the proposed relative difference equation, Equation 6. Also, equation 6 was corrected from a normalized percent difference to a normalized relative percent difference that is appropriate for comparing collocated pairs at low concentrations. The technical memorandum titled ''Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network'' was amended to correct the error and is included in the docket.[187]

Equation 6 in the proposal (88 FR 5668, January 27, 2023) was:

$$s_i = \frac{meas - audit}{\sqrt{audit}} \times 100$$

And the corrected Equation 6 is:

$$t_i = \frac{X_i - Y_i}{\sqrt{(X_i - Y_i)/2}}$$

Equation 7 is below and is unchanged.

$$CV90_{NAAQS} = 100 * \sqrt{\frac{k \times \sum_{i=1}^{k} t_i^2 - (\sum_{i=1}^{k} t_i)^2}{2k(k-1)}} \times \sqrt{\frac{k-1}{NAAQS\ Concentration * X^2_{0.1,k-1}}}$$

As a result of the positive comments received and the correction to the equation made in response to those comments, the EPA is finalizing the update to Equation 6 and retaining Equation 7 as proposed for the calculation of the *Collocated Quality Control Sampler Precision Estimate for PM_{10}, $PM_{2.5}$ and Pb* in section 4.2.1.

The EPA proposed to update the appendix B, section 4.2.5, Equation 8, calculation for the Performance Evaluation Program Bias Estimate for $PM_{2.5}$ (88 FR 5668–59, January 27, 2023). Because average ambient PM concentrations across the nation have steadily declined since the promulgation of the $PM_{2.5}$ standard, the EPA proposed to replace the current percent difference equation with a relative difference equation. The EPA received several comments in support of this change in general, but some commenters identified a potential error in the new calculation that resulted in an artificially high estimate, which they do not support. The EPA reviewed the technical memorandum and discovered that a multiplier of 100 was left in the new relative difference equation used in the bias equation. The technical memorandum, ''Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network'' has been amended to correct the error and is included in the docket. The proposed Equation 8 (88 FR 5669, January 27, 2023) was:

[187] Noah, G. (2023). Task 16 on PEP/NPAP Task Order: Bias and Precision DQOs for the $PM_{2.5}$ Ambient Air Monitoring Network. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

$$100 * \frac{\sum_{i=1}^{n} s_i}{n\sqrt{NAAQS\ concentration}} \quad \text{where} \quad s_i = \frac{meas - audit}{\sqrt{audit}} \times 100$$

and the corrected Equation 8 is:

$$100 \times \frac{\sum_{i=1}^{n} s_i}{n\sqrt{NAAQS\ concentration}} \quad \text{where} \quad s_i = \frac{meas - audit}{\sqrt{audit}}$$

As a result of the supportive comments received and the correction to the equation in response to some comments, the EPA is updating and finalizing Equation 8 as described for the calculation for the Performance Evaluation Program Bias Estimate for $PM_{2.5}$, in section 4.2.5.

d. References

The EPA proposed to update the references and hyperlinks in appendix B, section 6 (88 FR 5669, January 27, 2023) to provide accuracy in identifying and locating essential supporting documentation and delete references to historical documents that do not represent current practices. The EPA received only favorable comments, and as a result, the EPA is finalizing the updated the references and hyperlinks in appendix B, section 6, as proposed.

The EPA also proposed to add a footnote to Table B–1 of part 58, appendix B—Minimum Data Assessment Requirements for NAAQS Related Criteria Pollutant PSD Monitors (88 FR 5669, January 27, 2023). The proposed footnote clarifies the allowable time (*i.e.,* every two weeks, once a month, once a quarter, once every six months, or distributed over all four quarters depending on the check) between checks and encourages monitoring organizations to perform data assessments at regular intervals. The EPA received two comments regarding this proposal. One commenter indicated that this change is inconsistent with the QA Handbook. The EPA agrees with the commenter; because the QA Handbook is guidance, the EPA will revise it after this action is finalized to be consistent with the updated CFR provision. Another commenter does not support the addition of the footnote due to concerns about limiting flexibility. In response, the EPA reiterates that the proposed revision is intended to clarify intent and does not make any changes to the required frequencies or acceptance criteria for data assessment. A ''weight of evidence'' narrative is still found in 40 CFR part 58, appendix B, section 1.2.3. As a result of the comments received and the rationale discussed above, the EPA is adding the new footnote to Table B–1 of part 58, appendix B—Minimum Data Assessment Requirements for NAAQS Related Criteria Pollutant PSD Monitors as proposed.

3. Amendments to PM Ambient Air Quality Methodology

a. Revoking Approved Regional Methods (ARMs)

The EPA proposed to remove provisions for approval and use of Approved Regional Methods (ARMs) throughout parts 50 and 58 of the CFR (88 FR 5669, January 27, 2023). ARMs are continuous $PM_{2.5}$ methods that have been approved specifically within a State or local air agency monitoring network for purposes of comparison to the NAAQS and to meet other monitoring objectives. Currently, there are no approved ARMs. There are, however, more than a dozen approved Federal Equivalent Methods (FEMs) for $PM_{2.5}$. These approved FEMs are eligible for comparison to the NAAQS and to meet other monitoring objectives.

The EPA received comments from multiple State air programs in support of the proposal to remove provisions for approval and use of ARMs. One commenter cites that there are multiple FEMs available for monitoring agencies to work with and that the agency was never able to get a candidate ARM to meet the requirements for approval. With the availability of multiple FEMs that now work in the monitoring agency's network, the commenting agency does not anticipate the need to ever pursue an ARM in the future and, therefore, suggests that the ARM provision is no longer needed. Another commenter strongly supported the proposed changes to remove the ARM provisions. The EPA also received comments from a few agencies that supported retaining the ARM provisions instead. One commenter cited the need to consider the rapid advancement of various new technologies and that, in some cases, approved continuous FEMs may have shortcomings, meaning that losing the ability to propose an ARM in the future may limit useful alternative options to monitoring agencies. Another commenter suggested that the removal of the ARM would take away the ability and right to use locally derived correction factors.

After considering the comments for and against removing the provisions for ARMs, the EPA believes it is most appropriate to remove the ARM provisions. As described in the proposal, when the EPA first proposed the process for approving and using ARMs, there were no continuous FEMs approved. There are now over a dozen approved $PM_{2.5}$ continuous FEMs and no approved ARMs. Therefore, the EPA is finalizing the removal of ARMs throughout 40 CFR parts 50 and 58 as proposed.

b. Calibration of PM Federal Equivalent Methods (FEMs)

The EPA proposed to modify its specifications for PM FEMs in appendix C to Part 58 (88 FR 5670–73, January 27, 2023). Specifically, the EPA proposed that valid State, local, and Tribal (SLT) air monitoring data from Federal Reference Methods (FRMs) generated in routine networks and submitted to the EPA may be used to improve the PM concentration measurement performance of approved FEMs. This approach, initiated by instrument manufacturers, would be implemented as a national solution in factory calibrations of approved FEMs through a firmware update. This could apply to any PM FEM methods (*i.e.,* PM_{10}, $PM_{2.5}$, and $PM_{10-2.5}$).

The EPA proposed this modification because there are some approved PM FEMs that are not currently meeting bias measurement quality objectives (MQOs) when evaluating data nationally as described in the 2022 PA (U.S. EPA, 2022b, section 2.2.3.1), meaning that an update to factory calibrations may be appropriate; however, there is no clearly defined process to update the calibration of FEMs. While there are several types of data available to use as the reference for such updates (*e.g.,* routinely operated FRMs, audit program FRMs, and chemical speciation sampler

data), we proposed to use routinely operated SLT FRMs as the basis of comparison upon which to calibrate FEMs. The goal of updating factory calibrations would be to increase the number of routinely operating FEMs meeting bias MQOs across the networks in which they are operated. While there are other approaches that could improve data comparability between PM FEMs and collocated FRMs, the EPA believes that the proposed modification to calibrate PM FEMs represents the most reliable approach to update FEM factory calibrations, since the existing FRM network data that meet MQOs would be used to set updated factory calibrations.

While the Agency proposed to add this language to more expressly define a process to update factory calibrations of approved PM FEMs, the EPA believes that the existing rules for updating approved FRMs and FEMs found at 40 CFR 53.14 may also continue to be utilized for this purpose, as appropriate. 40 CFR 53.14 allows instrument manufactures to submit to the EPA a ''Modification of a reference or equivalent method.'' Submitting a modification request may be appropriate to ensure an approved FEM continues to meet 40 CFR 53.9, ''Conditions of designation.'' Specifically, 40 CFR 53.9(c) requires that, ''Any analyzer, PM_{10} sampler, $PM_{2.5}$ sampler, or $PM_{10–2.5}$ sampler offered for sale as part of an FRM or FEM shall function within the limits of the performance specifications referred to in § 53.20(a), § 53.30(a), § 53.35, § 53.50, or § 53.60, as applicable, for at least 1 year after delivery and acceptance when maintained and operated in accordance with the manual referred to in § 53.4(b)(3).'' Thus, instrument manufacturers are encouraged to seek improvements to their approved FEM methods as needed to continue to meet data quality needs as operated across the network.

There are several technical components to EPA's proposed modification, including: the reference data to be used in the calibrations; implementing as a national solution in factory calibrations of approved FEMs through firmware updates; application to any PM FEM methods (*i.e.,* PM_{10}, $PM_{2.5}$, and $PM_{10–2.5}$); the appropriate range of data to be used to develop and test new factory calibrations, from just the most representative concentrations up to all available concentrations; the representative set of geographic locations that can be used; whether outliers may be included or not included; that new factory calibrations should be developed using data from at least 2 years and tested on data from a separate year or years; that updates to factory calibrations can occur as often as needed; that calibrations should be evaluated by monitoring agencies as part of routine data assessments, *e.g.,* during certification of data and 5-year assessments; the EPA's recognition that only data from existing operating sites is available; and finally, that an updated factory calibration does not have to work with the original field study data submitted that led to the original FEM designation.

With the proposed modification, the EPA solicited input on these technical issues as well as the overall approach and any alternatives that could lead to more sites meeting the bias MQO with automated FEMs, especially for those sites that are near the level of the primary annual $PM_{2.5}$ NAAQS, as proposed to be revised in section II above. In response, the EPA received comments from about two dozen entities, most of which were SLT air programs or Multi-Jurisdictional Organizations (MJOs) comprised of these entities.

Overall, there was broad and strong support from a majority of commenters for the proposed requirement to use FRM data generated in routine networks and submitted to the EPA to update factory calibrations included as part of approved FEMs. There were a smaller number of critical comments on the proposed process as well as some commentors that supported the proposed requirement but also provided additional suggestions for the EPA's consideration. Below, we address each of the areas on which the EPA requested comment regarding the calibration of PM FEMs, as well as a few additional areas where multiple commenters offered input on other areas related to our proposal.

A majority of the commenters on the proposed PM FEM calibration process support the process to use valid State, local, and Tribal FRM data generated in routine networks and submitted to the EPA to improve the PM concentration measurement performance of approved FEMs. Some commenters suggested that this action is needed to ensure that data reported from FRMs and FEMs are comparable and correction methods applied to data from FEM monitors are defensible across the national PM monitoring network. Others stated that they agree with the EPA that this is a critical step in the right direction to account for the discrepancies between $PM_{2.5}$ FRM data and $PM_{2.5}$ FEM data. Some commented that applying corrections includes a recognition that, while different measurement principles may produce differences in the resulting data, having an approach that minimizes bias is extremely important. Finally, some stated their belief that a correction factor is necessary to preserve data integrity with the FRM.

The EPA also received comments suggesting ways that the PM FEM correction could be performed, including through detailed analysis of data; by having PM FEM instrument manufacturers evaluate nationally available valid FRM data to update factory calibrations; and, by having the instrument manufacturers implement calibration adjustments at the factory.

The EPA also received supportive comments on the PM FEMs calibration relating to comparability to the NAAQS. For example, a commenter stated that it is important to ensure bias MQOs are met for FEMs run at sites potentially affected by revised standards as well as the need to accurately designate areas as attaining or not attaining the NAAQS. There were comments supporting the correction of PM FEM data as helping the EPA and SLT monitoring programs continue to evolve toward more automated methods. For example, one commenter appreciates the EPA's support for the ongoing move from filter-based $PM_{2.5}$ FRMs to use of continuous FEMs, stating that they concur with the EPA's assessment that there is monitoring bias between FRMs and FEMs, and commending EPA for recognizing ongoing data quality issues for FEMs and for taking action to improve these issues in collaboration with instrument manufacturers and SLT agencies.

A small number of commenters were critical of the proposed FEM calibration approach. One commenter noted that EPA should further examine the handling of FEM $PM_{2.5}$ data when used for comparison to the NAAQS. In response, we note that monitoring agencies and the EPA will continue to examine the comparability and use of FEM data used in comparison to the NAAQS. Another commenter suggested that the calibration process for a designated PM monitor should not be altered following Class III designation approval. The EPA disagrees as we believe it is appropriate for FEMs to be calibrated with routinely operated FRMs, because doing so is an efficient way to work towards FEM data meeting the bias MQO across the networks in which the FEMs are currently being operated. Also, having continuous PM FEMs meeting bias MQOs allows the use of the data in a variety of other ways that manually operated FRMs samplers cannot support. Another commenter stated that, if a particular FEM designated make or model of

instruments fails to meet MQOs, then that make or model should be removed from the designations altogether. The EPA agrees and clarifies that the modification would not prevent removal of FEM designation from a make or model of instrument under the existing 40 CFR 53.11—Cancellation of reference or equivalent method designation. This may be appropriate if there are no other solutions to improve the method such that it achieves bias MQOs.

A few commenters provided specific recommendations for how the regulatory language could be improved. These included comments that the new regulatory language proposed for 40 CFR part 58, appendix C, section 2.2 must ensure consistency and transparency when requesting changes to the factory calibration; that the EPA should incorporate binding regulatory language in 40 CFR part 58, appendix C, section 2.2 (*i.e.,* it currently lacks ''shall'' or ''must'') to ensure the language is not open to inconsistency and does not provide unique deference to instrument manufacturers without a mechanism for transparent communication of the changes being made and the supporting technical analysis. A commenter also requested that the EPA define the core requirements needed to ensure all requests for updating factory calibrations are required to follow the same process, using data of the same known quality, and evaluating the effectiveness of the resulting correction factors consistently.

In response to these comments, while the EPA agrees that the proposed regulatory language for 40 CFR part 58, appendix C, section 2.2 must ensure consistency and transparency when entities request changes to factory calibrations, the EPA disagrees that the regulations cannot also provide some flexibility. For example, we believe that a degree of flexibility is appropriate regarding whether outliers in the data to be used for factory calibration should or should not be included, the range of data to be included, and in utilizing collocated FRM and FEM data for updated calibrations from a representative set of geographic areas in which it is produced. The EPA believes that the proposal defined the core requirements needed to ensure all requests for updating FEM factory calibrations will follow the same process, using data of the same known quality and evaluating the effectiveness of the resulting correction factors consistently.

In its proposal, the EPA identified that while there are several types of data available to use as the reference for FEM calibration updates, including data from routinely operated FRMs, audit program FRMs, and $PM_{2.5}$ chemical speciation samplers, the EPA proposed to use routinely operated State, local, and Tribal FRMs as the basis of comparison upon which to calibrate FEMs (88 FR 5670–71, January 27, 2023). Importantly, routine SLT agency FRM data form the largest portion of the monitored air quality data used in epidemiologic studies that are being used to inform proposed decisions regarding the adequacy of the public health protection afforded by the primary $PM_{2.5}$ NAAQS, as discussed in section II above.

Overall, there was broad and strong support for utilizing collocated FRM data from routine SLT networks to provide calibrations of the continuous FEMs. For example, several commenters agree that valid SLT air monitoring data generated in routine networks and submitted to the EPA will improve the PM concentration measurement performance of approved FEMs. Another commenter provided support for PM FEM instrument manufacturers to evaluate nationally available valid FRM data as well as other data sets such as the performance evaluation audit program to update factory calibrations. The EPA believes that the routinely operated PM FRMs represent the best and largest source of data to calibrate continuous PM FEMs, and that performance evaluation audit program data should be kept independent of the calibration process. This will mean that assessments of the routine monitoring operations, including both the FRM and any future updated PM FEMs, will appropriately remain independent in evaluating whether updated methods are meeting bias MQOs. The EPA is, therefore, finalizing its approach to use routinely operated SLT FRMs as the basis of comparison upon which to calibrate continuous PM FEMs as proposed.

Regarding the EPA's proposed requirement to utilize factory calibrations (88 FR 5670–71, January 27, 2023), several commenters agreed that factory calibrations provide the best option to improve PM FEMs. For example, one commenter stated that the correction factors are necessary to preserve data integrity with the FRM, and they support the proposal that the approach be initiated by instrument manufacturers and implemented as a national solution through firmware updates.

Regarding the proposed requirement that calibrations be initiated by instrument manufacturers (88 FR 5671, January 27, 2023), most commenters were supportive of the proposed approach that recalibration of FEM PM instruments be initiated by instrument manufacturers. For example, one commenter stated they support allowing instrument companies submit improvements to their existing FEMs, as vendors should be encouraged to improve their methods. Another commenter noted that having a methodology initiated by the manufacturer will have nationwide consistency. A few of commenters recommended that SLT air agencies should have the additional ability to petition the EPA Administrator to initiate factory calibrations of FEMs to better meet MQOs when data collected by their agencies indicate disparities, because the monitoring agencies are responsible for the quality of the data from the specific makes and models of instrumentation used in their networks. While the EPA believes that, in most cases, the instrument companies should be the ones to initiate the process for calibration of FEMs to routinely operated FRMs, we agree with the commenters who suggested that other options should be available, including allowing monitoring agencies or MJOs to work independently or together to pursue improvements to designated FEMs. However, the EPA believes that any such improvements initiated by monitoring agencies or MJOs should still be facilitated through the responsible instrument company. Also, any such effort to improve data quality should be employed across all the networks in which the methods are operated and not limited to the networks operated by the agency(s) pursuing such improvements.

Regarding how frequently factory calibrations should be updated, our proposal identified that it would be most appropriate to not define a specific time period for updates; rather, updates should be based on whether or not quality data is being produced across a given network (88 FR 5672, January 27, 2023). Regarding this issue, one commenter recommended that instrument manufacturers be required to evaluate and, if necessary, adjust PM FEMs factory calibrations on an ongoing basis at regular intervals. The EPA notes that while it does not have the authority to require instrument companies to evaluate the quality of data from operating FEMs under 40 CFR part 58, the EPA does routinely participate in conferences and workshops and makes assessments of data quality specific to instrument makes and models publicly available. The EPA also regularly summarizes relevant FRM and FEM data

quality in documents such as the 2022 PA (U.S. EPA, 2022b). Therefore, consistent with the proposal, we are not finalizing any specifics regarding how frequently factory calibrations should be updated but commit to continue to routinely provide information to SLT agencies regarding FEM data quality.

The EPA proposed that the calibration of FEMs could apply to any of the PM FEM method indicators (*i.e.,* PM_{10}, $PM_{2.5}$, and $PM_{10–2.5}$) (88 FR 5670, January 27, 2023). The EPA received only supportive comments. All comments that included a discussion of three PM metrics support their inclusion for calibration of PM FEMs. Therefore, the EPA is finalizing the inclusion of all three PM indicators (*i.e.,* PM_{10}, $PM_{2.5}$, and $PM_{10–2.5}$) as proposed.

The EPA proposed that either all data available or a range of data up to 125% of the 24-hour NAAQS for the PM indicator of interest may be used to establish new factory calibrations, (88 FR 5671–73, January 27, 2023). The EPA received many comments supportive of the proposal and one comment offering a different approach on the range of data to use. One commenter recommends that the EPA should consider using all ''validated'' data because how these instruments behave under normal operating ranges may be just as important as how they behave when monitoring conditions are low or elevated, and that the full range of data should be used when determining the appropriate level of the standard, just as the full range of data is used in determining if an area is attaining the standard. In response to this comment, the EPA believes that making allowances for some flexibilities will increase the likelihood of instrument companies pursuing such improvements. Also, even though there is flexibility, the EPA will still be able to evaluate the appropriateness of a range of concentration data included as part of each application submitted. Also, the EPA notes that in certain circumstances, States do petition the EPA to set aside data under the Exceptional Events Rule (§ 50.14, ''Treatment of air quality monitoring data influenced by exceptional events''). Where approved, exceptional event data are set aside from use in regulatory decisions. Thus, there is a process to set aside certain high concentration data for certain purposes. Therefore, the EPA is finalizing the provision that factory calibrations may be based on a range of valid data as proposed.

The EPA solicited comment on the representative set of geographic locations to use in the calibration of FEMs compared to collocated FEMs (88 FR 5671, January 27, 2023). Most commenters were supportive of the approach of using representative sites in SLT networks from across the country. For example, several commenters provided their support for PM FEM instrument manufacturers to evaluate nationally available valid FRM data to update factory calibrations. Commenters disagreeing with a national geographic approach preferred to allow local solutions to correct data. For example, one commenter suggested having a local or regional option because PM instruments are impacted by, and respond differently to, a variety of local factors, including relative humidity, temperature, concentration levels, and particle composition. The EPA agrees that there are challenges in the response of PM FEMs to a variety of local factors; however, this can be true of many methods and are not specific to PM FEMs and, therefore, does not provide a reason to reject this approach in this instance. Another commenter stated that the proposed national correction factor is a ''flawed concept,'' suggesting that it is ''widely understood throughout the monitoring community that monitors perform best with a local correction factor.'' This commentor offered no record or citation supporting this point. The EPA counters that while monitoring agencies may statistically correct data from a PM continuous monitor for AQI purposes (40 CFR part 58, appendix G), there are both examples of well performing statistically corrected PM continuous monitors being used for AQI purposes; however, without proper attention and updates, there are also examples of poorly performing ones. Finally, another commenter believes that a national correction factor cannot possibly incorporate data to represent all the scenarios across the nation that have an impact on monitor performance and data quality. Although the EPA agrees that there are a variety of local scenarios that could affect monitor performance, the overall benefits of having nationally consistent measurement of PM concentrations and national calibration of data outweigh the potential advantages of locally specific calibrations.

Several commenters also disagreed with using local and regional calibrations of data, including some monitoring agencies that asserted being unable to reinvest in the operation of FRMs that would be required to locally calibrate their own PM FEMs. Further, every approved PM FEM method designated today is effectively calibrated through demonstration of field testing in the areas in which it was required to be tested (40 CFR 53.35(b)(1)). Moreover, the EPA proposed to require instrument manufacturers to demonstrate that they can improve the number of sites meeting bias MQOs by initiating a recalibration of an FEM. Thus, the use of a national set of sites where the methods are operated is essentially a fine-tuning of the PM FEMs performance across all sites where it is used.

After considering all the comments received, the EPA believes it is appropriate to finalize as proposed with a representative set geographic locations at SLT sites to calibrate PM FEMs. Identification of such sites would be made by the applicant of the planned updated calibration, subject to EPA approval, and submitted to the EPA in accordance with the requirements and application instructions in 40 CFR part 58, appendix C, sections 2.2 and 2.7. The EPA encourages early communication between an applicant seeking a method update and the EPA to facilitate the most appropriate sites are included in any updated application of the methods calibration.

The EPA proposed that instrument companies may, but are not required to, check for and exclude any potential outliers that may exist in the validated State, local, and Tribal agency network data available from AQS that would be used to establish new factory calibrations. The EPA received two comments regarding potential outlier approaches. One commenter disagreed with the proposed approach and instead recommended the use of all ''validated'' data, because how these instruments behave under normal operating ranges may be just as important as how they behave when monitoring conditions are low or elevated. The EPA acknowledges this point; however, the proposal on outliers allows flexibility in using standard outlier tests if needed to include or exclude such data as part of the calibration process. Ultimately, the true test of success for an updated method calibration will be that a higher number of sites are meeting bias MQOs in the areas in which the method is used, which will include all routine valid data including any potential outliers. Another commenter asserted concerns with the ability of instrument manufacturers to analyze data within individual monitoring agencies. The EPA disagrees with the commenter because decisions whether to include or exclude outliers should be flexible and made on a case-by-case basis. Moreover, the expected substantially larger dataset from routinely operated collocated FRMs and FEMs compared to what was

used in the original FEM designation testing (§ 53.35 Test procedure for Class II and Class III methods for $PM_{2.5}$ and $PM_{10–2.5}$) will minimize the effect of any potential outliers.

In contrast to these two comments, the EPA received many comments supportive of the proposed outlier approach overall. Therefore, the EPA is finalizing this part of the proposal that instrument companies may, but are not required to, check for and exclude any potential outliers that may exist in the validated State, local, and Tribal agency network data available from AQS that would be used to establish new factory calibrations.

Several commenters offered input on statistical criteria and initial testing requirements for approval of candidate PM FEMs and the role of instrument manufacturers in this process. The EPA did not propose any changes related to these issues; however, these comments have been considered below.

One commenter suggested that data quality objectives, bias, and precision estimators for different monitoring methods should be based on averages at both national and regional levels for purposes of comparison. Another commenter asked to strengthen the criteria for Class 3 Equivalency standards for candidate PM instrumentation. On testing requirements, one commenter recommended that the EPA consider updating the 40 CFR part 53 process for approving FEMs so that the testing process more closely reflects the regulatory deployment and data handling that generates NAAQS-comparable data. Another commenter asked that the results from ''summer'' and ''winter'' field evaluations not be averaged together because it allows agencies to minimize the error of biased instruments by averaging poor results with data often biased in the other direction. The same commenter also recommended that candidate instruments data sets should not be averaged together as is done currently where data from triplicate instruments are averaged for each day. Another commenter asked that the EPA require FEM field comparability tests in the northwest (*e.g.,* in EPA Region 10) in areas where particulate derived from biomass predominates to ensure that certified instruments will perform reliably in regions influenced by these sources. Related to the different measurement principles and the instrument companies' role in PM FEMs, one commenter noted that FEMs may never align perfectly with the FRMs due to the use of different measurement principles. Another commenter asked that manufacturers of FEM instruments be held accountable for ensuring that they continue to meet FEM criteria, whether through calibration updates and/or follow-up evaluations. Another commenter suggested that instrument manufacturers should be required to further evaluate the FEM monitoring data at defined intervals including, but not limited to, the 2-year and 5-year approval anniversaries.

The EPA did not propose to make modifications to the statistical criteria or testing requirements; however, we did solicit comment on any alternatives that would lead to more sites meeting the bias MQO with automated FEMs, especially for those sites that are near the level of the primary annual $PM_{2.5}$ NAAQS as proposed (88 FR 5672–73, January 27, 2023). While the comments requesting that the statistical criteria be strengthened may have merit, doing so would not address the large inventory of already deployed PM FEMs used throughout the country. Also, without performing a detailed Data Quality Objective (DQO) design process, it is unclear how changing one or more statistical criteria would help improve the number of sites meeting the bias MQO now or in the future. Similarly, while the comments asking for changes to the locations of testing may also have merit, the EPA believes this could be a deterrent for instrument manufactures to seek additional improvements since more testing would be required, at least for candidate methods. Regarding the comment on the different measurement principles, the EPA concurs that different measurement principles may never align perfectly. Also, the EPA notes that the Agency has longstanding goals for acceptable measurement uncertainty of automated and manual $PM_{2.5}$ methods in 40 CFR part 58, appendix A, section 2.3.1.1. Therefore, while having different measurement principles align is useful, meeting the goal for acceptable measurement uncertainty is the objective.

Regarding the comments related to the instrument companies' role in PM FEMs, the EPA notes that FEMs are already required to meet 40 CFR 53.9, ''Conditions of designation.'' Specifically, 40 CFR 53.9(c) requires that, ''Any analyzer, PM_{10} sampler, $PM_{2.5}$ sampler, or $PM_{10–2.5}$ sampler offered for sale as part of an FRM or FEM shall function within the limits of the performance specifications referred to in § 53.20(a), § 53.30(a), § 53.35, § 53.50, or § 53.60, as applicable, for at least 1 year after delivery and acceptance when maintained and operated in accordance with the manual referred to in § 53.4(b)(3).'' The EPA does not have the authority to require instrument manufacturers to further evaluate the FEM monitoring data at defined intervals, including but not limited to the 2-year and 5-year approval anniversaries, as one commenter suggested.

In addition to these few recommendations, the EPA received many comments supportive of the proposal that valid State, local, and Tribal air monitoring data from FRMs generated in routine networks and submitted to the EPA may be used to improve the PM concentration measurement performance of approved FEMs; therefore, consistent with the proposal we are not finalizing any updates to the statistical criteria, testing requirements, or requirements on instrument manufactures as proposed.

The EPA proposed that any new factory calibration should be developed using data from at least 2 years and tested on a separate year(s) of data (88 FR 5672, January 27, 2023). Comments on this part of the proposal were generally supportive. One commenter requested that at least a 3-year dataset, rather than the proposed 2 years, be used for a representative design value comparison of the FEM and FRM datasets to be evaluated. Another commenter pointed out that as large a data set as possible should be used, but EPA should not limit it to only data collected by instruments that have operated for more than 2 years.

In response to these comments, the EPA notes the broad support for the proposal as written. Also, the EPA notes that the 2-year period for using data to develop a factory calibration is a minimum, and that more years may be used as appropriate. Therefore, the EPA is finalizing its approach that any new factory calibration should be developed using data from at least 2 years and tested on a separate year(s) of data as proposed.

The EPA proposed several aspects of the FEM calibration on which we did not receive specific comments, including a provision that FEM methods should be evaluated by monitoring agencies as part of routine data assessments, such as during certification of data and 5-year assessments; the fact that the EPA recognizes only data from existing operating sites are available for use in factory calibrations; and recognition that an updated factory calibration does not have to work with the original field study data submitted that led to the designation as an FEM. With the broad general support from commenters summarized above, the EPA is finalizing each of these

individual aspects of the FEM calibration as proposed.

In the proposal, the EPA identified that we should expect a lag between the date when an already designated method is approved with a new factory calibration as an updated method by the EPA and when it can be implemented in the field. The EPA solicited comment on how to approach the data produced during this lag. Commenters provided input not only on how to address data during the lag, but also regarding how to address data already collected prior to a method update that has the potential to be used in regulatory decision making, particularly where such collected data do not meet the bias MQO. In response to this solicitation of comment, there was a consistent recommendation that calibrations of data associated with method updates should be applied to all relevant PM data prior to the EPA using it for designations under a final NAAQS.

While the EPA appreciates these comments and recognizes their support for retroactive data correction, at this time and following this final rule, monitoring agencies should continue to report PM FEM data as measured. This component of this final rule is focused only on revising 40 CFR part 53, appendix C to implement an updated calibration for approved PM FEMs. The issue of how prior and future monitoring data will be used in the implementation of this NAAQS, such as for designations, and for air quality regulatory programs is outside the scope of this rulemaking and will therefore be addressed by the EPA in a subsequent relevant action or actions.

The EPA received comments on whether updates to PM FEM methods should be required to be implemented or there would flexibility in when and if a monitoring agency implemented them. The commenters asked that EPA be flexible in allowing the use of updated method correction factors intended to improve the data comparability between the FRMs and FEMs.

In most cases, the EPA expects that updating the FEMs will result in improved data quality and more sites meeting bias MQOs; however, the EPA is not finalizing an update requirement in this action. Monitoring agencies can assess their data and make decisions on an update based on whether they are meeting the bias MQOs. Such decisions on whether or not to update a method may efficiently be included in those agencies' annual monitoring network plans under 40 CFR 58.10, ''Annual monitoring network plan and periodic assessment,'' which are already subject to EPA Regional office approval. In some circumstances, it is possible the original PM FEM may be revised in a manner where only the updated method has an active approved designation. In these cases, monitoring agencies would need to address updating their PM FEM in a timely manner.

The EPA solicited input on any alternative approaches that could lead to more sites meeting the bias MQO with automated PM FEMs, especially for those sites that are near the level of the primary annual $PM_{2.5}$ NAAQS as proposed to be revised in section II above. A few commentors provided input on potential options for alternative approaches and several others offered input on how a local or regional calibration of an FEM could work. Among alternative approaches, one commenter suggested that manufacturers of FEMs could provide settings that would allow for adjustments to make FEM data more ''FRM-like.'' Another commenter suggested working with the manufacturers of FEM equipment to diagnose the cause of the bias and then to address it appropriately.

The EPA received several comments on how to implement a local or regional calibration of FEMs. One commenter suggested that EPA could allow for SLT agencies to adjust FEM data to be more ''FRM-like'' prior to submitting data to AQS. Another commenter suggested using a rolling 3-month linear regression based on a comparison of FEM data to $PM_{2.5}$ levels measured by a 1-in-6-day FRM. Another commenter recommended that the EPA allow the application of a correction factor that is from an area with a similar climate and other conditions. Another commenter suggested that, for metropolitan statistical areas (MSAs) where the re-calibrated FEMs still do not meet equivalency criteria, monitoring agencies should be able to use the rolling linear regression technique to further calibrate the FEMs within an MSA. Another commenter suggested that developing a simple linear regression could establish the relationship between FEM data and FRM data and be used to adjust the FEM data at each site where they are collocated. Another commenter suggested that averaging the results within a MSA and applying it on an MSA basis with the previous 2 years of data could provide an adjustment method for sites without a collocated FRM. Another commenter identified that a regional correction factor potentially could improve instrument accuracy to biomass sources, which are a large component of PM in many communities.

Among the alternative approaches suggested, having settings that would allow for adjustments to make FEM data more ''FRM-like'' has merit, but assuming this was within a PM FEM itself, it would need to be separately incorporated into each make and model of FEM. If EPA were to pursue this alternative approach, the suggestion could be incorporated into a future regulatory action as a potential condition of designation because, without having the opportunity to thoughtfully consider how every step of such an approach would need to work, including what such requirements would look like and how potential settings adjustments would be made, it is not appropriate for the EPA to require the availability of such settings now, nor would it address the inventory of currently available PM FEMs already operating.

Regarding the suggestion that the EPA and SLTs should work with the manufacturers of FEM equipment to diagnose the cause of any biases and then to address them appropriately, the EPA supports this recommendation, but does not believe a regulatory change is required to allow the monitoring community (EPA and SLTs) to work with instrument manufacturers in this way.

Regarding the several comments on how to implement a local or regional calibration of FEMs, the EPA acknowledges the desire for this flexibility but believes that any such provisions for local or regional calibration of FEMs would need to be thoroughly thought out and proposed for consideration across the monitoring community. While several commenters support such an approach, the EPA also received adverse comments on the potential for local and regional calibration of PM FEMs instead of national. Most of the criticism of local and regional calibration of PM FEMs centered on both the lack of existing operating PM FRMs in commenters' networks and monitoring agencies' inability to staff the higher number of operating FRMs that would have to be collocated with PM FEMs to calibrate. Thus, the commenters that oppose local and regional calibrations of data prefer to utilize the national calibration of FEM data as proposed. Acknowledging all of these viewpoints, the EPA believes that it would not be appropriate to institute such an approach at this time. As discussed throughout this section, this final rule, the EPA is embarking on a new national approach to calibration of FEMs where valid State, local, and

Tribal air monitoring data from FRMs generated in routine networks and submitted to the EPA may be used to improve the PM concentration measurement performance of approved FEMs. The EPA and the community of SLT monitoring agencies can further consider other solutions to improving PM FEM methods, including local and regional scale calibration of FEMs, in a future review of the PM NAAQS.

In summary, the EPA is finalizing its proposal to allow valid State, local, and Tribal air monitoring data from PM FRMs and FEMs generated in routine networks and submitted to the EPA to update factory calibrations included as part of approved FEMs (40 CFR part 58, appendix C, sections 2.2 and 2.7). This approach, which will typically be initiated by instrument manufacturers but can also be spurred by monitoring agencies, MJOs of monitoring agencies, and the EPA itself, is to be implemented as a national solution in factory calibrations of approved FEMs through a firmware update, subject to EPA approval. FEM calibrations can apply to any PM FEM methods (*i.e.,* PM_{10}, $PM_{2.5}$, and $PM_{10-2.5}$). As part of this process, the EPA is finalizing that a range of data based on the most representative concentrations up to all available concentrations may be used in developing and testing a new factory calibration; that a representative set of geographic locations can be used; that outliers may be included or not included; that a new factory calibration should be developed using data from at least 2 years and tested on a separate year(s) of data; that updates to factory calibrations can occur as often as needed and should be evaluated by monitoring agencies as part of routine data assessments such as during certification of data and 5-year assessments; that the EPA recognizes only data from existing operating sites is available; and that an updated factory calibration does not have to work with the original field study data submitted that led to the designation as an FEM. The EPA is finalizing this approach as proposed with the intention of having more sites meet the bias MQOs with automated PM FEMs.

4. Revisions to the $PM_{2.5}$ Monitoring Network Design Criteria To Address At-Risk Communities

To enhance protection of air quality in communities subject to disproportionate air pollution risk, particularly in light of the proposed range for a revised primary annual $PM_{2.5}$ standard, the EPA proposed to modify the $PM_{2.5}$ monitoring network design criteria to include an environmental justice (EJ) factor that accounts for proximity of at-risk populations (*i.e.,* those identified in the 2019 ISA and ISA Supplement as being at increased risk of adverse health effects from $PM_{2.5}$ exposures to sources of concern), consistent with the statutory requirement that the NAAQS protect the health of at-risk populations (88 FR 5673, January 27, 2023). Specifically, the EPA proposed to modify the existing requirement at 40 CFR part 58, appendix D, section 4.7.1(b)(3)): ''For areas with additional required SLAMS, a monitoring station is to be sited in an area of poor air quality,'' to additionally address at-risk communities with a focus on anticipated exposures from local sources of emissions. The scientific evidence evaluated in the 2019 ISA and ISA Supplement indicates that sub-populations at potentially greater risk from $PM_{2.5}$ exposures include children, lower socioeconomic status (SES) [188] populations, minority populations (particularly Black populations), and people with certain preexisting diseases (particularly cardiovascular disease and asthma). The EPA proposed that communities with relatively higher proportions of sub-populations at greater risk from $PM_{2.5}$ exposure within the jurisdiction of a State or local monitoring agency should be considered ''at-risk communities'' for these purposes.

The $PM_{2.5}$ network design criteria have led to a robust national network of $PM_{2.5}$ monitoring stations. These monitoring stations are largely in Core-Based Statistical Areas (CBSAs) [189] across the country that include many $PM_{2.5}$ monitoring sites in at-risk communities. Many of the epidemiologic studies evaluated in the 2019 ISA and ISA Supplement, including those that provide evidence of disparities in $PM_{2.5}$ exposure and health risk in minority populations and low-SES populations, often use data from these existing $PM_{2.5}$ monitoring sites. However, we anticipate that with the more protective annual NAAQS finalized in section II above, characterizing localized air quality issues around local emission sources may become even more important. The EPA believes that adding a network design requirement to locate monitors in at-risk communities will improve our characterization of exposures for at-risk communities where localized air quality issues may contribute to air pollution exposures. Requiring that $PM_{2.5}$ monitoring stations be sited in at-risk communities will allow other methods to be operated alongside $PM_{2.5}$ measurements to support multiple monitoring objectives per 40 CFR part 58, appendix D, section 1.1. The EPA believes that it is appropriate to formalize the monitoring network's characterization of $PM_{2.5}$ concentrations in communities at increased risk to provide such areas with the level of protection intended with the $PM_{2.5}$ NAAQS. The addition of this requirement will also lead to enhanced local data that will allow air quality regulators help communities reduce exposures and inform future implementation and reviews of the NAAQS.

The EPA received comments concerning the proposed requirement to modify the $PM_{2.5}$ monitoring network design criteria to include an EJ factor that accounts for the proximity of populations at increased risk of adverse health effects from $PM_{2.5}$ exposures to sources of concern. Commenters included State, local, and Tribal air agencies and multijurisdictional organizations (MJOs) comprised of those agencies; industry and industry groups; other Federal, State, and local government entities; public health, medical, and environmental nongovernmental organizations (NGOs); and private citizens. The EPA proposed to require that sites located in at-risk communities (particularly those whose air quality is potentially affected by local sources of concern) should nonetheless meet the requirements to be considered representative of ''areawide'' air quality as this is consistent with all other minimally required sites. There were several other technical components of the proposed requirement for which we asked for comment, including: how to identify at-risk communities; the PM sources of concern important to consider; the datasets that can be used to identify communities with high exposures; the most useful measurement methods to collocate with $PM_{2.5}$ in at-risk communities; and the timeline to implement any new or moved sites.

Overall, most commenters were very supportive of the EPA's proposed modification to the $PM_{2.5}$ monitoring

[188] SES is a composite measure that includes metrics such as income, occupation, and education, and can play a role in populations' access to healthy environments and healthcare.

[189] Metropolitan and Micropolitan Statistical Areas are collectively referred to as ''Core-Based Statistical Areas.'' Metropolitan statistical areas have at least one urbanized area of 50,000 or more population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties. Micropolitan statistical areas are a set of statistical areas that have at least one urban cluster of at least 10,000 but less than 50,000 population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties.

network design criteria to include an EJ factor that accounts for proximity of populations at increased risk of adverse health effects from $PM_{2.5}$ exposures to sources of concern. A few commenters offered detailed supporting comments. For example, one commenter recommended targeting investment in regulatory monitors in EJ communities, opining that there is presently a lack of equitable distribution of these monitors in low-income and minority communities. Another commenter supports the inclusion of an EJ factor in $PM_{2.5}$ monitoring network design criteria as a means to assess whether disparities in exposure are reduced in the future. The EPA appreciates the support for the proposed requirement and acknowledges the desirability of a goal to assess if disparities in exposure are reduced in the future as a result of these monitoring efforts.

Some commenters were generally supportive of the proposed requirement but suggested that the EPA should recast the approach in a more specific way or offered additional examples of sources of concern. For example, one commenter stated that $PM_{2.5}$ emissions from residential and commercial wood burning result in localized hotspots that are often not revealed by community air monitoring. Another commenter asked that the EPA adopt a strategy to monitor EJ communities near both larger well-known point sources of $PM_{2.5}$ and along traffic corridors as well as smaller sources that, when taken together, may create a large amount of emissions and health harms in the area. Another commenter stated that the national network of monitors operated by the EPA captures data used for generalized modeling, but overall monitoring is not as granular as one would expect, especially in urban areas. For instance, the commenter suggested that EPA could monitor suspected ''hot spots'' (*e.g.,* residential development adjacent to highways and active construction sites) to better manage and mitigate $PM_{2.5}$ pollution at their sites of origin, and that more extensive and granular monitoring data would also facilitate essential research and inform future evaluations and adjustments of the NAAQS. The EPA acknowledges these comments identifying other sources of concern, and we address these and other potential sources of concern below.

Among adverse comments, a few commenters stated that ''at-risk communities'' is not well defined. The EPA disagrees and directs those commenters to the numerous places where this definition is covered, including in Section II.B.2 of the proposal where we explained the term related to a variety of at-risk populations (88 FR 5591–92, January 27, 2023) as well as section 12.5 of the 2019 ISA (U.S. EPA, 2019a) and section 3.3.3 of the ISA Supplement (U.S. EPA, 2022a). Other commenters oppose the addition of the proposed monitoring because they feel it would reduce flexibility for agencies in deciding where they should site monitors, advocating that monitoring agencies should be afforded maximum flexibility to identify where to site monitors for at-risk areas. Because the EPA recognizes the challenges cited by these commenters related to establishing new ambient air monitoring stations, the EPA is finalizing the modified requirement on $PM_{2.5}$ monitoring network design criteria intended to address at-risk communities that allows flexibility regarding which EJ communities should be monitored. Finally, one commenter asked that the EPA clarify a specific metric to judge how to site monitors in at-risk communities. Instead, the EPA believes it is appropriate for agencies to recommend what they believe to be the most important things to consider for their sites to meet the $PM_{2.5}$ network design requirements and, thus, applying a new metric could take away from local priorities for at-risk communities.

A few commenters asked that the EPA require more monitoring than proposed. One commenter stated that it would be more beneficial to overburdened communities if air monitoring were required in all at-risk communities. A few commenters asked that EPA require additional monitoring for attainment of $PM_{2.5}$ NAAQS in EJ communities. In response to these comments, the EPA supports the SLT agencies' initiatives to conduct additional monitoring beyond the minimum monitoring requirements and network design criteria. In addition, the EPA supports agencies' use of alternative datasets such as sensors and sensors networks, satellites, and other non-regulatory monitoring where appropriate for non-regulatory data uses. The EPA notes that many monitoring agencies already operate more monitoring sites than are minimally required, and we expect this to continue as agencies consider siting monitors in at-risk communities.

However, the EPA also received substantial concerns from monitoring agencies about their resource constraints, including staffing to support any potential new monitoring. The EPA also notes that the existing and robust network of almost 1,000 $PM_{2.5}$ sites nationally is designed to continue to protect all populations at the level of the NAAQS discussed in section II of this final action by always having at least one site in the area of expected maximum concentration for each CBSA where monitoring is required. As a result of the revisions to the annual $PM_{2.5}$ NAAQS being finalized in this action, a small number of new monitoring sites will also be required under EPA's current minimum monitoring requirements. With the monitoring network design changes finalized in this rule, many of these existing and new sites will form an important sub-component of the $PM_{2.5}$ network by better characterizing air quality in at-risk communities, particularly with respect to sources of concern.

The EPA concludes that the requirements in this final rule for siting of monitoring in at-risk communities will meaningfully improve the $PM_{2.5}$ monitoring network and its characterization of air quality in at-risk communities, without placing substantial new resource burdens on States and their monitoring agencies that would be associated with requirements for additional monitoring sites. Therefore, the EPA is finalizing this part of the proposed action without requiring additional monitoring sites beyond what would be associated with the revised annual $PM_{2.5}$ NAAQS described in section II as they pertain to the minimum requirements associated with Table D–5 of Appendix D to Part 58—$PM_{2.5}$ Minimum Monitoring Requirements.

A few commenters asked that the EPA enhance monitoring in smaller cities and rural areas. One commenter asked for the EPA to extend the proposed monitoring network to Micropolitan Statistical Areas with populations of 10,000–50,000 and to rural areas. Another commenter pointed out that current air quality monitoring networks focus on urban and densely populated areas; therefore, rural areas are often not captured in this existing monitoring infrastructure, despite well-documented examples of high PM concentration in rural communities. The commenter believes this results in inadequate assessment of air pollution exposures for a substantial segment of the U.S. population. The EPA disagrees that there needs to be additional requirements for small CBSA's and rural areas. Regarding these comments, the EPA points out that we have a long-standing requirement for each State to monitor at background and transport sites (40 CFR part 58, appendix D, section 4.7.3—Requirement for $PM_{2.5}$ Background and Transport Sites). Also, if an agency deems it appropriate to do so, monitoring coverage of rural areas can be accomplished with other tools

such as sensors and sensors networks, satellites, and other non-regulatory monitoring. Although there may be short-term high exposures in rural areas, there is no evidence that long-term averages are higher in rural areas compared to urban areas with significantly higher density of populations and emissions. For smaller cities or rural areas that may have concentrations near the level of the $PM_{2.5}$ NAAQS finalized in section II above, monitoring agencies are encouraged to monitor and address emissions as appropriate.

Some commenters disagree that the proposed revision to the $PM_{2.5}$ monitoring network design criteria to address at-risk communities is needed. One commenter stated that including an EJ factor is not necessary because the current network is designed to protect all citizens. Another commenter stated that EJ factors could be cumbersome to implement. Another commenter asserted the proposal to add SLAMS in at-risk communities with higher $PM_{2.5}$ concentrations might create more granular data and provide for a greater margin of safety for those communities and monitors in such a way that data from those areas could misrepresent the larger area represented by the network. In response to the comment on the current network protecting all citizens, the EPA agrees that by measuring in the community with the highest concentration of $PM_{2.5}$ we protect other citizens; however, as stated in the proposal, the EPA believes that adding a requirement for sites with an EJ factor near sources of concern will enhance the overall network to the benefit of all citizens. Also, we anticipate that with the more protective annual NAAQS finalized in section II above, characterizing localized air quality issues will become even more important around local emission sources. As for EJ factors being cumbersome to implement, the EPA disagrees because there are many such locations already operating successfully in the current network. Regarding the comment that sites in at-risk communities may misrepresent the larger area represented by a particular network, the EPA notes that pursuant to 40 CFR part 58, minimally required sites in a given network are to represent area-wide air quality; therefore, sites in at-risk communities, by definition, would be representative of the communities within the network in which they are sited for the level of protection intended under the annual $PM_{2.5}$ NAAQS.

In the proposal, the EPA identified that, in light of the evidence of increased risk to at-risk communities, it would be appropriate to better characterize exposures for communities in proximity to local sources of concern (88 FR 5673–76, January 27, 2023). Thus, the EPA proposed that enhanced networks should include representation of at-risk communities living near emission sources of concern (*e.g.,* major ports, rail yards, airports, industrial areas, or major transportation corridors). The EPA requested comment on the types of sources of concern most important to consider. In addition to supporting the types of sources the EPA identified in the proposal, commenters also identified several additional localized sources such as railroads, stationary sources, transportation facilities, and communities with high numbers of wood stoves.

A few commenters suggested the inclusion of sources that are often considered line and/or area sources, *e.g.,* traffic corridors and emissions from federally regulated facilities, military installations, and national forests. Commenters also identified other sources usually associated with long-range transport such as smoke from wildfire and prescribed fires and long-distance transport of PM, for example from Saharan dust and other international transport. As explained in the proposal, the site with the highest expected $PM_{2.5}$ is already required to have a monitor by our long-standing requirement that monitors be placed ''. . . in the area of expected maximum concentration'' (§ 58.1 and appendix D, section 4.7.1(b)(1)). The EPA expects that both sites with the expected maximum concentration and sites specifically placed in at-risk communities would be impacted by any long-range transport in the area. Therefore, the EPA believes any emphasis on the sources of concern should prioritize localized sources, including point, area, and line sources of concern impacting the at-risk community of interest. Therefore, based upon the comments, the EPA is finalizing a broader example list of sources of concern to include localized sources such as point sources and transportation facilities, since these are the most commonly expected additional sources of concern. In response to the other sources of concern suggested by commenters, the EPA notes that while it has provided examples, the siting of monitors in EJ communities would not be limited to these examples. Thus, the revised set of examples would include ''a major industrial area, point source(s), port, rail yard, airport, or other transportation facility or corridor.'' In finalizing this modified list of examples, the EPA is not looking to prioritize one type of source category over another; rather, we intend to further illustrate the types of localized sources of pollution that might impact at-risk communities such that the siting of monitors nearby may be appropriate.

One commenter noted that the proposal may have unintentionally taken out the requirement related to specific design criteria for $PM_{2.5}$ in 40 CFR part 58, appendix D, 4.7.1(b)(3) that, for an area with a requirement for an additional SLAMS monitor, it should ''be sited in an area of poor air quality.'' Thus, the language as proposed neither requires that such monitors be sited in areas of poor air quality, nor does it require that the monitor be sited in an area that is anticipated to experience poor air quality from unspecified (and thus potentially relatively insignificant) sources in the area. The EPA agrees that this was not our intention; the EPA wants to protect populations in at-risk communities by ensuring they are protected by the NAAQS when there are sources of concern that may be impacting them (*i.e.,* not insignificant sources). Thus, the EPA is reinstating this requirement in the network design language and combining it with the examples of the types of localized sources of concern: ''For areas with additional required SLAMS, a monitoring station is to be sited in an at-risk community with poor air quality, particularly where there are anticipated effects from sources in the area (*e.g.,* a major industrial area, point source(s), port, rail yard, airport, or other transportation facility or corridor).''

To ensure minimally required monitoring sites appropriately represent exposures in at-risk communities, the EPA proposed that sites represent ''area-wide'' air quality near local sources of concern (88 FR 5674, January 27, 2023). Sites representing ''area-wide'' air quality are those monitors sited at neighborhood, urban, and regional scales, as well as those monitors sited at either micro- or middle-scale that are identified as being representative of many such locations in the same Metropolitan Statistical Area (MSA).[190] Most existing—as well as new or moved sites—are expected to be neighborhood-scale, which means that the monitoring stations would typically represent conditions throughout some reasonably homogeneous urban sub-region with dimensions of a few kilometers per part 58, appendix D, section 4.7.1(c)(3). Additionally, as described in § 58.30,

[190] MSA means a CBSA associated with at least one urbanized area of 50,000 population or greater. The central-county, plus adjacent counties with a high degree of integration, comprise the area.

sites representing ''area-wide'' air quality have a long-standing applicability to both the annual and 24-hour $PM_{2.5}$ NAAQS. Our proposed requirement for siting monitors in communities representing ''area-wide'' air quality is consistent with other network design objectives pursuant to which we seek to have monitors located where people live, work, and play.

The EPA received a few comments on its proposed requirement that minimally required sites represent ''area-wide'' air quality. One commenter stated that the inclusion of a provision for EJ would narrow the location of monitors to certain communities that may not best represent ''areawide'' air quality. Another commenter asked the EPA to consider removing requirements that sites be area-wide, since 24-hour and annual averaging times would miss short, elevated pollution events. A couple commenters had concerns with the difference in the scale of representation between EJ monitors using small scale and other NAAQS monitors using area-wide scale, in that area-wide scale would not protect those most at risk. However, another commenter agreed with the EPA that sites representing at-risk communities should represent area-wide air quality. In addition to these comments, the EPA received many comments with support for its proposed modifications to the network design criteria as whole.

Regarding whether narrowing the location to certain communities may not best represent ''area-wide'' air quality, the EPA notes that sites are either identified as being area-wide or not; the EPA did not suggest it was seeking a best ''area-wide'' location. In response to the comment that area-wide site may miss short, elevated pollution events, the EPA is aware that there can be local, short-term spikes in $PM_{2.5}$ concentrations. However, the network design criteria associated with minimally required sites is applicable to both the annual and 24-hour $PM_{2.5}$ NAAQS, and the EPA believes it is appropriate to continue to ensure all minimally required sites have the most utility and remain applicable to both forms of the $PM_{2.5}$ NAAQS. The identification of unique micro- and middle-scale sites was directed at discretionary efforts of any monitoring agency, with the recognition that such sites, (*i.e.,* relatively unique micro-scale, or localized hot spot, or unique middle-scale impact sites), are not applicable to the annual NAAQS as described in § 58.30—Special consideration for data comparison to the NAAQS.

After considering all the comments on this topic, the EPA is finalizing this part of the modification to the network design criteria to maintain, consistent with our long-standing network design criteria, that all minimally required sites are to represent area-wide air quality.

In addition to using data from the robust network of almost 1,000 $PM_{2.5}$ sites for NAAQS and AQI purposes, having a stable network of long-term sites is especially valuable to examine trends and to inform long-term health and epidemiology studies that support reviews of the PM NAAQS. Therefore, while we proposed to add a $PM_{2.5}$ network design criterion to address at-risk communities, many sites are likely already in valuable locations meeting one of the existing network design criteria (*i.e.,* being in an area-wide area of expected maximum concentration or collocated with near-road sites) and supporting multiple monitoring objectives. Also, in many communities, there may already be sites meeting the network design criterion we proposed for at-risk communities. Thus, acknowledging the value of having long-term data from a consistent set of network sites, the EPA believes that moving sites should be minimized, especially in MSAs with a small number of sites. However, because a small number of new sites are expected to be required due to the existing minimum monitoring requirements (40 CFR part 58, appendix D, Table D–5) [191] and the revised primary annual $PM_{2.5}$ NAAQS detailed in section II, and because sites occasionally have to be moved—due to, for example, loss of access to a site or a site no longer meeting siting criteria—the EPA believes it is appropriate to prioritize establishing sites in at-risk communities near sources of concern, whenever new sites are established, whether because it is a new site or a replacement for a prior site that must be moved. The EPA accordingly proposed that annual monitoring network plans (40 CFR 58.10(a)(1)) and 5-year assessments (40 CFR 58.10(d)) that include any of the few new sites that will be required include a commitment to examine the ability of existing and proposed sites to support air quality characterization for areas with at-risk populations in the community and the objective discussed herein.

In the proposal, the EPA identified that assessing and prioritizing at-risk communities for monitoring can be accomplished through several approaches (88 FR 5675). The most critical aspect of prioritizing which communities to monitor is their representation of the at-risk populations described earlier in this section. The other major consideration is whether the community is near a source or sources of concern. While many CBSAs have one or more sources of concern described above, some CBSAs will not have a quantity of emissions from sources of concern that result in an elevated level of measured $PM_{2.5}$ concentrations in surrounding communities. The siting criteria to be ''in the area of expected maximum concentration,'' § 58.1 & appendix D, section 4.7.1(b)(1) ensures there is a monitoring site in the community with the highest exposure in each CBSA with a monitoring requirement. Some CBSAs may also have a requirement to collocate a $PM_{2.5}$ monitor at a near-road NO_2 station. Therefore, the EPA believes that for cases where an additional $PM_{2.5}$ site is required, we should include a criterion that the site be in an at-risk community when there are no sources of concern identified in that CBSA, or such sources do exist but are not expected to lead to elevated levels of measured $PM_{2.5}$ concentrations.

In its proposal, the EPA highlighted that tools such as the EPA's EJSCREEN [192] are available to identify the at-risk communities intended for monitoring as part of the proposed revision to the $PM_{2.5}$ network design criteria (88 FR 5675–76, January 27, 2023). The EPA solicited comment on other tools and/or datasets that can be utilized to identify at-risk communities. In addition to support for using EJSCREEN, commenters identified several other options to identify at-risk communities intended for monitoring as part of the proposed revision to the $PM_{2.5}$ network design criteria. Among similar tools, one commentor suggesting using CalEnviroScreen.[193] Commenters also identified different options for models including InMAP,[194] satellite-derived models that can be employed to help identify EJ communities, and hybrid models. A few commenters also suggested using sensors and sensor networks such as the BlueSky [195] and PurpleAir [196] sensors.

The EPA supports the use of other State and local tools designed to help identify the at-risk communities that

[191] Gantt, B. (2022). Analyses of Minimally Required $PM_{2.5}$ Sites Under Alternative NAAQS. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

[192] See: *https://www.epa.gov/ejscreen.*

[193] See: *https://oehha.ca.gov/calenviroscreen.*

[194] See: *https://inmap.run/#home.*

[195] Mention of commercial names does not constitute EPA endorsement.

[196] Mention of commercial names does not constitute EPA endorsement.

should be monitored to meet the revised network design criteria. The EPA additionally agrees with commenters that the use of models as well as sensors and sensor networks may be appropriate and helpful in identifying the most appropriate at-risk communities in which to locate monitors.

For at-risk communities, monitoring agencies need data that can best inform where there may be elevated levels of exposures from sources of concern. While we use FRMs and FEMs to determine compliance with the NAAQS, data from these methods will only be available at existing sites. However, there are several additional datasets available that may be useful in evaluating the potential for elevated levels of exposure to communities near sources of concern. In the proposal, EPA identified potential non-regulatory monitoring datasets such as CSN, IMPROVE, and AQI non-regulatory $PM_{2.5}$ continuous monitors; modeling data that utilizes emission inventory and meteorological data; emerging sensor networks such as those that comprise EPA and the USFS's Fire and Smoke Map;[197] and satellites that measure radiance and, with computational algorithms, can be used to estimate $PM_{2.5}$ from aerosol optical depth (AOD) (88 FR 5675–76, January 27, 2023). The EPA solicited comment on datasets most useful to identify communities with high exposures for $PM_{2.5}$ NAAQS (*i.e.,* annual or 24-hour). In addition to providing information about datasets that can inform the NAAQS comparison, commenters additionally identified several types of datasets that may be useful to identify where there may be elevated levels of exposures from sources of concern. These datasets include satellite measurements, sensors, and sensor network data, which may all be useful to find hot spots in communities. Commenters also identified EJScreen and CalEnviroScreen, which are screening and mapping tools that utilize several datasets. Another commenter stated that to better understand exposure differences in disadvantaged communities, shorter measurement intervals should be measured and reported.

In considering the datasets identified in the proposal as well as the ones commenters provided, the EPA believes all the datasets have value to help inform where there may be elevated levels of exposures from sources of concern. However, each of them may also have limitations and, therefore, users should be careful not to rely solely on one dataset versus another for all purposes. Fortunately, many of the available datasets are becoming easier to work with and more accessible, which will allow interested parties and monitoring agencies the opportunity to efficiently review the datasets and determine best applicability. For all of these reasons, the EPA is not finalizing a requirement to use a specific dataset or tool to identify at risk communities; however, whatever datasets a monitoring agency elects to use, its plan to use such data for purposes of meeting the network design requirements will be subject to EPA approval as part of the 40 CFR 58.10 annual monitoring network plan. Regarding the comment recommending shorter measurement intervals in measuring and reporting data to better understand exposure differences in disadvantaged communities, the EPA agrees and generally supports use of continuous methods. While we generally support use of continuous methods, approved filter-based technologies and methods also provide valuable air quality information. Therefore, the EPA is not requiring the use of automated continuous methods beyond what is already required in 40 CFR part 58, appendix D, section 4.7.2—Requirement for Continuous $PM_{2.5}$ Monitoring.

The monitoring methods appropriate for use at required $PM_{2.5}$ sites in at-risk communities are FRMs and automated continuous FEMs (88 FR 5675–76, January 27, 2023). These are the methods eligible to compare to the $PM_{2.5}$ NAAQS, which is the primary objective for collecting this data. There are several other monitoring objectives that would benefit from the use of automated continuous FEMs. For example, having hourly data available from automated continuous FEMs would allow sites to provide data in near-real time to support forecasting and near real-time reporting of the AQI. Automated continuous methods are also useful to support evaluation of other methods such as low-cost sensors. When used in combination with on-site wind speed and wind direction measurements, automated FEMs can provide useful pollution roses, which help in identifying the origin of emissions that affect a community. Additionally, when collocated with continuous carbon methods such as an aethalometer, automated FEMs can help identify potential local carbon sources contributing to increased exposure in the community. While either FRMs or automated FEMs may be used at a site for comparison to the $PM_{2.5}$ NAAQS, the EPA supports use of automated continuous FEMs at sites in at-risk communities.

The EPA requested comment on the measurement methods most useful to collocate with $PM_{2.5}$ in at-risk communities (88 FR 5675–76, January 27, 2023), and a few commenters provided input. One commenter recommended that the EPA should employ supplemental technologies and systems to increase coverage of the regulatory monitoring network and obtain more complete data to further protect public health and address environmental injustice in air pollution exposure. Another commenter recommended that the EPA invest in community-led monitoring and mobile air quality monitoring with a goal of recording block-level variabilities in data. And another commenter cited the value of community-deployed $PM_{2.5}$ monitoring.

The EPA appreciates the comments provided on the measurement methods most useful to collocate with $PM_{2.5}$ monitoring sites in at-risk communities. Because the use of methods beyond the required $PM_{2.5}$ FRMs or FEMs or other criteria pollutant measurements meeting a NAAQS monitoring requirement is voluntary, the establishment of $PM_{2.5}$ NAAQS comparable sites in at-risk communities will allow for collaboration at multiple levels. The EPA strongly encourages such collaboration with impacted communities, and the measurement methods discussed here should be considered for use as appropriate.

In the proposal, the EPA identified that, to meet the revised network design criteria, there will be only a few new sites required,[198] plus any potentially moved sites in cases where an existing site lease is lost or otherwise requires relocation (88 FR 5675–76, January 27, 2023). To handle these new or relocated sites, the EPA proposed to build upon our existing regulatory process for selecting and approving these sites under 40 CFR 58.10 (88 FR 5676, January 27, 2023). In the proposal, we stated it would be appropriate to provide at least 12 months from the effective date of the final rule to allow monitoring agencies to initiate planning to implement these measures by seeking input from communities and other interested parties and considering whether to revise their $PM_{2.5}$ networks

[197] See: *https://fire.airnow.gov/.*

[198] Gantt, B. (2022). Analyses of Minimally Required $PM_{2.5}$ Sites Under Alternative NAAQS. Memorandum to the Rulemaking Docket for the Review of the National Ambient Air Quality Standards for Particulate Matter (EPA–HQ–OAR–2015–0072). Available at: *https://www.regulations.gov/docket/EPA-HQ-OAR-2015-0072.*

or explain how their existing networks meet the objectives of the proposed modification to the network design criteria. Thus, the EPA proposed that monitoring agencies should address their approach to the question of whether any new or moved sites are needed and identify the potential communities in which the agencies are considering adding monitoring, if applicable, as well as identifying how they intend to meet the revised criteria for $PM_{2.5}$ network design to address at-risk communities in the agencies' annual monitoring network plans due to each applicable EPA Regional office no later than July 1, 2024 (see 40 CFR 58.10). Specifics on the resulting new or moved sites for $PM_{2.5}$ network design to address at-risk communities were proposed to be detailed in the annual monitoring network plans due to each applicable EPA Regional office no later than July 1, 2025 (40 CFR 58.10). The EPA proposed that any new or moved sites would be required to be implemented and fully operational no later than 24 months from the date of approval of a plan or January 1, 2027, whichever comes first, but the EPA solicited comment on whether less time is needed (*e.g.,* 12 months from plan approval and/or January 1, 2026).

The EPA received a few comments on its proposed timeline for monitoring agencies to identify, propose, and ultimately bring any new or moved sites online. One commenter asked that the timeline give states more time to start or move sites. A few commenters asked that the EPA only require meeting a timeline for identifying whether any new or moved sites are needed after the EPA has provided the monitoring agencies with guidance on the priority of the potential at-risk communities. One of those commenters further requests that the EPA allow at least 24 months from the date of approval of a § 58.10 monitoring plan identifying any relocation of monitoring sites or establishment of new monitoring sites to implement any changes to the network, citing the need for more time to work with local officials, procure monitoring equipment, and contract for services, all of which can cause significant delays in establishing a monitoring site. Another commenter asked that the EPA remain attentive to the challenges that States, and air agencies face regarding recruiting and retaining the specialized staff needed to support their existing regulatory monitoring networks and the capital resources needed to implement and sustain new monitoring stations in areas that are clearly meeting the existing PM NAAQS or any revised PM NAAQS. Another commenter stated that the July 1, 2024, timeline for a network evaluation this complex is insufficient, noting that they submit their draft annual monitoring network plan for public review and comment in mid-April for 30 days. Because the final plan is due July 1 and must include all comments and responses and describe any changes based on those comments, the timeline does not take these requirements into consideration by allowing for the more extensive assessment of changes that may be needed to meet the proposed new monitoring requirements. The commenter stated that it would be appropriate to provide at least 12 months from the effective date of this final rule for monitoring agencies to initiate planning to implement these measures, seek input, consider revisions to their $PM_{2.5}$ networks, and explain how their existing networks meets the objectives of the final rule. The commenter notes that that SLT agencies should be provided a minimum of 18 months after the final recommendation is published to add this information to their § 58.10 annual monitoring network plans. Another commenter encourages the EPA to retain the proposed deadline for any newly required monitoring stations in at-risk communities to be operational (*i.e.,* 24 months after the July 2025 network plan approval or January 1, 2027, whichever is earlier). While the need for this data is urgent, the commenter stated that the process for procuring instrumentation, securing leases, and building permits, and other logistics in constructing new monitoring sites can take a significant amount of time, some of which are outside of agencies' control.

As stated earlier, the EPA received strong support for our proposal to modify the $PM_{2.5}$ monitoring network design criteria to include an EJ factor that accounts for proximity of populations at increased risk of adverse health effects from $PM_{2.5}$ exposures to sources of concern from a wide range of commenters. A few commenters support the timeline proposed, a few others support starting any new or moved sites sooner than proposed, while other commenters asked for more time or offered conditions regarding how to establish an appropriate timeline.

The EPA disagrees with the commenter that suggested the EPA should only require agencies to meet a timeline to identify whether any new or moved sites are needed after the EPA has provided the monitoring agencies with guidance on the priority of the potential at-risk communities, because the regulatory text provides all the guidance required for agencies to begin this process. As we explained above, the EPA does not anticipate that many new or moved sites will be required based on the final rule because we think most sites are already in suitable locations and long-term sites are highly valued. Also, monitoring agencies have discretion to provide to the EPA their recommendations regarding how they intend to meet the modifications to the $PM_{2.5}$ monitoring network design criteria to include an EJ factor that accounts for proximity of populations at increased risk of adverse health effects from $PM_{2.5}$ exposures to sources of concern. Overall, the EPA believes that having sites in the areas of expected maximum concentrations will best ensure that all communities are protected. Since there may be multiple choices for sites in EJ areas near sources of concern, the EPA acknowledges that there may be many locations that can meet the revised $PM_{2.5}$ network design criteria. While, as we explained earlier, we want such sites to also be in areas of poor air quality, the sites in the area of maximum concentration will ensure that all communities are protected, there can be more flexibility afforded in the selection amongst at-risk communities to meet the revised requirements, since any alternative at-risk communities would already be protected.

The EPA considered both the concerns and support for the timeline proposed and clarifies that the component of the proposed requirement regarding the need to identify potential new sites or an intention to move sites to be included in the annual monitoring network plan due to EPA on July 1, 2024, would be satisfied with a statement of intent to pursue a new site per the revised network design criteria and in consideration of the minimum monitoring requirements. While monitoring agencies may provide as much detail as they deem appropriate regarding the revised $PM_{2.5}$ network design criteria in their annual monitoring network plans due on July 1, 2024, there is no expectation that any details on site-specific information would be included at that stage. We encourage agencies to provide their initial thinking on the communities they are most interested in monitoring pursuant to the revised network design criteria. Therefore, the EPA is finalizing the timeline as proposed, including the provision that monitoring agencies report their intention to add or move sites, where required, in their annual monitoring network plans due to each applicable EPA Regional office no later than July 1, 2024 (40 CFR 58.10). The

monitoring agencies will then provide specifics on any new or moved sites for $PM_{2.5}$ network design to address at-risk communities in the annual monitoring network plans due to each applicable EPA Regional office no later than July 1, 2025 (40 CFR 58.10). And any new or moved sites shall be implemented and fully operational no later than 24 months from the date of approval of a § 58.10 plan, or January 1, 2027, whichever comes first.

In summary, the EPA is finalizing modifications to the $PM_{2.5}$ network design criteria to include an EJ factor to address at-risk communities with a focus on exposures from sources of concern in areas of poor air quality. While this modification to the $PM_{2.5}$ network design requires sites to be located in at-risk communities, particularly those whose air quality is potentially affected by local sources of concern, such sites must still meet the requirement for being considered ''area-wide'' air quality. In finalizing this modification to the $PM_{2.5}$ network design requirement, the EPA is making two changes in the final rule response to the comments received. First, the EPA is broadening our examples of ''sources of concern'' to include localized sources such as point sources and major transportation facilities or corridors. Second, the EPA is reinstating ''poor air quality'' in our requirement for the modified network design criteria, meaning the revised $PM_{2.5}$ network design requirement now states: ''For areas with additional required SLAMS, a monitoring station is to be sited in an at-risk community with poor air quality, particularly where there are anticipated effects from sources in the area (*e.g.,* a major industrial area, point source(s), port, rail yard, airport, or other transportation facility or corridor).'' All other aspects of the $PM_{2.5}$ network design requirements are being finalized as proposed.

5. Revisions to Probe and Monitoring Path Siting Criteria

The EPA proposed changes to monitoring requirements in the Appendix E—Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring (88 FR 5676–78, January 27, 2023). Since 2006, the EPA finalized multiple rule revisions to establish siting requirements for $PM_{10–2.5}$ and O_3 monitoring sites (71 FR 2748, January 17, 2006), Near-Road NO_2 monitoring sites (75 FR 6535, February 9, 2010), Near-Road CO monitoring sites (76 FR 54342, August 31, 2011), and Near-Road $PM_{2.5}$ monitoring sites (78 FR 3285, January 15, 2013). Through these previous revisions to the regulatory text, some requirements were inadvertently omitted, and, over time, the clarity of this appendix was reduced through those omissions that, in a few instances, led to unintended and conflicting regulatory requirements. The EPA proposed to reinstate portions of previous Probe and Monitoring Path Siting Criteria Requirements from previous rulemakings, where appropriate, to restore the original intent.

The EPA only received a few comments on the proposed rulemaking pertaining to the proposed changes regarding probe and monitoring path siting criteria for ambient air quality monitoring, most of which were supportive of the proposed revisions. One commenter noted that the image for Figure E–1 in Appendix E to part 58 was distorted and of extremely poor quality, rendering the text in places almost unreadable (88 FR 5712, January 27, 2023). The EPA makes several references to Figure E–1, which provides detailed information needed for assessing a range of acceptable probe distances from roadways based on a monitor's spatial scale. The commenter also stated that a higher quality image is needed for the figure so that agencies can fully interpret the figure to the extent that EPA requires. The EPA agrees with the commenter that a higher quality image for Figure E–1 is important and needed. Based on this comment, the EPA is finalizing the revision to Figure E–1 to clearly communicate the requirements of appendix E.

The EPA is revising appendix E in its entirety as proposed (88 FR 5709–5717, January 27, 2023) for clarity and as described in detail below.

a. Separate Section for Open Path Monitoring Requirements

The EPA proposed to relocate all open path monitor siting criteria requirements to a separate section in appendix E from those requirements for siting samplers and monitors that utilize probe inlets (88 FR 5676, January 27, 2023). Separate sections for these distinct monitoring method types allows the EPA to more clearly articulate minimum technical siting requirements for each.

The EPA received one supportive comment to adopt this change and received no adverse comments. Another commenter stated the regulatory text of the proposal improves the clarity of the appendix but encouraged the EPA to break the summary tables down further into more manageable components (perhaps by pollutant). The commenter stated that summary tables for the proposed appendix continue to be a ''jumbled mess of regulatory requirements.'' The EPA agrees that the summary tables E–3 and E–6 in the proposal could be improved further. Also, the EPA found that footnote 3 of Table E–6 in the proposed rule was incomplete and corrected this editorial error.

Therefore, the EPA is making editorial changes to both summary tables E–3 and E–6 and finalizing the remainder of the language as proposed with the open path monitor siting criteria requirements placed into a separate section of the appendix.

b. Distance Precision for Spacing Offsets

The EPA proposed to require that when rounding is performed to assess compliance with these siting requirements, the distance measurements will be rounded such as to retain at least two significant figures (88 FR 5676, January 27, 2023). The EPA proposed to communicate this rounding requirement in the regulatory text using footnotes in the tables of this appendix.

The EPA received two supportive comments and no adverse comments regarding this proposed change. While supportive of the proposal, one of the two supporting comments suggested it would be clearer if EPA explicitly defined a decimal in the distance values and round to the nearest tenths place for these assessments. The EPA disagrees with this recommendation because in some cases it would be more restrictive and burdensome than the proposed requirement that was intended to provide both clarity and flexibility. Therefore, the EPA is finalizing the language as proposed.

c. Summary Table of Probe Siting Criteria

The EPA proposed to provide additional specificity and flexibility to the summary table for probe siting criteria by changing the ''>'' (greater than) symbols to ''≥'' (greater than or equal to) symbols in the summary table E–4 (88 FR 5676, January 27, 2023). Because one commenter pointed out to the EPA that in the prior version of the rule there was no table E–4, as a clerical matter, we have renumbered this summary table to table E–3 in the final rule. This proposed minor revision to the summary table more clearly expresses the EPA's intent that the distance offsets provided in the summary tables in appendix E are acceptable for NAAQS compliance monitoring.

The EPA received one comment supporting the proposal. The EPA received no adverse comments. Because

one commenter pointed out to the EPA that in the prior version of the rule there was no table E–4, as a clerical matter, we have renumbered this summary table to table E–3 in the final rule. Therefore, the EPA is updating the table numbering and otherwise finalizing the tables as proposed.

d. Spacing From Minor Sources

The EPA proposed to clarify and provide flexibility regarding siting monitors near minor sources by changing a requirement to a goal (88 FR 5676–77, January 27, 2023). To accomplish this, the EPA proposed to replace the ''must'' in the regulation with a ''should.'' While the EPA proposed to change this requirement to a goal, the EPA reiterated in the proposal that it recommends that sites with minor sources be avoided whenever practicable and probe inlets should be spaced as far from minor sources as possible when alternative monitoring stations are not suitable.

The EPA received one comment supporting the proposed revision and received no adverse comments. Therefore, the EPA is finalizing the language as proposed.

e. Spacing From Obstructions and Trees

The EPA proposed to clarify and redefine that the minimum arc required to be free of obstructions for a probe inlet or monitoring path is 270-degrees and that probe inlets must be no closer than 10-meters to the driplines of any trees (88 FR 5677, January 27, 2023). These changes were proposed because of inconsistencies introduced into the rule with the 2006 rulemaking. Both are discussed in more detail in the following sections.

The majority of comments received were supportive of these proposed siting amendments and clarifications. Two commenters were not supportive of this proposal. One adverse comment focused on the potential that site modifications would be required if the minimum arc required to be free of obstructions for a probe inlet is 270-degrees. The second adverse comment pertained to the proposal to clarify distance requirements from tree driplines. The commenter stated they would expect significant challenges in meeting the proposed 20-meter tree dripline distance. This comment is not a substantive negative comment because the 20-meter distance provided in the proposal is a goal and not a requirement. As such, monitoring organizations should not expect additional challenges in meeting the probe siting requirements. One supportive commenter on the 270-degree minimum arc proposal also requested that the EPA acknowledge that some cases exist where monitoring is desired or necessary to protect the public health, but siting criteria cannot be met.

Based on the only two negative comments received from monitoring agencies or organizations, one of which was not substantive, the EPA believes most sites already meet these proposed requirements related to the arc and distance from dripline. However, the EPA also acknowledges that there may be limited cases where this proposed revision may require site modifications, and some sites may not be able to be achieve the proposed siting requirements, even with modifications to the site. For cases where long-term trend sites or monitors that determine the design value for their area cannot reasonably meet these regulatory siting requirements, the EPA encourages monitoring organizations to work with their respective EPA Regional offices to determine if a waiver from this siting criteria would be appropriate under appendix E, section 10.

These siting requirements are discussed in more detail below in sections VII.B.5.f and VII.B.5.h.

f. Reinstating Minimum 270-Degree Arc and Clarified 180-Degree Arc

The EPA proposed to correct identified inconsistencies in the 270-degree requirement for unrestricted airflow to the probe inlet by reinstating the requirement stated in appendix E, paragraph 4(b), and to clarify that the continuous 180-degree minimum arc of unrestricted airflow provision is reserved for monitors sited on the side of a building or wall to comply with network design criteria requirements specified in appendix D of part 58 (88 FR 5677, January 27, 2023).

The EPA received two comments regarding this proposal, with one being supportive and one being negative. The adverse comment focused on the potential that site modifications would be required if this revision was made. The commenter supporting the proposal also requested that the EPA acknowledge that some cases exist where monitoring is desired or necessary to protect the public health, but siting criteria cannot be met. The EPA agrees with both commenters and acknowledges that there does exist limited cases where this proposal would require site modifications and some sites may not be able to be achieve the proposed siting requirement even with modifications to the site. For these cases, and especially when long-term trend sites or monitors that determine the design value for their area cannot reasonably meet these regulatory siting requirements, the EPA encourages monitoring organizations to work with their respective EPA Regional Offices to determine if a waiver from this siting criteria is appropriate through the provisions found in Section 10 of this appendix.

Based on the EPA only receiving a single negative comment regard the 270-degree and 180-degree provisions the EPA thinks most sites already meet these proposed requirements. Additionally, as stated above, the EPA is also retaining waiver provisions from these siting requirements for the remaining cases that can be exercised when appropriate. Therefore, the EPA is finalizing the language as proposed.

g. Obstacles That Act as Obstructions

The EPA proposed to clarify the definitions of ''obstructions'' and ''obstacles'' in the regulatory text (88 FR 5677, January 27, 2023). Stating that, ''[o]bstructions to the air flow of the probe inlet are those obstacles that are horizontally closer than twice the vertical distance the obstacle protrudes above the probe inlet and can be reasonably thought to scavenge reactive gases or to restrict the airflow for any pollutant,'' the EPA proposed to reiterate that the EPA does not generally consider objects or obstacles such as flag poles or site towers used for NO_y convertors and meteorological sensors, etc., to be deemed obstructions.

The EPA received one comment supporting the proposal and received no adverse comments. Therefore, the EPA is finalizing the definitions as proposed.

h. 10-Meter Tree Dripline Requirement

The EPA proposed to reconcile the conflicting requirements in 5(a) and the prior table E–4 footnote 3 by clarifying that the probe inlet must always be no closer than 10 meters to the tree dripline (88 FR 5677, January 27, 2023). The EPA also proposed to reinstate the goal ''that monitor probe inlets should be at least 20-meters from the driplines of trees,'' a goal that was inadvertently omitted during previous rule revisions. In addition, the EPA proposed to clarify that if a tree or group of trees is considered an ''obstruction,'' section 4(a) will apply.

As described above, the majority of comments received were supportive of the EPA proposed amendments and clarification, with two commenters focused on the possibility that monitoring agencies may not be able to meet the revised siting requirements. Specific to the proposed dripline requirement, the EPA reiterates that the

20-meter tree dripline offset is not a requirement, but rather a goal. Monitoring programs should as much as practicable attempt to meet this 20-meter tree dripline offset goal but are only required to be at least 10 meters removed from tree driplines. If these requirements cannot be met, the EPA encourages monitoring organizations to contact their respective EPA Regional offices to determine if a waiver from this siting criteria would be appropriate under appendix E, section 10.

Another commenter recommended that the proposal should also include an elevation specification. For instance, if a monitor is on the roof of a shelter, a tree below that roof should not be considered an obstruction no matter the distance to the dripline. The EPA considers this scenario to occur in practice only rarely. The EPA agrees that when the overall tree height is less than the height of the probe inlet, the tree is not obstructing the airflow to the probe inlet. However, a tree in such proximity to the probe inlet in many cases is not likely to remain at a height lower than the probe inlet. The EPA considers a scenario such as this to be best addressed in the waiver provisions of this appendix due both to the rarity of this occurring as well as the need for the EPA to periodically reassess whether tree growth has adversely impacted the site conditions.

For these reasons, the EPA is finalizing the language as proposed.

i. Spacing Requirement for Microscale Monitoring

The EPA proposed to require that microscale sites for any pollutant shall have no trees or shrubs blocking the line-of-sight fetch between the monitor's probe inlet and the source under investigation (88 FR 5677, January 27, 2023). This proposed revision would bring consistency between near-road monitoring stations and other microscale monitoring.

The EPA received one comment on this proposed requirement expressing concerns regarding its practicality and legality. The commenter stated agencies may at times want to site a monitor close to a source, but the closest location will have trees in the line of sight on private property. Additionally, in some cases, the trees may have been planted for the purpose of reducing off-property emissions from a source such as a Concentrated Animal Feeding Operation (CAFO). The commenter further stated that the proposal mandates that State agencies order the removal of trees from private property to collect valid data.

The EPA disagrees that the proposed requirement is impractical or unlawful. The proposed requirement would not require, mandate, or otherwise empower monitoring agencies to force the removal of trees on private property. The EPA agrees with the commenter that trees may at times be planted as part of control strategies to reduce offsite emissions and thus protect the public, but the EPA disagrees with the commenter that the trees must be removed to perform ambient air monitoring in these locations. Rather, if trees or shrubs block the line-of-sight fetch between the monitor's probe inlet and the source under investigation, it is the EPA's position that, for most cases, a microscale designation does not accurately reflect the monitoring scale for this location, and instead the EPA would recommend that the monitoring scale be designated to a more representative monitoring scale such as middle scale or neighborhood scale.

Moreover, for cases where long-term trend sites or monitors that determine the design value for an area cannot reasonably meet this regulatory siting requirement, the EPA encourages monitoring organizations to work with their respective EPA Regional offices to determine if a waiver from this siting criteria may be appropriate under appendix E, section 10.

For these reasons, the EPA is finalizing the language as proposed.

j. Waiver Provisions

The EPA proposed to maintain the appendix E, section 10 waiver provisions in the current regulation for siting criteria, but to modify section 10.3 to require that waivers from the probe-siting criteria must be reevaluated and renewed minimally every 5 years (88 FR 5677–78, January 27, 2023).

The EPA received one comment supporting the proposal and no adverse comments. Therefore, the EPA is finalizing the language as proposed.

k. Acceptable Probe Materials

The EPA proposed to expand the list of acceptable probe materials for sampling reactive gases in appendix E, section 9, from just borosilicate glass and fluorinated ethylene propylene (FEP) Teflon®, or their equivalents. The EPA proposed to add polyvinylidene fluoride (PVDF), also known as Kynar®, polytetrafluoroethylene (PTFE), and perfluoroalkoxy (PFA) to the list of approved materials for efficiently transporting gaseous criteria pollutants, and the use of Nafion™ upstream of ozone analyzers (88 FR 5678, January 27, 2023). Mention of trade names or commercial products does not constitute endorsement.

The EPA received two comments supporting the proposal and received no adverse comments. Therefore, the EPA is finalizing the language as proposed.

D. Incorporating Data From Next Generation Technologies

In the proposal, the EPA requested comment on how to incorporate data from next generation technologies into Agency efforts (88 FR 5678–80, January 27, 2023). The near real-time integration of data from $PM_{2.5}$ continuous monitors, sensors, and satellites has allowed the EPA to use data in certain informational applications such as EPA and USFS's Fire and Smoke Map.[199] This mapping product uses Application Program Interfaces (APIs) where data sets are automatically shared on prespecified computer servers. Given the success of the Fire and Smoke Map, the EPA indicated interest in exploring the use of next-generation technologies to develop additional approaches, products, and applications to help address important non-regulatory air quality data needs. Therefore, the EPA solicited comment on the most important data uses and data sets to consider in such future initiatives. Such approaches and/or products could utilize historical or near real-time data. The EPA sought this input and prioritization on use of next generation technologies to help improve the utility of data to better support air quality management to improve public health and the environment.

The EPA received comments from about two dozen entities on its request for comments on how to incorporate data from next generation technologies. The entities that provided comment included federal agencies; representatives of industry and industry groups; public health, medical, and environmental organizations; State, local and related multi-state organizations involved in air program management; Tribes and Tribal organizations involved in air program management; and other State and local governments.

While there were some differences across commenters, a majority of the commenters support use of next generation data for non-regulatory purposes, but not for regulatory decision making due to their inherent uncertainties and limitations. The EPA also received comments from some environmental organizations support using alternative data for regulatory decision making.

[199] Available at *https://fire.airnow.gov/*.

Many commenters pointed out that they are already successfully using sensor data and networks in supplemental and informational applications and support further expansion of these capabilities. Across many commenters, there was support for using next generation data as ''fit for purpose,'' filling in gaps, finding hot spots, identifying and addressing EJ concerns, and evaluating and informing network siting. The EPA acknowledges the successful examples of sensor data and networks for non-regulatory purposes. A few commenters support expanding the use of sensor data to provide real-time AQI; the EPA is interested in this use of next generation data as well. A few commenters pointed the need for the EPA to work closely with them and their communities to understand and use next generation data, while others expressed a desire for help developing best practices around collecting and using next generation data, developing products with data analysis/visualization, and developing appropriate QA/QC for sensor data. The EPA acknowledges each of these requests and expects to continue to work closely with SLTs and other stakeholders to understand and develop information on the collection and use of next generation data.

A few commenters offered more detailed comments. Some recommended that the EPA repropose implementation provisions related to next generation technologies with greater clarity to provide for meaningful comment. For example, the use of low-cost sensor and satellite data could be used in drawing nonattainment area boundaries or identifying sources for emissions control, but doing so would be such a significant change from prior EPA policy that it warrants a more specific proposal, beyond the scope of this request for comment. In response to this comment, the EPA notes it did not propose or change the use of non-regulatory measurement data as part of this proposal, but instead opened an opportunity to comment about the use of next generation technologies.

Another commenter stated that while low-cost sensor data can be invaluable for some purposes, the potentially overwhelming amount of data produced by sensors may present additional challenges to communities without the resources or expertise to analyze it. Cost is another concern associated with some next generation technologies of which some communities may not be aware, as the initial cost of the sensor alone is not indicative of the total cost of operation, which can include costs of internet access and servers. The EPA appreciates the need to consider all the costs of implementing and maintaining sensor data.

Another commenter stated that having a dense sensor network collocated with FRMs and FEMs could help ensure timely maintenance of the regulatory measurements in the event there appears to be a divergence of data. The EPA appreciates the comment that emphasizes how sensors could be used to complement the FRM and FEM data with regard to ensuring timely maintenance.

Another commentor strongly opposes incorporating sensor data into any EPA systems unless robust quality assurance (QA) practices are widely established and managed by qualified personnel. The EPA agrees that QA is necessary, and notes that the ''fit for purpose'' aspect of using sensor data will inform the appropriate QA associated with the intended use of such data.

In summary, the EPA invited comment on how we should consider incorporating data from next generation technologies into our air monitoring efforts. In seeking comment on this topic, the EPA did not propose to add, edit, or delete any regulatory language associated with the PM NAAQS. The EPA received comments from a variety of entities that largely support using next generation data for a variety of purposes that supplement, but cannot replace, the measurement data from monitoring methods required (*i.e.,* FRMs and FEMs) for regulatory decision making. Across many commenters, there was support for using next generation technologies and data as ''fit for purpose,'' filling in gaps, finding hot spots, identifying, and addressing EJ concerns, and evaluating and informing network siting. Quality assurance of the data will be an important component in the use of next generation technology data. The EPA will consider these comments as it continues its work with the co-regulated community comprised of SLT agencies and other stakeholders to understand and use next generation data and joint efforts to manage the nation's ambient air.

VIII. Clean Air Act Implementation Requirements for the Revised Primary Annual $PM_{2.5}$ NAAQS

The EPA's revision to the primary annual $PM_{2.5}$ NAAQS discussed in section II above triggers a number of implementation related activities that were described in the NPRM. The two most immediate implementation impacts following a final new or revised NAAQS are related to stationary source permitting and the initial area designations process. Permitting implications are discussed below in section VIII.E. With regard to initial area designations, the EPA is separately issuing a memorandum regarding the Initial Area Designations for the Revised Primary Annual Fine Particle National Ambient Air Quality Standard Memorandum (the ''Annual $PM_{2.5}$ NAAQS Designations Memorandum'') that will provide information about the statutory schedule for the designations process. For other implementation related implications, please refer back to the NPRM section VIII.

The NPRM also referred to the $PM_{2.5}$ State Implementation Plan (SIP) Requirements Rule (81 FR 58010, August 24, 2016), which specifies planning requirements for areas designated as nonattainment for purposes of the $PM_{2.5}$ NAAQS and includes a number of key recommendations for areas to consider implications of environmental justice through the attainment planning process, consistent with the identification of at-risk groups in the 2019 ISA and ISA Supplement and the statutory requirement to protect the health of at-risk groups. As stated in the NPRM, State and local air agencies are encouraged to consider how they might develop implementation plans that encourage early emission reductions.

A. Designation of Areas

As discussed in section II, with respect to the $PM_{2.5}$ NAAQS, the EPA is finalizing: (1) Revisions to the level of the primary annual $PM_{2.5}$ NAAQS and retaining the current primary 24-hour $PM_{2.5}$ NAAQS (section II.B.4); and (2) no change to the current secondary annual and 24-hour $PM_{2.5}$ NAAQS at this time (section V.B.4). Upon promulgation of a new or revised NAAQS, States and the EPA must initiate the process for initial designations.

The timeline for initial area designations begins with promulgation of the revised primary annual $PM_{2.5}$ NAAQS, as stated in the CAA section 107(d)(1)(B)(i). Through this process, which provides for input from States and others at various stages, the EPA identifies areas of the country that either meet or do not meet the revised primary annual $PM_{2.5}$ NAAQS, along with the nearby areas contributing to NAAQS violations. The following includes additional information regarding the designations process described in the CAA.

Section 107(d)(1) of the CAA states that, ''By such date as the Administrator may reasonably require, but not later than 1 year after promulgation of a new or revised national ambient air quality standard for any pollutant under section

109, the Governor of each State shall . . . submit to the Administrator a list of all areas (or portions thereof) in the State'' and make recommendations for whether the EPA should designate those areas as nonattainment, attainment, or unclassifiable.[200] The CAA provides the EPA with discretion to require States to submit their designations recommendations within a reasonable amount of time not exceeding one additional year.[201] Section 107(d)(1)(A) of the CAA also states that ''the Administrator may not require the Governor to submit the required list sooner than 120 days after promulgating a new or revised national ambient air quality standard.'' Section 107(d)(1)(B)(i) further provides, ''Upon promulgation or revision of a NAAQS, the Administrator shall promulgate the designations of all areas (or portions thereof) . . . as expeditiously as practicable, but in no case later than 2 years from the date of promulgation. Such period may be extended for up to one year in the event the Administrator has insufficient information to promulgate the designations.'' With respect to the NAAQS setting process, courts have interpreted the term ''promulgation'' to be signature and widespread dissemination of a final rule.[202]

If the EPA agrees with the designations recommendation of the State, then it may proceed to promulgate the designations for such areas. If, however, the EPA disagrees with the State's recommendation, then the EPA may elect to make modifications to the recommended designations. By no later than 120 days prior to promulgating the final designations, the EPA is required to notify States of any intended modifications to the State designation recommendations for any areas or portions thereof, including the boundaries of areas, as the EPA may deem necessary. States then have an opportunity to comment on the EPA's intended modification and tentative designation decision. If a State elects not to provide designation recommendations for any area, then the EPA must itself promulgate the designation that it deems appropriate.

While section 107(d) of the CAA specifically addresses the designations process for States, the EPA intends to follow the same process for Tribes to the extent practicable, pursuant to section 301(d) of the CAA regarding Tribal authority, and the Tribal Authority Rule (63 FR 7254, February 12, 1998). To provide clarity and consistency in doing so, the EPA issued a guidance memorandum to our Regional Offices on working with Tribes during the designations process.[203]

Consistent with the process used in previous area designations efforts, the EPA will evaluate each area on a case-by-case basis considering the specific facts and circumstances unique to the area to support area boundary decisions for the revised standard. The EPA intends to issue a designations memorandum which will provide information regarding the designations process. In broad overview, the EPA has historically used area-specific analyses to support nonattainment area boundary recommendations and final boundary determinations by evaluating factors such as air quality data, emissions and emissions-related data (*e.g.,* population density and degree of urbanization, traffic and commuting patterns), meteorology, geography/topography, and jurisdictional boundaries. We expect to follow a similar process when establishing area designations for this revised $PM_{2.5}$ NAAQS. CAA section 107(d) explicitly requires that the EPA designate as nonattainment not only the area that is violating the pertinent standard, but also those nearby areas that contribute to the violation in the violating area. In the $PM_{2.5}$ NAAQS Designations Memorandum, the EPA intends to include information regarding consideration of federal land boundaries that may be fully or partially included within the bounds of a county otherwise identified as nonattainment.

As with past revisions of the $PM_{2.5}$ NAAQS, the EPA intends to make the designations decisions for the revised primary annual $PM_{2.5}$ NAAQS based on the most recent three years of quality-assured, certified air quality data in the EPA's Air Quality System (AQS). Accordingly, the EPA recommends that States base their initial area designation recommendations on the most current available three years of complete and certified air quality data at the time of the recommendations. The EPA will then base the final designations on the most recent three consecutive years of complete, certified air quality monitoring data available at the time of final designations.[204]

Monitoring data are currently available from numerous existing $PM_{2.5}$ Federal Equivalent Methods (FEM) and Federal Reference Methods (FRM) sites to determine violations of the revised primary annual $PM_{2.5}$ NAAQS. As described in section VII.C.3.b, the EPA took comment on how to deal with cases where an FEM is approved by the EPA with an update and when it can be implemented in the field. The EPA took comment on how to approach the data produced during this lag and received input from over a dozen commenters. The commenters asked that the EPA be flexible in allowing the use of updated method correction factors intended to improve the data comparability between the FRMs and FEMs. The EPA will address any data correction issues between the FRMs and FEMs through a future Notice of Data Availability (NOA).

Consistent with past practice and as noted in the NPRM, the EPA intends to provide additional information concerning the designations process, including information about the schedule and recommendations for determining area boundaries in the forthcoming Annual $PM_{2.5}$ NAAQS Designations Memorandum. Other topics addressed in this memorandum include the schedule for preparing and submitting exceptional events initial notification and exceptional events demonstrations relevant to the designations process, and information related to wildfire and prescribed fire on wildlands as it pertains to initial area designations, as well as addressing back-correction of PM FEM data when a method has an approved factory calibration as part of a method update. The Annual $PM_{2.5}$ NAAQS Designations Memorandum is intended to assist States and Tribes in formulating their area recommendations.[205]

As discussed in the proposal, the ''Treatment of Data Influenced by Exceptional Events; Final Rule,'' (81 FR 68216, October 3, 2016) and codified at 40 CFR 50.1, 40 CFR 50.14, and 40 CFR 51.930, contains instructions and requirements for air agencies that may

[200] While the CAA says ''designating'' with respect to the Governor's letter, in the full context of the CAA section it is clear that the Governor actually makes a recommendation to which the EPA must respond via a specified process if the EPA does not accept it.

[201] In certain circumstances in which the Administrator has insufficient information to promulgate area designations within two years from the promulgation of the NAAQS, CAA section 107(d)(1)(B)(i) provides that the EPA may extend the designations schedule by up to one year.

[202] *API* v. *Costle,* 609 F.2d 20 (D.C. Cir. 1979).

[203] ''Guidance to Regions for Working with Tribes during the National Ambient Air Quality Standards (NAAQS) Designations Process,'' December 20, 2011, Memorandum from Stephen D. Page to Regional Air Directors, Regions 1–X available at *https://www.epa.gov/sites/default/files/2017-02/documents/12-20-11_guidance_to_regions_for_working_with_tribes_naaqs_designations.pdf.*

[204] In certain circumstances in which the Administrator has insufficient information to promulgate area designations within two years from the promulgation of a new or revised NAAQS, CAA section 107(d)(1)(B)(i) provides the EPA may extend the designations schedule by up to one year.

[205] See: *https://www.epa.gov/particle-pollution-designations.*

flag air quality data for certain days in the Air Quality System due to potential impacts from exceptional events (*i.e.,* such as prescribed fires on wildland, wildfires, or high wind dust storms). Accordingly, for purposes of initial area designations for a new or revised NAAQS, an air agency may submit to the EPA an exceptional events demonstration with supporting information and analyses for each monitoring site and day the air agency claims the EPA should exclude from design value calculations for designations purposes.

The EPA has provided tools to assist air agencies in preparing adequate exceptional events demonstrations.[206] Further, the EPA will continue to work with air agencies as they identify exceptional events that may influence decisions related to the initial area designations process, and to prepare and submit exceptional events demonstrations if appropriate. Importantly, air quality monitoring data may be influenced by emissions from prescribed fires on wildland and wildfires. The EPA's Exceptional Events Rule provides for both of these types of events to be considered as exceptional events, provided the affected air agencies submit exceptional events demonstrations that meet the procedural and technical requirements of the EPA's Exceptional Events Rule. To that end, the EPA has issued guidance addressing development of exceptional events demonstrations for both wildfire and prescribed fires on wildland.[207] In light of the growing frequency and severity of wildfire events, and expected increases in the application of prescribed fire as a means to achieve long-term reductions in high severity wildfire risk and associated smoke impacts, the EPA seeks to ensure that the Agency's exceptional events process provides an efficient and clear pathway for excluding data that may be affected by such events in a manner that is consistent with the Clean Air Act and the public health objectives of the NAAQS. Accordingly, the EPA is continuing to explore opportunities to develop additional tools that could assist air agencies in preparing exceptional events demonstrations for wildfires and prescribed fires on wildland. In addition, EPA intends to continue engaging with the U.S. Department of Agriculture, U.S. Department of the Interior, air agencies, and other stakeholders on these issues. For more information regarding the exceptional events demonstration submission deadlines for the area designations process, please see Table 2 to 40 CFR 50.14(c)(2)(vi)—''Schedule for Initial Notification and Demonstration Submission for Data Influenced by Exceptional Events for Use in Initial Area Designations.''

B. Section 110(a)(1) and (2) Infrastructure SIP Requirements

As discussed in the NPRM, the CAA directs States to address basic SIP requirements to implement, maintain, and enforce the NAAQS. Under CAA sections 110(a)(1) and (2), states are required to have State implementation plans that provide the necessary air quality management infrastructure that provides for the implementation, maintenance, and enforcement of the NAAQS. After the EPA promulgates a new or revised NAAQS, States are required to make a new SIP submission to establish that they meet the necessary structural requirements for such new or revised NAAQS or make changes to do so. The EPA refers to this type of SIP submission as an ''infrastructure SIP submission.'' Under CAA section 110(a)(1), all States are required to make these infrastructure SIP submissions within three years after the effective date of a new or revised primary standard. While the CAA authorizes the EPA to set a shorter time for States to make these SIP submissions, the EPA is requiring submission of infrastructure SIPs within three years of the effective date of this revised primary annual $PM_{2.5}$ NAAQS.

The EPA has provided general guidance to States concerning its interpretation of these requirements of CAA section 110(a)(1) and (2) in the context of infrastructure SIP submissions for a new or revised NAAQS.[208] The EPA encourages States to use this guidance when developing their infrastructure SIPs for this revised primary annual $PM_{2.5}$ NAAQS.

As a reminder, the EPA notes that States are not required to address nonattainment plan requirements for purposes of the revised primary annual $PM_{2.5}$ NAAQS on the same schedule as infrastructure SIP requirements. The EPA interprets the CAA such that two elements identified in section 110(a)(2) are not subject to the 3-year submission deadline of section 110(a)(1) and thus States are not required to address them in the context of an infrastructure SIP submission. The elements pertain to part D, in title I of the CAA, which addresses additional SIP requirements for nonattainment areas. Therefore, for the reasons explained below, the following section 110(a)(2) elements are considered by the EPA to be outside the scope of infrastructure SIP actions: (1) The portion of section 110(a)(2)(C), programs for enforcement of control measures and for construction or modification of stationary sources that applies to permit programs applicable in designated nonattainment areas (known as ''nonattainment new source review'') under part D; and (2) section 110(a)(2)(I), which requires a SIP submission pursuant to part D, in its entirety.

Accordingly, the EPA does not expect States to address the requirement for a new or revised NAAQS in the infrastructure SIP submissions to include regulations or emissions limits developed specifically for attaining the relevant standard in areas designated nonattainment for the revised primary annual $PM_{2.5}$ NAAQS. States are required to submit infrastructure SIP submissions for the revised primary annual $PM_{2.5}$ NAAQS before they will be required to submit nonattainment plan SIP submissions to demonstrate attainment with the same NAAQS. States are required to submit nonattainment plan SIP submissions to provide for attainment and maintenance of a revised primary annual $PM_{2.5}$ NAAQS within 18 months from the effective date of nonattainment area designations as required under CAA section 189(a)(2)(B). The EPA reviews and acts upon these later SIP submissions through a separate process. For this reason, the EPA does not expect States to address new nonattainment area emissions controls per section 110(a)(2)(I) in their infrastructure SIP submissions.

One of the required infrastructure SIP elements is that each State SIP must contain adequate provisions to prohibit, consistent with the provisions of title I of the CAA, emissions from within the State that will significantly contribute to nonattainment in, or interfere with maintenance by, any other State of the primary or secondary NAAQS.[209] This

[206] See the EPA's Exceptional Events homepage at *https://www.epa.gov/air-quality-analysis/treatment-air-quality-data-influenced-exceptional-events-homepage-exceptional.*

[207] See EPA's ''Final Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations and EPA's Exceptional Events Guidance: Prescribed Fire on Wildland that May Influence Ozone and Particulate Matter Concentrations,'' found on EPA's Exceptional Events homepage at *https://www.epa.gov/air-quality-analysis/treatment-air-quality-data-influenced-exceptional-events-homepage-exceptional.*

[208] *See* ''Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2)'' September 2013, Memorandum from Stephen D. Page to Regional Air Directors, Regions 1–10.

[209] CAA section 110(a)(2)(D)(i)(I).

element is often referred to as the ''good neighbor'' or ''interstate transport'' provision.[210] The provision has two prongs: significant contribution to nonattainment (prong 1), and interference with maintenance (prong 2). The EPA and States must give independent significance to prong 1 and prong 2 when evaluating downwind air quality problems under CAA section 110(a)(2)(D)(i)(I).[211] Further, case law has established that the EPA and States must implement requirements to meet interstate transport obligations in alignment with the applicable statutory attainment schedule of the downwind areas impacted by upwind-state emissions.[212] Thus, the EPA anticipates that States will need to address interstate transport obligations associated with this revised PM NAAQS, in alignment with the provisions of subpart 4 of part D of the CAA, as discussed in more detail in section VIII.C below. Specifically, States must implement any measures required to address interstate transport obligations as expeditiously as practicable and no later than the next statutory attainment date, *i.e.,* for this NAAQS revision as expeditiously as practicable, but no later than the end of the sixth calendar year following nonattainment area designations. *See* CAA section 188(c). States may find it efficient to make SIP submissions to address the interstate transport provisions separately from other infrastructure SIP elements.

Each State has the authority and responsibility to review its air quality management program's existing SIP provisions in light of a new or revised NAAQS to determine if any revisions are necessary to implement the new or revised NAAQS. Most States have revised and updated their SIPs in recent years to address requirements associated with other revised NAAQS. For certain infrastructure elements, some States may believe they already have adequate State regulations adopted and approved into the SIP to address a particular requirement with respect to the revised primary annual $PM_{2.5}$ NAAQS.

If a State determines that existing SIP-approved provisions are adequate in light of this revised primary annual $PM_{2.5}$ NAAQS with respect to a given infrastructure SIP element (or sub-element), then the State may make an infrastructure SIP submission ''certifying'' that the existing State's existing EPA approved SIP already contains provisions that address one or more specific section 110(a)(2) infrastructure elements.[213] In the case of such a submission, the State does not have to include a copy of the relevant provision (*e.g.,* rule or statute) itself. Rather, this certification submission should provide citations to the SIP-approved State statutes, regulations, or non-regulatory measures, as appropriate, in or referenced by the already EPA-approved SIP that meet particular infrastructure SIP element requirements. The State's infrastructure SIP submission should also include an explanation as to how the State has determined that those existing provisions meet the relevant requirements.

Like any other SIP submission, that State can make such an infrastructure SIP submission certifying that it has already met some or all of the applicable requirements only after it has provided reasonable notice and opportunity for public hearing. This ''reasonable notice and opportunity for public hearing'' requirement for infrastructure SIP submissions is to meet the requirements of CAA sections 110(a) and 110(l). Under the EPA's regulations at 40 CFR part 51, if a public hearing is held, an infrastructure SIP submission must include a certification by the State that the public hearing was held in accordance with the EPA's procedural requirements for public hearings. See 40 CFR part 51, appendix V, section 2.1(g), and see 40 CFR 51.102.

In consultation with the EPA's Regional office, a State should follow all applicable EPA regulations governing infrastructure SIP submissions in 40 CFR part 51—*e.g.,* subpart I (Review of New Sources and Modifications), subpart J (Ambient Air Quality Surveillance), subpart K (Source Surveillance), subpart L (Legal Authority), subpart M (Intergovernmental Consultation), subpart O (Miscellaneous Plan Content Requirements), subpart P (Protection of Visibility), and subpart Q (Reports). For the EPA's general criteria for infrastructure SIP submissions, refer to 40 CFR part 51, appendix V, Criteria for Determining the Completeness of Plan Submissions. For additional information on infrastructure SIP submission requirements, refer to the EPA's 2013 guidance entitled ''Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2).'' The EPA recommends that States electronically submit their infrastructure SIPs to the EPA through the State Plan Electronic Collaboration System (SPeCS),[214] an online system available through the EPA's Central Data Exchange.

C. Implementing Revised Primary Annual $PM_{2.5}$ NAAQS in Nonattainment Areas

As discussed in the NPRM, the EPA issued a SIP Requirements Rule for implementing the $PM_{2.5}$ NAAQS (81 FR 58010, August 24, 2016) ($PM_{2.5}$ SIP Requirements Rule). It provides guidance and establishes additional regulatory requirements for States regarding development of attainment plans for nonattainment areas for the 1997, 2006, and 2012 revisions of the $PM_{2.5}$ NAAQS. The guidance and regulations in the SIP Requirements Rule also apply to any States for which the EPA promulgates nonattainment area designations for the new revised primary annual $PM_{2.5}$ NAAQS.

The $PM_{2.5}$ SIP Requirements Rule provides comprehensive information regarding nonattainment plan requirements including, among other things: nonattainment area emissions inventories; policies regarding $PM_{2.5}$ precursor pollutants (*i.e.,* SO_2, NO_X, VOC, and ammonia); control strategies (such as reasonably available control measures and reasonably available control technology for direct $PM_{2.5}$ and relevant precursors); air quality modeling; attainment demonstrations; reasonable further progress requirements; quantitative milestones; and contingency measures. Information provided in the $PM_{2.5}$ SIP Requirements Rule is supplemented by other EPA documents, including guidance on emissions inventory development (80 FR 8787, February 19, 2015; U.S. EPA, 2017), optional $PM_{2.5}$ precursor demonstrations (U.S. EPA, 2019b),[215] and guidance on air quality modeling for meeting air quality goals for the ozone and $PM_{2.5}$ NAAQS and regional haze program (U.S. EPA, 2018b).

As stated in the NPRM, the $PM_{2.5}$ SIP Requirements Rule provides recommendations to States regarding consideration of environmental justice in the context of $PM_{2.5}$ attainment

[210] CAA section 110(a)(2)(D)(i)(II) also addresses certain interstate effects that states must address and thus is also sometimes referred to as relating to ''interstate transport.''

[211] *See North Carolina* v. *EPA,* 531 F.3d 896, 909–11 (D.C. Cir. 2008).

[212] *See id.* 911–13. *See also Wisconsin* v. *EPA,* 938 F.3d 303, 313–20 (D.C. Cir. 2019); *Maryland* v. *EPA,* 958 F.3d 1185, 1203–04 (D.C. Cir. 2020).

[213] A ''certification'' approach would not be appropriate for the interstate pollution control requirements of CAA section 110(a)(2)(D)(i).

[214] *https://cdx.epa.gov/.*

[215] Provides guidance on developing demonstrations under section 189(e) intended to show that a certain $PM_{2.5}$ precursor in a particular nonattainment area does not significantly contribute to $PM_{2.5}$ concentrations that exceed the standard.

planning. Some of the considerations for States include: (1) Identifying areas with overburdened communities where more ambient monitoring may be warranted; (2) targeting emissions reductions that may be needed to attain the $PM_{2.5}$ NAAQS; and (3) increasing opportunities for meaningful involvement for overburdened populations (*see* 88 FR 5558, 5684, January 27, 2023; 80 FR 58010, 58136, August 25, 2016). In light of the identification of at-risk populations for this reconsideration, the EPA encourages States to consider these and other factors as part of their attainment plan SIP development process.

The $PM_{2.5}$ SIP Requirements Rule outlines some examples of how States can elect to implement these recommendations.[216] For instance, States can use modeling and screening tools to better understand where sources of $PM_{2.5}$ or $PM_{2.5}$ precursor emissions are located and identify areas that may be candidates for additional ambient monitoring. Furthermore, once these target areas are identified, States can prioritize direct $PM_{2.5}$ or $PM_{2.5}$ precursor control measures and enforcement strategies in these areas to reduce ambient $PM_{2.5}$ and achieve the NAAQS. As articulated in the NPRM and the $PM_{2.5}$ SIP Requirements Rule, the EPA recognizes that States have flexibility under the CAA to concentrate State resources on controlling sources of $PM_{2.5}$ emissions in light of environmental justice considerations (*see* 88 FR 5558, 5684, January 27, 2023; 81 FR 58010, 58137, August 24, 2016). Moreover, States can establish opportunities to bolster meaningful involvement in a number of ways, such as communicating in appropriate languages, ensuring access to draft SIPs and other information, and developing enhanced notice-and-comment opportunities, as appropriate (*see* 88 FR 5558, 5684, January 27, 2023; 80 FR 58010, 58136, August 25, 2016).

As previously mentioned, the $PM_{2.5}$ SIP Requirements Rule provides guidance and regulatory requirements for remaining nonattainment areas for the 1997, 2006, and 2012 revisions of the $PM_{2.5}$ NAAQS, as well as for nonattainment areas designated pursuant to any future revisions of the $PM_{2.5}$ NAAQS, including the revised annual $PM_{2.5}$ NAAQS being finalized in this action. The EPA is not making any changes to the current $PM_{2.5}$ SIP Requirements Rule.

[216] For more information on the EPA's recommendations and examples, *see* 81 FR 58010, 58137, August 24, 2016.

D. Implementing the Primary and Secondary PM_{10} NAAQS

As summarized in sections III.B.4 and V.B.4 above, the EPA is retaining the current primary and secondary 24-hour PM_{10} NAAQS to protect against the health effects associated with short-term exposures to thoracic coarse particles and against the welfare effects considered in this reconsideration (*i.e.,* visibility, climate, and materials effects). The EPA is retaining the existing implementation strategy for meeting the CAA requirements for the PM_{10} NAAQS. States and emissions sources should continue to follow the existing regulations and guidance for implementing the current standards.[217]

E. Prevention of Significant Deterioration and Nonattainment New Source Review Programs for the Revised Primary Annual $PM_{2.5}$ NAAQS

The CAA, at parts C and D of title I, contains preconstruction review and permitting programs applicable to new major stationary sources and major modifications of existing major sources. The preconstruction review of each new major stationary source and major modification applies on a pollutant-specific basis, and the requirements that apply for each pollutant depend on whether the area in which the source is situated is designated as attainment (or unclassifiable) or nonattainment for that pollutant. In areas designated attainment or unclassifiable for a pollutant, the Prevention of Significant Deterioration (PSD) requirements under part C apply to construction at major sources. In areas designated nonattainment for a pollutant, the Nonattainment New Source Review (NNSR) requirements under part D apply to construction at major sources. Collectively, those two sets of permit requirements are commonly referred to as the ''major New Source Review'' or ''major NSR'' programs.

Until the EPA designates an area with respect to the revised primary annual $PM_{2.5}$ NAAQS, the NSR provisions applicable under an area's current designation for the 1997, 2006, and 2012 $PM_{2.5}$ NAAQS would continue to apply. *See* 40 CFR 51.166(i)(2) and 52.21(i)(2). That is, for areas designated as attainment/unclassifiable for the 1997, 2006, and 2012 $PM_{2.5}$ NAAQS, PSD will apply to new major stationary sources and major modifications that trigger major source permitting requirements for $PM_{2.5.}$ For areas designated nonattainment for the 1997, 2006, or 2012 $PM_{2.5}$ NAAQS, NNSR requirements will apply for new major stationary sources and major modifications that trigger major source permitting requirements for $PM_{2.5}$. When the initial area designations for this revised primary annual $PM_{2.5}$ NAAQS become effective, those designations will further determine whether PSD or NNSR applies to $PM_{2.5}$ in a particular area, depending on the designation status. New major sources and major modifications will be subject to the PSD program requirements for $PM_{2.5}$ if they are located in an area that does not have a current nonattainment designation under CAA section 107 for $PM_{2.5}$.[218]

Under the PSD program, the permit applicant must demonstrate that the new or modified source emissions increase does not cause or contribute to a NAAQS violation. In 2017, the EPA revised the *Guideline on Air Quality Models* (published as appendix W to 40 CFR part 51) to address primary and secondary $PM_{2.5}$ impacts in making this demonstration. The EPA has since provided associated technical guidance, models and tools, such as the recent ''Final Guidance for Ozone and Fine Particulate Matter Permit Modeling'' (July 29, 2022).[219] Additionally, in light of this NAAQS revision, the EPA is updating its guidance that provides recommended significant impact levels (SILs) for $PM_{2.5}$ and expects that an updated SIL for the revised primary annual $PM_{2.5}$ NAAQS will be available

[217] CAA Sections 110(a) and 172 contain general nonattainment planning provisions, regarding the public review, adoption, submittal, and content of implementation plans. CAA Section 189 specifies additional plan provisions for particulate matter nonattainment areas. General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990 provides a detailed discussion of the EPA's interpretation of the Title I requirements (57 FR 13498, April 16, 1992; 59 FR 41998, August 16, 1994).

[218] 40 CFR 51.166(i)(2) and 52.21(i)(2).

[219] On July 29, 2022, the EPA issued ''Final Guidance for Ozone and Fine Particulate Matter Permit Modeling,'' available at *https://www.epa.gov/system/files/documents/2022-07/Guidance_for_O3_PM25_Permit_Modeling.pdf.* This guidance provides the EPA's recommendations for how a stationary source seeking a PSD permit may demonstrate that it will not cause or contribute to a violation of the National Ambient Air Quality Standards for Ozone and $PM_{2.5}$ and PSD increments for $PM_{2.5}$, as required under section 165(a)(3) of the Clean Air Act and 40 CFR 51.166(k) and 52.21(k). The EPA has also previously issued two technical guidance documents for use in conducting these demonstrations: ''Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program,'' available at *https://www.epa.gov/sites/default/files/2020-09/documents/epa-454_r-19-003.pdf,* and ''Guidance on the Use of Models for Assessing the Impacts of Emissions from Single Sources on the Secondarily Formed Pollutants: Ozone and $PM_{2.5}$,'' available at *https://www.epa.gov/sites/default/files/2020-09/documents/epa-454_r-16-005.pdf.*

on or before the effective date of the final NAAQS.

The statutory requirements for a PSD permit program set forth under part C of title I of the CAA (sections 160 through 169) are addressed by the EPA's PSD regulations found at 40 CFR 51.166 (minimum requirements for an approvable PSD SIP) and 40 CFR 52.21 (PSD permitting program for permits issued under the EPA's Federal permitting authority). These regulations already apply to $PM_{2.5}$ in areas that are designated attainment or unclassifiable for $PM_{2.5}$ whenever a proposed new major source or major modification triggers PSD requirements for $PM_{2.5}$.

For PSD, a ''major stationary source'' is one with the potential to emit 250 tons per year (tpy) or more of any regulated NSR pollutant, unless the new or modified source is classified under a list of 28 source categories contained in the statutory definition of ''major emitting facility'' in section 169(1) of the CAA. For those 28 source categories, a ''major stationary source'' is one with the potential to emit 100 tpy or more of any regulated NSR pollutant. A ''major modification'' is a physical change or a change in the method of operation of an existing major stationary source that results, first, in a significant emissions increase of a regulated NSR pollutant and, second, in a significant net emissions increase of that pollutant. See 40 CFR 51.166(b)(2)(i), 40 CFR 52.21(b)(2)(i). The EPA PSD regulations define the term ''regulated NSR pollutant'' to include any pollutant for which a NAAQS has been promulgated and any pollutant identified by the EPA as a constituent or precursor to such pollutant. See 40 CFR 51.166(b)(49), 40 CFR 52.21(b)(50). These regulations identify SO_2 and NO_X as precursors to $PM_{2.5}$ in attainment and unclassifiable areas. See 40 CFR 51.166(b)(49)(i)(b), 40 CFR 52.21(b)(50)(i)(b).[220] Thus, for $PM_{2.5}$, the PSD program currently requires the review and control of emissions of direct $PM_{2.5}$ emissions and SO_2 and NO_X (as precursors to $PM_{2.5}$), absent a demonstration otherwise for NO_X. Among other things, for each regulated NSR pollutant emitted or increased in a significant amount, the PSD program requires a new major stationary source or a major modification to apply the ''best available control technology'' (BACT) to limit emissions and to conduct an air quality impact analysis to demonstrate that the proposed major stationary source or major modification will not cause or contribute to a violation of any NAAQS or PSD increment.[221] See CAA section 165(a)(3) and (4), 40 CFR 51.166(j) and (k), 40 CFR 52.21(j) and (k). The PSD requirements may also include, in appropriate cases, an analysis of potential adverse impacts on Class I areas. See CAA sections 162(a) and 165(d), 40 CFR 51.166(p); 40 CFR 52.21(p)).[222] The EPA developed the Guideline on Air Quality Models and other documents to, among other things, provide methods and guidance for demonstrating that increased emissions from construction will not cause or contribute to exceedances of the $PM_{2.5}$ NAAQS and PSD increments for $PM_{2.5}$.[223]

Upon the effective date of the revised primary annual $PM_{2.5}$ NAAQS, the demonstration required under CAA Section 165(a)(3), and the associated regulations, must include the revised primary annual $PM_{2.5}$ NAAQS. In past NAAQS revision rules, including the 2012 $PM_{2.5}$ NAAQS (78 FR 3086, January 15, 2013) and 2015 Ozone NAAQS (80 FR 65292, October 26, 2015), the EPA included limited provision that exempted certain sources with pending PSD permit applications (those that had reached a particular stage in the permitting process at the time the revised NAAQS was promulgated or became effective) from the requirement to demonstrate that the proposed emissions increases would not cause or contribute to a violation of the revised NAAQS.[224] In August 2019, the U.S. Court of Appeals for the D.C. Circuit vacated the exemption provision in the PSD rules for the 2015 Ozone NAAQS, finding that the provision contradicted ''Congress's 'express policy choice' not to allow construction which will 'cause or contribute to' nonattainment of 'any' effective NAAQS, regardless of when they are adopted or when a permit was completed.'' *Murray Energy Corp.* v. *EPA,* 936 F.3d 597, 627 (D.C. Cir. 2019).[225] Based on that court decision, the EPA is not establishing any PSD permitting exemption provision in this action. Some commenters requested that the EPA provide the same kind of relief for pending PSD permit applications by extending the effective date of this new revised NAAQS beyond the 60 days that the EPA has traditionally used for such rules. Such comments are addressed in the Response to Comments portion of this action. The EPA is making this revised primary annual $PM_{2.5}$ NAAQS effective in 60 days.

The EPA anticipates that the existing $PM_{2.5}$ air quality in some areas will not be in attainment with the revised primary annual $PM_{2.5}$ NAAQS, and the EPA will designate these areas as nonattainment at a later date, consistent with the designation process described in the preceding sections. However, until such nonattainment designation occurs, proposed new major sources and major modifications located in any area currently designated attainment or unclassifiable for all preexisting $PM_{2.5}$ NAAQS will continue to be subject to the PSD program requirements for $PM_{2.5}$. Any proposed major stationary source or major modification triggering PSD requirements for $PM_{2.5}$ that does not receive its PSD permit by the effective date of a new nonattainment designation for the area where the source would locate would then be required to satisfy applicable NNSR preconstruction permit requirements for $PM_{2.5}$.

In areas where air pollution exceeds the level of the revised primary annual $PM_{2.5}$ NAAQS, a PSD permit applicant must demonstrate that the source or modification will not cause or

[220] Sulfur dioxide is a precursor to $PM_{2.5}$ in all attainment and unclassifiable areas. NO_X is presumed to be a precursor to $PM_{2.5}$ in all attainment and unclassifiable areas, unless a state or the EPA demonstrates that emissions of NO_X from sources in a specific area are not a significant contributor to that area's ambient $PM_{2.5}$ concentrations. VOC is presumed not to be a precursor to $PM_{2.5}$ in any attainment or unclassifiable area, unless a state or the EPA demonstrates that emissions of VOC from sources in a specific area are a significant contributor to that area's ambient $PM_{2.5}$ concentrations.

[221] By establishing the maximum allowable level of ambient pollutant concentration increase in a particular area, an increment defines ''significant deterioration'' of air quality in that area. Increments are defined by the CAA as maximum allowable increases in ambient air concentrations above a baseline concentration and are specified in the PSD regulations by pollutant and area classification (Class I, II and III). 40 CFR 51.166(c), 40 CFR 52.21(c); 75 FR 64864 (October 20, 2010).

[222] Congress established certain Class I areas in section 162(a) of the CAA, including international parks, national wilderness areas, and national parks that meet certain criteria. Such Class I areas, known as mandatory Federal Class I areas, are afforded special protection under the CAA. In addition, States and Tribal governments may establish Class I areas within their own political jurisdictions to provide similar special air quality protection.

[223] *See* 40 CFR part 51, appendix W; 82 FR 5182 (January 17, 2017); *See also* U.S. EPA, 2021d. The EPA provided an initial version of the 2021 guidance for public comment on February 10, 2020. Upon consideration of the comments received, and consistent with Executive Order 13990, the EPA revised the initial draft guidance and posted the revised version for additional public comment.

[224] This exemption was referred to as ''grandfathering'' in the 2015 Ozone NAAQS and the D.C. Circuit's *Murray Energy Corp.* decision on that exemption. *See* 80 FR 65292, 65431 (October 26, 2015); *Murray Energy Corp.* v. *EPA,* 936 F.3d 597, 627 (D.C. Cir. 2019). The EPA refers to this ''grandfathering'' provision in this action as an exemption provision.

[225] While the specifics of this case involved the 2015 ozone NAAQS, the case was based upon an interpretation of CAA section 165(a) and therefore applies equally to any PSD permitting exemption provision for a new or revised NAAQS.

contribute to a violation of the NAAQS. Section 165(a)(3)(B) of the CAA states that a proposed source may not construct unless it demonstrates that it will not cause or contribute to a violation of any NAAQS. This statutory requirement is implemented through a provision contained in the PSD regulations at 40 CFR 51.166(k) and 52.21(k).[226] If a source cannot make this demonstration, or if its initial air quality impact analysis shows that the source's impact would cause or contribute to a violation, the reviewing authority may not issue a PSD permit to that source. However, a PSD permit applicant may be able to make this demonstration if it compensates for the adverse impact that would otherwise cause or contribute to a violation of the NAAQS. In contrast to the NSR requirements for nonattainment areas, the PSD regulations do not explicitly specify remedial actions that a prospective source must take to address such a situation, but the EPA has historically recognized that sources applying for PSD permits may utilize offsetting reductions in emissions as part of the required PSD demonstration under CAA section 165(a)(3)(B).[227]

Part D of title I of the CAA includes preconstruction review and permitting requirements applicable to new major stationary sources and major modifications located in areas designated nonattainment for a pollutant for which the EPA has established a NAAQS (*i.e.,* a criteria pollutant). The relevant part D requirements are typically referred to as the nonattainment NSR (NNSR) program. The EPA's regulations for the NNSR program are contained in 40 CFR 51.165 and 52.24 and part 51, appendix S. Specifically, the EPA has developed minimum program requirements for a NNSR program that is approvable in a SIP, and those requirements, which include requirements for $PM_{2.5}$, are contained in 40 CFR 51.165. In addition, 40 CFR part 51, appendix S, contains requirements constituting an interim NNSR program. This interim program enables NNSR permitting in nonattainment areas by States that lack a SIP-approved NNSR permitting program during the time between the date of the relevant designation and the date that the EPA approves into the SIP a NNSR program. *See* 40 CFR part 51, appendix S, section I; 40 CFR 52.24(k).

For NNSR, ''major stationary source'' is generally defined as a source with the potential to emit at least 100 tpy of the regulated NSR pollutant for which the area is designated nonattainment. In some cases, however, the CAA and the NNSR regulations define ''major stationary source'' for NNSR in terms of a lower rate dependent on the pollutant and degree of nonattainment in the area. For purposes of the $PM_{2.5}$NAAQS, in addition to the general threshold level of 100 tpy in Moderate $PM_{2.5}$ nonattainment areas, a lower major source threshold of 70 tpy applies in Serious $PM_{2.5}$ nonattainment areas pursuant to subpart 4 of part D, title I of the CAA. *See* 40 CFR 51.165(a)(1)(iv)(A)(*1*)(*vii*) and (*viii*); 40 CFR part 51, appendix S, II.A.4(i)(a)(7) and (8).

Under the NNSR program, direct $PM_{2.5}$ emissions and emissions of each $PM_{2.5}$ precursor are considered separately in accordance with the applicable major source threshold. For example, the threshold for Serious $PM_{2.5}$ nonattainment areas is 70 tpy of direct $PM_{2.5}$, as well as for the $PM_{2.5}$ precursors SO_2, NO_X, VOC, and ammonia.[228] See 40 CFR 51.165(a)(1)(iv)(A)(*1*)(*vii*) and (*viii*); 40 CFR part 51, appendix S, II.A.4.(i)(a)(7) and (8). A source qualifies as major for nonattainment NSR in a $PM_{2.5}$ nonattainment area if it emits or has the potential to emit direct $PM_{2.5}$ or any $PM_{2.5}$ precursor in an amount equal to or greater than the applicable threshold.

For modifications, NNSR applies to proposed physical changes or changes in the method of operation of an existing stationary source where (1) the source is major for the nonattainment pollutant (or a precursor for that pollutant) and (2) the physical change or change in the method of operation of a major stationary source results, first, in a significant emissions increase of a regulated NSR pollutant and, second, in a significant net emissions increase of that same nonattainment pollutant (or same precursor for that pollutant). *See* 40 CFR 51.165(a)(1)(v)(A); 40 CFR part 51, appendix S, II.A.5.(i). For example, to qualify as a major modification for SO_2 (as a $PM_{2.5}$ precursor) in a Moderate $PM_{2.5}$ nonattainment area, the existing source would have to have the potential to emit 100 tpy or more of SO_2, and the project would have to result in an increase in SO_2 emissions of 40 tpy or more. See 40 CFR 51.165(a)(1)(x)(A).

New major stationary sources and major modifications for $PM_{2.5}$ subject to NNSR must comply with the ''lowest achievable emission rate'' (LAER), as defined in the CAA and NNSR rules. Such sources must also perform other analyses and obtain emission offsets, as required under section 173 of the CAA and applicable regulations.

Following the promulgation of this revised primary annual $PM_{2.5}$ NAAQS, some new areas may be designated nonattainment for $PM_{2.5}$. Where a State does not have an existing NNSR program or where the current NNSR program does not apply to $PM_{2.5}$, that State will be required to submit the necessary SIP revisions to ensure that new major stationary sources and major modifications for $PM_{2.5}$ or a $PM_{2.5}$ precursor undergo preconstruction review pursuant to the NNSR program. States with designated nonattainment areas for the revised primary annual $PM_{2.5}$ NAAQS are required to make SIP submissions to meet nonattainment plan requirements within 18 months from the effective date of designations, as required under CAA section 189(a)(2)(B). States that have existing NNSR program requirements that cannot be interpreted to apply at the time of designation to the revised primary annual $PM_{2.5}$ NAAQS may, in the interim, issue permits in accordance with the applicable nonattainment permitting requirements contained in 40 CFR part 51, appendix S, which would apply to the revised primary annual $PM_{2.5}$ NAAQS upon its effective date. *See* 73 FR 28321, 28340, May 16, 2008.

Finally, the EPA has released several documents that discuss air permitting

[226] 40 CFR 51.166(k) states that SIPs must require that the owner or operator of the proposed source or modification demonstrate that allowable emission increases from the proposed source or modification, in conjunction with all other applicable emissions increases or reductions (including secondary emissions), would not cause or contribute to air pollution in violation of: (i) Any national ambient air quality standard in any air quality control region; or (ii) any applicable maximum allowable increase over the baseline concentration in any area.

[227] *See, e.g.,* Memorandum from Stephen D. Page, Director, Office of Air Quality Planning and Standards to Regional Air Division Directors, Guidance Concerning Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program. August 23, 2010. Office of Air Quality Planning and Standards U.S. EPA, Research Triangle Park. Available at: *https://www.epa.gov/sites/default/files/2015-07/documents/appwso2.pdf;* 44 FR 3274, 3278, January 16, 1979; See also *In re Interpower of New York, Inc.,* 5 E.A.D. 130, 141 (EAB 1994) (describing an EPA Region 2 PSD permit that relied in part on offsets to demonstrate the source would not cause or contribute to a violation of the NAAQS). 52 FR 24634, 24684, July 1, 1987; 78 FR 3085, 3261–62, January 15, 2013. The EPA has recognized the ability of sources to obtain offsets in the context of PSD though the PSD provisions of the Act do not expressly reference offsets as the NNSR provisions of the Act do. *See* 80 FR 65292, 65441, October 26, 2015.

[228] All of these pollutants are identified as precursors to $PM_{2.5}$ in NNSR regulations. *See* 40 CFR 51.165(a)(1)(xxxvii)(C)(*2*). No significant emission rate is established by the EPA for ammonia, and states are required to define ''significant'' for ammonia for their respective areas unless the state pursues the optional precursor demonstration to exclude ammonia from planning requirements. *See* 40 CFR 51.165(a)(1)(x)(F); 40 CFR 51.165(a)(13).

and environmental justice, including, for example, a memorandum [229] and attached permitting principles.[230] The EPA recommends that PSD and NNSR permitting authorities review this memorandum and the principles and consider applying them in their air permitting actions as appropriate to help identify, analyze, and address environmental justice concerns in those air permitting actions to help ensure that the NAAQS achieve their intended health benefits for at-risk populations.

F. Transportation Conformity Program

Transportation conformity is required under CAA section 176(c) to ensure that transportation plans, transportation improvement programs (TIPs) and federally supported highway and transit projects will not cause or contribute to any new air quality violation, increase the frequency or severity of any existing violation, or delay timely attainment or any required interim emissions reductions or other milestones. Transportation conformity applies to areas that are designated as nonattainment or nonattainment areas that have been redesignated to attainment with an approved CAA section 175A maintenance plan (*i.e.,* maintenance areas) for transportation-related criteria pollutants: carbon monoxide, ozone, NO_2, $PM_{2.5}$, and PM_{10}. Transportation conformity for the revised primary annual $PM_{2.5}$ NAAQS does not apply until one year after the effective date of nonattainment designations for that NAAQS. *See* CAA section 176(c)(6) and 40 CFR 93.102(d)). The EPA's Transportation Conformity Rule [231] establishes the criteria and procedures for determining whether transportation activities conform to the SIP. No changes are being made to the transportation conformity rule in this final rulemaking. The EPA notes that the transportation conformity rule already addresses the $PM_{2.5}$ and PM_{10} NAAQS. However, in the future, the EPA intends to review the need to issue or revise guidance describing how the current conformity rule applies in nonattainment and maintenance areas for the revised primary annual $PM_{2.5}$ NAAQS, as needed.

G. General Conformity Program

The conformity requirement under CAA section 176(c) ensures that federal activities implemented by federal agencies will not interfere with a State's ability to attain and maintain the NAAQS. Under CAA 176(c)(1), the requirement prohibits Federal agencies from approving, permitting, licensing, or funding activities that do not conform to the purpose of the applicable SIP for the control and prevention of air pollution. *See* CAA 176(c)(1)(A). Under CAA 176(c)(1)(B), conformity to an implementation plan means that federal activities will not cause or contribute to any new violations of the NAAQS, increase the frequency or severity of any existing NAAQS violation, or delay timely attainment or any required interim emissions reductions or other milestones contained in the applicable SIP.

The general conformity program [232] implements CAA section 176(c)(4)(A), and the criteria and procedures for determining conformity of federal activities to the applicable SIP are established under 40 CFR part 93 subpart B, sections 93.150 through 93.165. General Conformity applies to federal activities that (1) would cause emissions of relevant criteria or precursor pollutants to originate within nonattainment areas or areas that have been redesignated to attainment with an approved CAA section 175A maintenance plan (*i.e.,* maintenance areas), as set forth under 40 CFR 93.153, and (2) are not Federal Highway Administration (FHWA) or Federal Transit Administration (FTA) transportation projects as defined in 40 CFR 93.101 under the transportation conformity requirements. *See* 40 CFR 93.153. General conformity for the revised primary annual $PM_{2.5}$ NAAQS does not apply until one year after the effective date of the nonattainment designation for that NAAQS. *See* 40 CFR 93.153(k).

With regard to issues regarding prescribed fires, which were addressed earlier in this action, here is some additional information regarding prescribed fires and General Conformity regulations. Under the General Conformity regulations at 40 CFR 93.153(c)(4), a conformity evaluation is not required to support a decision by a federal agency to conduct or carry out prescribed burning when the burn is consistent with the terms of a land management plan or other plan that includes the prescribed burn at issue, where the overall plan that includes the burn was previously evaluated under 40 CFR part 93 subpart B by the responsible federal agency, and the agency found the plan conforms under CAA paragraphs 176(c)(1)(A) and (1)(B). This assumes the burn at issue will be conducted by meeting any conditions specified as necessary for meeting conformity in the agency's decision to approve the plan. Alternatively, a presumption of conformity applies also under 40 CFR 93.153(i)(2) for prescribed fires conducted in accordance with a Smoke Management Program that meets the requirements of the EPA's 1998 Interim Air Quality Policy on Wildland and Prescribed Fires or an equivalent replacement EPA policy. The preamble to the Exceptional Events Rule explains that the EPA adapted language associated with the six basic components of a certifiable Smoke Management Program for exceptional events purposes from the 1998 Interim Air Quality Policy on Wildland and Prescribed Fires (*see, e.g.,* 81 FR 68216, 68252 (including footnote 75), 68256, October 2, 2016). The Exceptional Events Rule at 40 CFR 50.14(a)(3)(ii)(A) also indicates that certain requirements within the Exceptional Events Rule can be satisfied if a prescribed fire is conducted under a certified Smoke Management Program or using appropriate basic smoke management practices such as those identified in Table 1 to 40 CFR 50.14 (*see e.g.,* 81 FR 68216, 68250–68257, 68277–68278, October 3, 2016).

No changes are being made to the general conformity regulations in this final rulemaking and the EPA notes that the courts recognize the regulations constitute control for the established $PM_{2.5}$ and PM_{10} NAAQS. However, in the future, the EPA intends to review the need to issue or revise guidance describing how the current General Conformity regulations apply within nonattainment and maintenance areas for the revised primary annual $PM_{2.5}$ NAAQS, as needed.[233]

IX. Statutory and Executive Order Reviews

Additional information about these statutes and Executive orders can be

[229] Memorandum from Joseph Goffman, Principal Deputy Assistant Administrator, Office of Air and Radiation, to Air and Radiation Division Directors, ''Principles for Addressing Environmental Justice in Air Permitting'' (December 22, 2022), available at *https://www.epa.gov/caa-permitting/ej-air-permitting-principles-addressing-environmental-justice-concerns-air.*

[230] *Id.,* Attachment, ''EJ in Air Permitting: Principles for Addressing Environmental Justice Concerns in Air Permitting'' (December 2022), available at *https://www.epa.gov/caa-permitting/ej-air-permitting-principles-addressing-environmental-justice-concerns-air.*

[231] 40 CFR part 93, subpart A.

[232] 40 CFR part 93 subpart B.

[233] Further, the EPA's current Unified Agenda and Regulatory Plan includes its intention to issue a proposed rule to amend the General Conformity Regulations. The EPA intends to address in that regulatory action topics regarding prescribed fire, including consideration of smoke management approaches such as those discussed in the Exceptional Events Rule, among other topics. See, *e.g., https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202310&RIN=2060-AV28.*

found at *https://www.epa.gov/laws-regulations/laws-and-executive-orders.*

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 14094: Modernizing Regulatory Review

This action is ''significant regulatory action'' as defined under section 3(f)(1) of Executive Order 12866, as amended by Executive Order 14094. Accordingly, the EPA submitted this action to the Office of Management and Budget (OMB) for review. Documentation of any changes made in response to the Executive Order 12866 review is available in the docket. The EPA prepared an illustrative analysis of the potential costs and benefits associated with this action. This analysis, ''Regulatory Impact Analysis for the Reconsideration of the National Ambient Air Quality Standards for Particulate Matter,'' is available in the Regulatory Impact Analysis (RIA) docket (EPA–HQ–OAR–2019–0587) and briefly summarized below. However, the CAA and judicial decisions make clear that the economic and technical feasibility of attaining ambient standards are not to be considered in setting or revising NAAQS, although such factors may be considered in the development of State plans to implement the standards. Accordingly, although an RIA has been prepared, the results of the RIA have not been considered in issuing this final rule.

The RIA estimates the costs and monetized human health benefits in 2032, after implementing existing and expected regulations and assessing emissions reductions to meet the current primary annual and 24-hour particulate matter NAAQS (12/35 μg/m^3), associated with applying national control strategies for the revised annual and 24-hour standard levels of 9/35 μg/m^3, as well as the following less and more stringent alternative standard levels: (1) A less stringent alternative annual standard level of 10 μg/m^3 in combination with the current 24-hour standard (*i.e.,* 10/35 μg/m^3), (2) a more stringent alternative annual standard level of 8 μg/m^3 in combination with the current 24-hour standard (*i.e.,* 8/35 μg/m^3), and (3) a more stringent alternative 24-hour standard level of 30 μg/m^3 in combination with an annual standard level of 10 μg/m^3 (*i.e.,* 10/30 μg/m^3). Table 3 provides a summary of the estimated monetized benefits, costs, and net benefits associated with applying national control strategies toward reaching the revised and alternative standard levels.

TABLE 3—ESTIMATED MONETIZED BENEFITS, COSTS, AND NET BENEFITS OF THE ILLUSTRATIVE CONTROL STRATEGIES APPLIED TOWARD THE PRIMARY REVISED AND ALTERNATIVE ANNUAL AND DAILY STANDARD LEVELS OF 10/35 μg/m^3, 10/30 μg/m^3, 9/35 μg/m^3, AND 8/35 μg/m^3 IN 2032 FOR THE U.S.

[Millions of 2017$]

	10/35	10/30	9/35	8/35
Benefits[a]	$8,500 and $17,000	$10,000 and $21,000	$22,000 and $46,000	$48,000 and $99,000.
Costs[b]	$200	$340	$590	$1,500.
Net Benefits	$8,300 and $17,000	$9,900 and $21,000	$22,000 and $46,000	$46,000 and $97,000.

Notes: Rows may not appear to add correctly due to rounding. We provide a snapshot of costs and benefits in 2032, using the best available information to approximate social costs and social benefits recognizing uncertainties and limitations in those estimates. The estimated costs and monetized human health benefits associated with applying national control strategies do not fully account for all the emissions reductions needed to reach the final and more stringent alternative standard levels for some standard levels analyzed.

[a] We assume that there is a cessation lag between the change in PM exposures and the total realization of changes in mortality effects. Specifically, we assume that some of the incidences of premature mortality related to $PM_{2.5}$ exposures occur in a distributed fashion over the 20 years following exposure, which affects the valuation of mortality benefits at different discount rates. Similarly, we assume there is a cessation lag between the change in PM exposures and both the development and diagnosis of lung cancer. The benefits are associated with two point estimates from two different epidemiologic studies, and we present the benefits calculated at a real discount rate of 3 percent. The monetized benefits exclude additional health and welfare benefits that could not be quantified.

[b] The costs are annualized using a 7 percent interest rate.

B. Paperwork Reduction Act (PRA)

This action does not impose any new information collection burden under the PRA. OMB has previously approved the information collection activities contained in the existing regulations and has assigned OMB control number 2060–0084. The data collected through this information collection consist of ambient air concentration measurements for the seven air pollutants with national ambient air quality standards (*i.e.,* ozone, sulfur dioxide, nitrogen dioxide, lead, carbon monoxide, $PM_{2.5}$ and PM_{10}), ozone precursors, air toxics, meteorological variables at a select number of sites, and other supporting measurements. Accompanying the pollutant concentration data are quality assurance/quality control data and air monitoring network design information. The EPA and others (*e.g.,* State and local air quality management agencies, tribal entities, environmental organizations, academic institutions, industrial groups) use the ambient air quality data for many purposes including informing the public and other interested parties of an area's air quality, judging an area's air quality in comparison with the established health or welfare standards, evaluating an air quality management agency's progress in achieving or maintaining air pollutant levels below the national and local standards, developing and revising State Implementation Plans (SIPs), evaluating air pollutant control strategies, developing or revising national control policies, providing data for air quality model development and validation, supporting enforcement actions, documenting episodes and initiating episode controls, assessing air quality trends, and conducting air pollution research.

C. Regulatory Flexibility Act (RFA)

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. This action will not impose any requirements on small entities. Rather, this final rule establishes national standards for allowable concentrations of PM in ambient air as required by section 109 of the CAA. See also *American Trucking Associations* v. *EPA,* 175 F.3d 1027, 1044–45 (D.C. Cir. 1999) (NAAQS do not have significant impacts upon small entities because NAAQS themselves impose no regulations upon small entities), rev'd in part on other grounds, *Whitman* v. *American Trucking Associations,* 531 U.S. 457 (2001).

D. Unfunded Mandates Reform Act (UMRA)

This action does not contain an unfunded mandate of $100 million or more as described in the Unfunded Mandates Reform Act (UMRA), 2 U.S.C. 1531–1538, and does not significantly or uniquely affect small governments. Furthermore, as indicated previously, in setting a NAAQS the EPA cannot consider the economic or technological feasibility of attaining ambient air quality standards, although such factors may be considered to a degree in the development of State plans to implement the standards. See also *American Trucking Associations* v. *EPA,* 175 F. 3d at 1043 (noting that because the EPA is precluded from considering costs of implementation in establishing NAAQS, preparation of the RIA pursuant to the Unfunded Mandates Reform Act would not furnish any information that the court could consider in reviewing the NAAQS).

E. Executive Order 13132: Federalism

This action will not have substantial direct effects on the States, on the relationship between the National Government and the States, or on the distribution of power and responsibilities among the various levels of government. However, the EPA recognizes that States will have a substantial interest in this action and any future revisions to associated requirements.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

This action does not have Tribal implications, as specified in Executive Order 13175. It does not have a substantial direct effect on one or more Indian Tribes as Tribes are not obligated to adopt or implement any NAAQS. In addition, Tribes are not obligated to conduct ambient monitoring for PM or to adopt the ambient monitoring requirements of 40 CFR part 58. Thus, Executive Order 13175 does not apply to this action. However, consistent with the *EPA Policy on Consultation and Coordination with Indian Tribes,* the EPA offered consultation to all 574 Federally Recognized Tribes during the development of this action. Although no Tribes requested consultation, the EPA provided informational meetings including an informational meeting with the Pueblo de San Ildefonso and provided information on the monthly National Tribal Air Association calls.

G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045 directs federal agencies to include an evaluation of the health and safety effects of the planned regulation on children in federal health and safety standards and explain why the regulation is preferable to potentially effective and reasonably feasible alternatives. This action is subject to Executive Order 13045 because it is a significant regulatory action under section 3(f)(1) of Executive Order 12866, and the EPA believes that the environmental health or safety risk addressed by this action may have a disproportionate effect on children. Accordingly, we have evaluated the environmental health or safety effects of PM exposures on children. The protection offered by these standards may be especially important for children because childhood represents a lifestage associated with increased susceptibility to PM-related health effects. Because children have been identified as a susceptible population, we have carefully evaluated the environmental health effects of exposure to PM pollution among children. Children make up a substantial fraction of the U.S. population, and often have unique factors that contribute to their increased risk of experiencing a health effect due to exposures to ambient air pollutants because of their continuous growth and development. As described in the 2019 Integrated Science Assessment, children may be particularly at risk for health effects related to ambient air $PM_{2.5}$ exposures compared with adults because they have (1) a developing respiratory system, (2) increased ventilation rates relative to body mass compared with adults, and (3) an increased proportion of oral breathing, particularly in boys, relative to adults. More detailed information on the evaluation of the scientific evidence and policy considerations pertaining to children, including an explanation for why the Administrator judges the revised standards to be requisite to protect public health, including the health of children, with an adequate margin of safety, are contained in section II.A.2. ''Overview of the Health Effects Evidence'', section II.A.2.b ''Public Health Implications and At-Risk Populations'' and II.B ''Conclusions on the Primary $PM_{2.5}$ Standards'' of this preamble. Copies of all documents have been placed in the public docket for this action. The Administrator judges that revising the primary annual $PM_{2.5}$ standard to a level of 9.0 $\mu g/m^3$ and retaining the primary 24-hour $PM_{2.5}$ standard provides requisite public health protection with an adequate margin of safety, including for children. Furthermore, the Policy on Children's Health also applies to this action. Information on how the Policy was applied is described in section II.A.2 ''Overview of the Health Effects Evidence'', section II.A.2.b ''Public Health Implications and At-Risk Populations'' and II.B ''Conclusions on the Primary $PM_{2.5}$ Standards'' of this preamble.

H. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution or Use

This action is not a ''significant energy action'' because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. The purpose of this action is to revise level of the primary annual $PM_{2.5}$ NAAQS. The action does not prescribe specific pollution control strategies by which these ambient standards and monitoring revisions will be met. Such strategies will be developed by States on a case-by-case basis, and the EPA cannot predict whether the control options selected by States will include regulations on energy suppliers, distributors, or users. Thus, the EPA concludes that this action does not constitute a significant energy action as defined in Executive Order 13211.

I. National Technology Transfer and Advancement Act (NTTAA)

This rulemaking involved environmental monitoring or measurement. The EPA has decided it will continue to use the existing indicators for fine ($PM_{2.5}$) and coarse (PM_{10}) particles. The indicator for fine particles is measured using the Reference Method for the Determination of Fine Particulate Matter as $PM_{2.5}$ in the Atmosphere (appendix L to 40 CFR part 50), which is known as the $PM_{2.5}$ FRM, and the indicator for coarse particles is measured using the Reference Method for the Determination of Particulate Matter as PM_{10} in the Atmosphere (appendix J to 40 CFR part 50), which is known as the PM_{10} FRM.

To the extent feasible, the EPA employs a Performance-Based Measurement System (PBMS), which does not require the use of specific, prescribed analytic methods. The PBMS is defined as a set of processes wherein the data quality needs, mandates or limitations of a program or project are specified and serve as criteria for selecting appropriate methods to meet those needs in a cost-effective manner.

It is intended to be more flexible and cost effective for the regulated community; it is also intended to encourage innovation in analytical technology and improved data quality. Though the FRM defines the particular specifications for ambient monitors, there is some variability with regard to how monitors measure PM, depending on the type and size of PM and environmental conditions. Therefore, it is not practically possible to fully define the FRM in performance terms to account for this variability. Nevertheless, our approach in the past has resulted in multiple brands of monitors being approved as FRM for PM, and we expect this to continue. Also, the FRMs described in 40 CFR part 50 and the equivalency criteria described in 40 CFR part 53, constitute a performance-based measurement system for PM, since methods that meet the field testing and performance criteria can be approved as FEMs. Since finalized in 2006 (71 FR 61236, October 17, 2006) the new field and performance criteria for approval of $PM_{2.5}$ continuous FEMs has resulted in the approval of 13 approved FEMs. In summary, for measurement of $PM_{2.5}$ and PM_{10}, the EPA relies on both FRMs and FEMs, with FEMs relying on a PBMS approach for their approval. The EPA is not precluding the use of any other method, whether it constitutes a voluntary consensus standard or not, as long as it meets the specified performance criteria.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations and Executive Order 14096: Revitalizing Our Nation's Commitment to Environmental Justice for All

The EPA believes that the human health or environmental conditions associated with the primary $PM_{2.5}$ NAAQS that exist prior to this action result in or have the potential to result in disproportionate and adverse human health or environmental effects on communities with environmental justice concerns. There is strong evidence for racial and ethnic disparities in $PM_{2.5}$ exposures and $PM_{2.5}$-related health risk, as assessed in the 2019 Integrated Science Assessment and with even more evidence available since the literature cutoff date for the 2019 Integrated Science Assessment and evaluated in the Supplement to the 2019 Integrated Science Assessment. There is strong evidence demonstrating that Black and Hispanic populations, in particular, have higher $PM_{2.5}$ exposures than non-Hispanic White populations. Black populations or individuals that live in predominantly Black neighborhoods experience higher $PM_{2.5}$ exposures, in comparison to non-Hispanic White populations. There is also consistent evidence across multiple studies that demonstrate increased risk of $PM_{2.5}$-related health effects, with the strongest evidence for health risk disparities for mortality. There is also evidence of health risk disparities for both Hispanic and non-Hispanic Black populations compared to non-Hispanic White populations for cause-specific mortality and incident hypertension.

Socioeconomic status (SES) is a composite measure that includes metrics such as income, occupation, or education, and can play a role in access to healthy environments as well as access to healthcare. SES may be a factor that contributes to differential risk from $PM_{2.5}$-related health effects. Studies assessed in the 2019 Integrated Science Assessment and Supplement to the 2019 Integrated Science Assessment provide evidence that lower SES communities are exposed to higher concentrations of $PM_{2.5}$ compared to higher SES communities. Studies using composite measures of neighborhood SES consistently demonstrated a disparity in both $PM_{2.5}$ exposure and the risk of $PM_{2.5}$-related health outcomes. There is some evidence that supports associations larger in magnitude between mortality and long-term $PM_{2.5}$ exposures for those with low income or living in lower income areas compared to those with higher income or living in higher income neighborhoods. Additionally, evidence supports conclusions that lower SES is associated with cause-specific mortality and certain health endpoints (*i.e.,* HI and CHF), but less so for all-cause or total (non-accidental) mortality.

The EPA believes that this action is likely to reduce existing disproportionate and adverse effects on communities with environmental justice concerns.

The EPA additionally identified and addressed environmental justice concerns by providing opportunities for public input on the proposed decisions. The EPA held a multi-day virtual public hearing for the public to provide oral testimony and there was a 60-day public comment period for the proposed action. As described in section II.A.3 above, the EPA conducted a risk assessment to support this action that included an at-risk analysis that evaluates exposure and $PM_{2.5}$ mortality risk for older adults (*e.g.,* 65 years and older), stratified for White, Black, Asian, Native American, Non-Hispanic, and Hispanic individuals. This at-risk analysis found that compared to a primary annual $PM_{2.5}$ standard with a level of 12.0 μg/m^3, meeting a revised annual standard with a level of 9.0 μg/m^3 is estimated to reduce $PM_{2.5}$-associated health risks in the 30 study areas controlled by the annual standard by about 22–28% and is expected to reduce disparities in exposure and risk among these populations.

The information supporting this Executive Order review is is contained in sections II.A.2, II.B.3.a, II.B.3.c, II.B.2, and II.B.4. of this preamble and also in the 2019 Integrated Science Assessment, Supplement to the 2019 Integrated Science Assessment, and 2022 Policy Assessment. The EPA has carefully evaluated the potential impacts on minority populations and low SES populations as discussed in sections II.A.2, II.A.3, II.B.2, and II.B.4 of this preamble. The 2019 Integrated Science Assessment, Supplement to the Integrated Science Assessment, and 2022 Policy Assessment contain the evaluation of the scientific evidence, quantitative risk analyses and policy considerations that pertain to these populations. These documents are available in the public docket for this action.

K. Congressional Review Act (CRA)

This action is subject to the CRA, and the EPA will submit a rule report to each House of the Congress and to the Comptroller General of the United States. This action meets the criteria set forth in 5 U.S.C. 804(2).

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List of Subjects

40 CFR Part 50

Environmental protection, Air pollution control, Carbon monoxide, Lead, Nitrogen dioxide, Ozone, Particulate matter, Sulfur oxides.

40 CFR Part 53

Environmental protection, Administrative practice and procedure, Air pollution control, Reporting and recordkeeping requirements.

40 CFR Part 58

Environmental protection, Administrative practice and procedure, Air pollution control, Intergovernmental relations, Reporting and recordkeeping requirements.

Michael S. Regan,

Administrator.

For the reasons set forth in the preamble, chapter I of title 40 of the Code of Federal Regulations is amended as follows:

PART 50—NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS

■ 1. The authority citation for part 50 continues to read as follows:

Authority: 42 U.S.C. 7401, *et seq.*

■ 2. Add § 50.20 to read as follows:

§ 50.20 National primary ambient air quality standards for $PM_{2.5}$.

(a) The national primary ambient air quality standards for $PM_{2.5}$ are 9.0 micrograms per cubic meter ($\mu g/m^3$) annual arithmetic mean concentration and 35 $\mu g/m^3$ 24-hour average concentration measured in the ambient air as $PM_{2.5}$ (particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers) by either:

(1) A reference method based on appendix L to this part and designated in accordance with part 53 of this chapter; or

(2) An equivalent method designated in accordance with part 53 of this chapter.

(b) The primary annual $PM_{2.5}$ standard is met when the annual arithmetic mean concentration, as determined in accordance with appendix N to this part, is less than or equal to 9.0 $\mu g/m^3$.

(c) The primary 24-hour $PM_{2.5}$ standard is met when the 98th percentile 24-hour concentration, as determined in accordance with appendix N to this part, is less than or equal to 35 $\mu g/m^3$.

■ 3. Amend appendix K to part 50 by:

■ a. In section 1.0 revising paragraph (b);

■ b. In section 2.3 adding paragraph (d); and

■ c. In section 3.0 adding paragraphs (a) and (b).

The revision and additions read as follows:

Appendix K to Part 50—Interpretation of the National Ambient Air Quality Standards for Particulate Matter

1.0 General

* * * * *

(b) The terms used in this appendix are defined as follows:

Average refers to the arithmetic mean of the estimated number of exceedances per year, as per section 3.1 of this appendix.

Collocated monitors refer to two or more air measurement instruments for the same parameter (*e.g.,* PM_{10} mass) operated at the same site location, and whose placement is consistent with part 53 of this chapter. For purposes of considering a combined site record in this appendix, when two or more monitors are operated at the same site, one

monitor is designated as the ''primary'' monitor with any additional monitors designated as ''collocated.'' It is implicit in these appendix procedures that the primary monitor and collocated monitor(s) are all reference or equivalent methods; however, it is not a requirement that the primary and collocated monitors utilize the same specific sampling and analysis method.

Combined site data record is the data set used for performing computations in this appendix and represents data for the primary monitors augmented with data from collocated monitors according to the procedure specified in section 3.0(a) of this appendix.

Daily value for PM_{10} refers to the 24-hour average concentration of PM_{10} calculated or measured from midnight to midnight (local time).

Exceedance means a daily value that is above the level of the 24-hour standard after rounding to the nearest 10 $\mu g/m^3$ (*i.e.,* values ending in 5 or greater are to be rounded up).

Expected annual value is the number approached when the annual values from an increasing number of years are averaged, in the absence of long-term trends in emissions or meteorological conditions.

Primary monitors are suitable monitors designated by a State or local agency in their annual network plan as the default data source for creating a combined site data record. If there is only one suitable monitor at a particular site location, then it is presumed to be a primary monitor.

Year refers to a calendar year.

* * * * *

2.3 Data Requirements

* * * * *

(d) 24-hour average concentrations will be computed from submitted hourly PM_{10} concentration data for each corresponding day of the year and the result will be stored in the first, or start, hour (*i.e.,* midnight, hour '0') of the 24-hour period. A 24-hour average concentration shall be considered valid if at least 75 percent of the hourly averages (*i.e.,* 18 hourly values) for the 24-hour period are available. In the event that fewer than all 24 hourly average concentrations are available (*i.e.,* fewer than 24 but at least 18), the 24-hour average concentration shall be computed on the basis of the hours available using the number of available hours within the 24-hour period as the divisor (*e.g.,* the divisor is 19 if 19 hourly values are available). 24-hour periods with 7 or more missing hours shall also be considered for computations in this appendix if, after substituting zero for all missing hourly concentrations, the resulting 24-hour average daily value exceeds the level of the 24-hour standard specified in § 50.6 after rounding to the nearest 10 $\mu g/m^3$.

* * * * *

3.0 Computational Equations for the 24-Hour Standards

(a) All computations shown in this appendix shall be implemented on a site-level basis. Site level concentration data shall be processed as follows:

(1) The default dataset for PM_{10} mass concentrations for a site shall consist of the measured concentrations recorded from the designated primary monitor(s). All daily values produced by the primary monitor are considered part of the site record.

(2) If a daily value is not produced by the primary monitor for a particular day, but a value is available from a single collocated monitor, then that collocated monitor value shall be considered part of the combined site data record. If daily value data is available from two or more collocated monitors, the average of those collocated values shall be used as the daily value. The data record resulting from this procedure is referred to as the ''combined site data record.''

(b) In certain circumstances, including but not limited to site closures or relocations, data from two nearby sites may be combined into a single site data record for the purpose of calculating a valid design value. The appropriate Regional Administrator may approve such combinations if the Regional Administrator determines that the measured concentrations do not differ substantially between the two sites, taking into consideration factors such as distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries, and terrain features.

* * * * *

■ 4. Amend appendix L to part 50 by revising section 7.3.4 and adding section 7.3.4.5 to read as follows:

Appendix L to Part 50—Reference Method for the Determination of Fine Particulate Matter as $PM_{2.5}$ in the Atmosphere

* * * * *

7.3.4 *Particle size separator.* The sampler shall be configured with one of the three alternative particle size separators described in this section. One separator is an impactor-type separator (WINS impactor) described in sections 7.3.4.1, 7.3.4.2, and 7.3.4.3 of this appendix. One alternative separator is a cyclone-type separator (VSCC™) described in section 7.3.4.4 of this appendix. The other alternative separator is also a cyclone-type separator (TE–$PM_{2.5}$C) described in section 7.3.4.5 of this appendix.

* * * * *

7.3.4.5 A second cyclone-type separator is identified as a Tisch TE–$PM_{2.5}$C Cyclone particle size separator specified as part of EPA-designated reference method RFPS–1014–219 and as manufactured by Tisch Environmental Incorporated, 145 S. Miami Avenue, Village of Cleves, Ohio 45002.

* * * * *

■ 5. Amend appendix N to part 50 by:
■ a. In section 1.0 revising paragraph (a);
■ b. In section 3.0 adding paragraph (d)(3);
■ c. In section 4.1 revising paragraph (a); and
■ d. In section 4.2 revising paragraph (a).

The addition and revisions read as follows.

Appendix N to Part 50—Interpretation of the National Ambient Air Quality Standards for $PM_{2.5}$

1.0 General

(a) This appendix explains the data handling conventions and computations necessary for determining when the national ambient air quality standards (NAAQS) for $PM_{2.5}$ are met, specifically the primary and secondary annual and 24-hour $PM_{2.5}$ NAAQS specified in §§ 50.7, 50.13, 50.18, and 50.20. $PM_{2.5}$ is defined, in general terms, as particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers. $PM_{2.5}$ mass concentrations are measured in the ambient air by a Federal Reference Method (FRM) based on appendix L to this part, as applicable, and designated in accordance with part 53 of this chapter or by a Federal Equivalent Method (FEM) designated in accordance with part 53 of this chapter. Only those FRM and FEM measurements that are derived in accordance with part 58 of this chapter (*i.e.,* that are deemed ''suitable'') shall be used in comparisons with the $PM_{2.5}$ NAAQS. The data handling and computation procedures to be used to construct annual and 24-hour NAAQS metrics from reported $PM_{2.5}$ mass concentrations, and the associated instructions for comparing these calculated metrics to the levels of the $PM_{2.5}$ NAAQS, are specified in sections 2.0, 3.0, and 4.0 of this appendix.

* * * * *

3.0 Requirements for Data Use and Data Reporting for Comparisons With the NAAQS for $PM_{2.5}$

* * * * *

(d) * * *

(3) In certain circumstances, including but not limited to site closures or relocations, data from two nearby sites may be combined into a single site data record for the purpose of calculating a valid design value. The appropriate Regional Administrator may approve such site combinations if the Regional Administrator determines that the measured concentrations do not differ substantially between the two sites, taking into consideration factors such as distance between sites, spatial and temporal patterns in air quality, local emissions and meteorology, jurisdictional boundaries, and terrain features.

* * * * *

4.1 Annual $PM_{2.5}$ NAAQS

(a) Levels of the primary and secondary annual $PM_{2.5}$ NAAQS are specified in §§ 50.7, 50.13, 50.18, and 50.20 as applicable.

* * * * *

4.2 Twenty-Four-Hour $PM_{2.5}$ NAAQS

(a) Levels of the primary and secondary 24-hour $PM_{2.5}$ NAAQS are specified in §§ 50.7, 50.13, 50.18, and 50.20 as applicable.

* * * * *

PART 53—AMBIENT AIR MONITORING REFERENCE AND EQUIVALENT METHODS

■ 6. The authority citation for part 53 continues to read as follows:

Authority: Sec. 301(a) of the Clean Air Act (42 U.S.C. 1857g(a)), as amended by sec. 15(c)(2) of Pub. L. 91–604, 84 Stat. 1713, unless otherwise noted.

Subpart A—General Provisions

■ 7. Amend § 53.4 by:
■ a. Revising paragraph (a);
■ b. Adding paragraph (b)(7); and
■ c. Revising paragraph (d).

The revisions and addition read as follows:

§ 53.4 Applications for reference or equivalent method determinations.

(a) Applications for FRM or FEM determinations and modification requests of existing designated instruments shall be submitted to: U.S. Environmental Protection Agency, Director, Center for Environmental Measurement and Modeling, Reference and Equivalent Methods Designation Program (MD–D205–03), 109 T.W. Alexander Drive, P.O. Box 12055, Research Triangle Park, North Carolina 27711 (commercial delivery address: 4930 Old Page Road, Durham, North Carolina 27703).

* * * * *

(b) * * *

(7) All written materials for new FRM and FEM applications and modification requests must be submitted in English in MS Word format. For any calibration certificates originally written in a non-English language, the original non-English version of the certificate must be submitted to EPA along with a version of the certificate translated to English. All laboratory and field data associated with new FRM and FEM applications and modification requests must be submitted in MS Excel format. All worksheets in MS Excel must be unprotected to enable full inspection as part of the application review process.

* * * * *

(d) For candidate reference or equivalent methods or for designated instruments that are the subject of a modification request, the applicant, if requested by EPA, shall provide to EPA a representative sampler or analyzer for test purposes. The sampler or analyzer shall be shipped free on board (FOB) destination to Director, Center for Environmental Measurements and Modeling, Reference and Equivalent Methods Designation Program (MD D205–03), U.S. Environmental Protection Agency, 4930 Old Page Road, Durham, North Carolina 27703, scheduled to arrive concurrently with or within 30 days of the arrival of the other application materials. This sampler or analyzer may be subjected to various tests that EPA determines to be necessary or appropriate under § 53.5(f), and such tests may include special tests not described in this part. If the instrument submitted under this paragraph (d) malfunctions, becomes inoperative, or fails to perform as represented in the application before the necessary EPA testing is completed, the applicant shall be afforded the opportunity to repair or replace the device at no cost to the EPA. Upon completion of EPA testing, the sampler or analyzer submitted under this paragraph (d) shall be repacked by EPA for return shipment to the applicant, using the same packing materials used for shipping the instrument to EPA unless alternative packing is provided by the applicant. Arrangements for, and the cost of, return shipment shall be the responsibility of the applicant. The EPA does not warrant or assume any liability for the condition of the sampler or analyzer upon return to the applicant.

■ 8. Amend § 53.8 by revising paragraph (a) to read as follows:

§ 53.8 Designation of reference and equivalent methods.

(a) A candidate method determined by the Administrator to satisfy the applicable requirements of this part shall be designated as an FRM or FEM (as applicable) by and upon publication of the designation in the **Federal Register**. Applicants shall not publicly announce, market, or sell the candidate sampler and analyzer as an approved FRM or FEM (as applicable) until the designation is published in the **Federal Register**.

* * * * *

■ 9. Amend § 53.14 by revising paragraphs (c)(4), (5), and (6) to read as follows:

§ 53.14 Modification of a reference or equivalent method.

* * * * *

(c) * * *

(4) Send notice to the applicant that additional information must be submitted before a determination can be made and specify the additional information that is needed (in such cases, the 90-day period shall commence upon receipt of the additional information).

(5) Send notice to the applicant that additional tests are necessary and specify which tests are necessary and how they shall be interpreted (in such cases, the 90-day period shall commence upon receipt of the additional test data).

(6) Send notice to the applicant that additional tests will be conducted by the Administrator and specify the reasons for and the nature of the additional tests (in such cases, the 90-day period shall commence 1 calendar day after the additional tests are completed).

* * * * *

■ 10. Revise table A–1 to subpart A of part 53 to read as follows:

TABLE A–1 TO SUBPART A OF PART 53—SUMMARY OF APPLICABLE REQUIREMENTS FOR REFERENCE AND EQUIVALENT METHODS FOR AIR MONITORING OF CRITERIA POLLUTANTS

Pollutant	Reference or equivalent	Manual or automated	Applicable appendix of part 50 of this chapter	Applicable subparts of this part					
				A	B	C	D	E	F
SO_2	Reference	Manual	A–2						
		Automated	A–1	✓	✓				
	Equivalent	Manual	A–1	✓		✓			
		Automated	A–1	✓	✓	✓			
CO	Reference	Automated	C	✓	✓				
	Equivalent	Manual	C	✓		✓			
		Automated	C	✓	✓	✓			
O_3	Reference	Automated	D	✓	✓				
	Equivalent	Manual	D	✓		✓			
		Automated	D	✓	✓	✓			
NO_2	Reference	Automated	F	✓	✓				
	Equivalent	Manual	F	✓		✓			
		Automated	F	✓	✓	✓			

TABLE A–1 TO SUBPART A OF PART 53—SUMMARY OF APPLICABLE REQUIREMENTS FOR REFERENCE AND EQUIVALENT METHODS FOR AIR MONITORING OF CRITERIA POLLUTANTS—Continued

Pollutant	Reference or equivalent	Manual or automated	Applicable appendix of part 50 of this chapter	Applicable subparts of this part					
				A	B	C	D	E	F
Pb	Reference	Manual	G						
	Equivalent	Manual	G	✓		✓			
		Automated	G	✓		✓			
PM_{10}-Pb	Reference	Manual	Q						
	Equivalent	Manual	Q	✓		✓			
		Automated	Q	✓		✓			
PM_{10}	Reference	Manual	J	✓			✓		
	Equivalent	Manual	J	✓		✓	✓		
		Automated	J	✓		✓	✓		
$PM_{2.5}$	Reference	Manual	L	✓				✓	
	Equivalent Class I	Manual	L	✓		✓		✓	
	Equivalent Class II	Manual	L [1]	✓		[2]✓		✓	[1 2]✓
	Equivalent Class III	Automated	L [1]	✓		✓		✓	[1]✓
$PM_{10-2.5}$	Reference	Manual	L,[2] O	✓				✓	
	Equivalent Class I	Manual	L,[2] O	✓		✓		✓	
	Equivalent Class II	Manual	L,[2] O	✓		[2]✓		✓	[1,2]✓
	Equivalent Class III	Automated	[1] L, [1 2] O	✓		✓		✓	[1]✓

[1] Some requirements may apply, based on the nature of each particular candidate method, as determined by the Administrator.
[2] Alternative Class III requirements may be substituted.

Subpart B—Procedures for Testing Performance Characteristics of Automated Methods for SO_2, CO, O_3, and NO_2

■ 11. Amend table B–1 to subpart B of part 53 by revising footnote 4 to read as follows:

Table B–1 to Subpart B of Part 53—Performance Limit Specifications for Automated Methods

* * * * *

[4] For nitric oxide interference for the SO_2 ultraviolet fluorescence (UVF) method, interference equivalent is ±0.003 ppm for the lower range.

* * * * *

■ 12. Revise table B–3 to subpart B of part 53 to read as follows:

TABLE B–3 TO SUBPART B OF PART 53—INTERFERENT TEST CONCENTRATION [1]

[Parts per million]

Pollutant	Analyzer type [2]	Hydrochloric acid	Ammonia	Hydrogen sulfide	Sulfur dioxide	Nitrogen dioxide	Nitric oxide	Carbon dioxide	Ethylene	Ozone	M-xylene	Water vapor	Carbon monoxide	Methane	Ethane	Naphthalene
SO_2	Ultraviolet fluorescence			[5] 0.1	[4] 0.14	0.5	0.5			0.5	0.2	20,000				[6] 0.05
SO_2	Flame photometric			0.01	[4] 0.14			750				[3] 20,000	50			
SO_2	Gas chromatography			0.1	[4] 0.14			750				[3] 20,000	50			
SO_2	Spectrophotometric-wet chemical (pararosanaline)	0.2	0.1	0.1	[4] 0.14	0.5		750		0.5						
SO_2	Electrochemical	0.2	0.1	0.1	[4] 0.14	0.5	0.5		0.2	0.5		[3] 20,000				
SO_2	Conductivity	0.2	0.1		[4] 0.14	0.5		750								
SO_2	Spectrophotometric-gas phase, including DOAS				[4] 0.14	0.5	0.5			0.5	0.2					
O_3	Ethylene Chemiluminescence			[3] 0.1				750		[4] 0.08		[3] 20,000				
O_3	NO-chemiluminescence			[3] 0.1		0.5		750		[4] 0.08		[3] 20,000				
O_3	Electrochemical		[3] 0.1		0.5	0.5				[4] 0.08		[3] 20,000				
O_3	Spectrophotometric-wet chemical (potassium iodide)		[3] 0.1		0.5	0.5	[3] 0.5			[4] 0.08						
O_3	Spectrophotometric-gas phase, including ultraviolet absorption and DOAS.				0.5	0.5	[3] 0.5			[4] 0.08	0.02	20,000				
CO	Non-dispersive Infrared							750				20,000	[4] 10			
CO	Gas chromatography with flame ionization detector											20,000	[4] 10		0.5	
CO	Electrochemical						0.5		0.2			20,000	[4] 10			
CO	Catalytic combustion-thermal detection		0.1					750	0.2			20,000	[4] 10	5.0	0.5	
CO	IR fluorescence							750				20,000	[4] 10		0.5	
CO	Mercury replacement-UV photometric								0.2				[4] 10		0.5	
NO_2	Chemiluminescent		[3] 0.1		0.5	[4] 0.1	0.5					20,000				
NO_2	Spectrophotometric-wet chemical (azo-dye reaction)				0.5	[4] 0.1	0.5	750		0.5						
NO_2	Electrochemical	0.2	[3] 0.1		0.5	[4] 0.1	0.5	750		0.5		20,000	50			
NO_2	Spectrophotometric-gas phase		[3] 0.1		0.5	[4] 0.1	0.5			0.5		20,000	50			

[1] Concentrations of interferent listed must be prepared and controlled to ±10 percent of the stated value.
[2] Analyzer types not listed will be considered by the Administrator as special cases.
[3] Do not mix interferent with the pollutant.
[4] Concentration of pollutant used for test. These pollutant concentrations must be prepared to ±10 percent of the stated value.
[5] If candidate method utilizes an elevated-temperature scrubber for removal of aromatic hydrocarbons, perform this interference test.
[6] If naphthalene test concentration cannot be accurately quantified, remove the scrubber, use a test concentration that causes a full-scale response, reattach the scrubber, and evaluate response for interference.

■ 13. Amend appendix A to subpart B of part 53 by revising figures B–3 and B–5 to read as follows:

Appendix A to Subpart B of Part 53—Optional Forms for Reporting Test Results

* * * * *

Figure B–3 to Appendix A to Subpart B of Part 53—Form for Test Data and Calculations for Lower Detectable Limit (LDL) and Interference Equivalent (IE) (see § 53.23(c) and (d))

Analyzer _____
Date _____
Pollutant _____

LDL Interference Test Data

Applicant _____

TEST PARAMETER		READING or CALCULATION	TEST NUMBER														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LOWER DETECTABLE LIMIT		B_Z															
		B_L															
		$LDL = B_L - B_Z$															
INTER-FERENCE EQUIV-ALENT	1	R_1															
		R_{I1}															
		$IE = R_{I1} - R_1$															
	2	R_2															
		R_{I2}															
		$IE = R_{I2} - R_2$															
	3*	R_3															
		R_{I3}															
		$IE = R_{I3} - R_3$															
	4*	R_4															
		R_{I4}															
		$IE = R_{I4} - R_4$															
	5*	R_5															
		R_{I5}															
		$IE = R_{I5} - R_5$															
	TOTAL*	$\sum_{i=1}^{n} \lvert IE_i \rvert$															

*If required.

* * * * *

Figure B–5 to Appendix A to Subpart B of Part 53—Form for Calculating Zero Drift, Span Drift and Precision (see § 53.23(e))

Analyzer _____
Date _____
Pollutant _____

Calculation of Zero Drift, Span Drift, and Precision

Applicant _____

TEST PARAMETER		CALCULATION	TEST DAY (n)														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ZERO DRIFT	12 HOUR	$12ZD = C_{max} - C_{min}$															
	24 HOUR	$Z = (L_1 + L_2)/2$															
		$24ZD = Z_n - Z_{n-1}$															
		$24ZD = Z'_n - Z'_{n-1}$															
SPAN DRIFT	24 HOUR	$S_n = \frac{1}{6}\sum_{i=7}^{12} P_i$															
		$SD_n = \frac{S_n - S_{n-1}}{S_{n-1}} \times 100\%$															
		$SD_n = \frac{S_n - S'_{n-1}}{S'_{n-1}} \times 100\%$															
PREC-ISION	20% URL (P_{20})	P20 = % STANDARD DEVIATION of ($P_1 \ldots P_6$)															
	80% URL (P_{80})	P20 = % STANDARD DEVIATION of ($P_7 \ldots P_{12}$)															

* * * * *

Subpart C—Procedures for Determining Comparability Between Candidate Methods and Reference Methods

■ 14. Amend § 53.35 by revising paragraph (b)(1)(ii)(D) to read as follows:

§ 53.35 Test procedure for Class II and Class III methods for $PM_{2.5}$ and $PM_{10-2.5}$.

* * * * *

(b) * * *

(1) * * *

(ii) * * *

(D) Site D shall be in a large city east of the Mississippi River, having characteristically high humidity levels.

* * * * *

■ 15. Revise table C–4 to subpart C of part 53 to read as follows:

TABLE C–4 TO SUBPART C OF PART 53—TEST SPECIFICATIONS FOR PM_{10}, $PM_{2.5}$, AND $PM_{10-2.5}$ CANDIDATE EQUIVALENT METHODS

Specification	PM_{10}	$PM_{2.5}$			$PM_{10-2.5}$	
		Class I	Class II	Class III	Class II	Class III
Acceptable concentration range (R_j), μg/m³.	5–300	3–200	3–200	3–200	3–200	3–200.
Minimum number of test sites.	2	1	2	4	2	4.
Minimum number of candidate method samplers or analyzers per site.	3	3	3[1]	3[1]	3[1]	3.[1]
Number of reference method samplers per site.	3	3	3[1]	3[1]	3[1]	3.[1]
Minimum number of acceptable sample sets per site for PM_{10} methods:						
R_j < 20 μg/m³	3					
R_j > 20 μg/m³	3					
Total	10					
Minimum number of acceptable sample sets per site for $PM_{2.5}$ and $PM_{10-2.5}$ candidate equivalent methods:						
R_j < 15 μg/m³ for 24-hr or R_j < 8 μg/m³ for 48-hr samples..		3	3	3	3	3.
Rj > 15 μg/m³ for 24-hr or R_j > 8 μg/m³ for 48-hr samples.		3	3	3	3	3.
Each season		10	23	23	23	23.
Total, each site.		10	23	23 (46 for two-season sites).	23	23 (46 for two-season sites).
Precision of replicate reference method measurements, P_{Rj} or RP_{Rj}, respectively; RP for Class II or III $PM_{2.5}$ or $PM_{10-2.5}$, maximum.	5 μg/m³ or 7%.	2 μg/m³ or 5%.	10%[2]	10%[2]	10%[2]	10%.[2]
Precision of $PM_{2.5}$ or $PM_{10-2.5}$ candidate method, CP, each site.			10%[2]	15%[2]	15%[2]	15%.[2]
Slope of regression relationship.	1 ±0.10	1 ±0.05	1 ±0.10	1 ±0.10	1 ±0.10	1 ±0.12.
Intercept of regression relationship, μg/m³.	0 ±5	0 ±1	Between: 13.55—(15.05 × slope), but not less than—1.5; and 16.56—(15.05 × slope), but not more than +1.5.	Between: 15.05—(17.32 × slope), but not less than—2.0; and 15.05—(13.20 × slope), but not more than +2.0.	Between: 62.05—(70.5 × slope), but not less than—3.5; and 78.95—(70.5 × slope), but not more than +3.5.	Between: 70.50—(82.93 × slope), but not less than—7.0; and 70.50—(61.16 × slope), but not more than +7.0.
Correlation of reference method and candidate method measurements.	≥ 0.97	≥ 0.97	≥ 0.93—for CCV ≤ 0.4; ≥ 0.85 + 0.2 × CCV—for 0.4 ≤ CCV ≤ 0.5; ≥ 0.95—for CCV ≥ 0.5			

[1] Some missing daily measurement values may be permitted; see test procedure.
[2] Calculated as the root mean square over all measurement sets.

Subpart D—Procedures for Testing Performance Characteristics of Methods for PM_{10}

■ 16. Amend § 53.43 by revising the formula in paragraph (a)(2)(xvi) and the formula in paragraph (c)(2)(iv) to read as follows:

§ 53.43 Test procedures.

(a) * * *

(2) * * *

$$CV_E = \left. \sqrt{\frac{\sum_{i=1}^{n} E^2(i) - \frac{1}{n}\left(\sum_{i=1}^{n} E\,(i)\right)^2}{n-1}} \right/ \bar{E}$$

(xvi) * * *

* * * * *

(c) * * *

(2) * * *

(iv) * * *

$$Pj = \sqrt{\frac{\sum_{i=1}^{3} C^2(i)(j) - \frac{1}{3}\left(\sum_{i=1}^{3} C\,(i)(j)\right)^2}{2}}$$

if $\bar{C}_j$ is below 80 μg/m³, or

$$RP_j = \ 100\%\ x \left. \sqrt{\frac{\sum_{i=1}^{3} C^2(i)\,(j) - \frac{1}{3}\left(\sum_{i=1}^{3} C\,(i)(j)\right)^2}{2}} \right/ \overline{C}_{(j)}$$

if $\bar{C}_j$ is above 80 μg/m³.

Subpart E—Procedures for Testing Physical (Design) and Performance Characteristics of Reference Methods and Class I and Class II Equivalent Methods for $PM_{2.5}$ or PM_{10}–2.5

■ 17. Amend § 53.51 by revising paragraph (d)(2) to read as follows:

§ 53.51 Demonstration of compliance with design specifications and manufacturing and test requirements.

* * * * *

(d) * * *

(2) *VSCC and TE–$PM_{2.5}$C separators.* For samplers and monitors utilizing the BGI VSCC or Tisch TE–$PM_{2.5}$C particle size separators specified in sections 7.3.4.4 and 7.3.4.5 of appendix L to part 50 of this chapter, respectively, the respective manufacturers shall identify the critical dimensions and manufacturing tolerances for the separator, devise appropriate test procedures to verify that the critical dimensions and tolerances are maintained during the manufacturing process, and carry out those procedures on each separator manufactured to verify conformance of the manufactured products. The manufacturer shall also maintain records of these tests and their test results and submit evidence that this procedure is incorporated into the manufacturing procedure, that the test is or will be routinely implemented, and that an appropriate procedure is in place for the disposition of units that fail this tolerance tests.

* * * * *

Subpart F—Procedures for Testing Performance Characteristics of Class II Equivalent Methods for $PM_{2.5}$

■ 18. Amend § 53.61 by revising paragraph (g) introductory text, the first sentence of paragraph (g)(1), the first sentence of (g)(1)(i), (g)(2)(i) and adding paragraph (g)(2)(iii) to read as follows:

§ 53.61 Test conditions.

* * * * *

(g) *Vibrating Orifice Aerosol Generator (VOAG) and Flow-Focusing Monodisperse Aerosol Generator (FMAG) conventions.* This section prescribes conventions regarding the use of the vibrating orifice aerosol generator (VOAG) and the flow-focusing monodisperse aerosol generator (FMAG) for the size-selective performance tests outlined in §§ 53.62, 53.63, 53.64, and 53.65.

(1) *Particle aerodynamic diameter.* The VOAG and FMAG produce near-monodisperse droplets through the controlled breakup of a liquid jet. * * *

(i) The physical diameter of a generated spherical particle can be calculated from the operational parameters of the VOAG and FMAG as:

* * * * *

(2) * * *

(i) Solid particle tests performed in this subpart shall be conducted using particles composed of ammonium fluorescein. For use in the VOAG or FMAG, liquid solutions of known volumetric concentration can be prepared by diluting fluorescein powder ($C_2OH_{12}O_5$, FW = 332.31, CAS 2321–07–5) with aqueous ammonia. Guidelines for preparation of fluorescein solutions of the desired volume concentration (C_{vol}) are presented in Vanderpool and Rubow (1988) (Reference 2 in appendix A to this subpart). For purposes of converting particle physical diameter to aerodynamic diameter, an ammonium fluorescein particle density of 1.35 g/cm³ shall be used.

* * * * *

(iii) Calculation of the physical diameter of the particles produced by the VOAG and FMAG requires

knowledge of the liquid solution's volume concentration (C_{vol}). Because uranine is essentially insoluble in oleic acid, the total particle volume is the sum of the oleic acid volume and the uranine volume. The volume concentration of the liquid solution shall be calculated as:

Equation 5 to Paragraph (g)(2)(iii)

$$C_{vol} = \frac{V_u + V_{oleic}}{V_{sol}} = \frac{(M_u/P_u) + (M_{oleic}/P_{oleic})}{V_{sol}}$$

Where:
V_u = uranine volume, ml;
V_{oleic} = oleic acid volume, ml;
V_{sol} = total solution volume, ml;
M_u = uranine mass, g;
P_u = uranine density, g/cm^3;
M_{oleic} = oleic acid mass, g; and
P_{oleic} = oleic acid density, g/cm^3.
* * * * *

PART 58—AMBIENT AIR QUALITY SURVEILLANCE

■ 19. The authority citation for part 58 continues to read as follows:

Authority: 42 U.S.C. 7403, 7405, 7410, 7414, 7601, 7611, 7614, and 7619.

Subpart A—General Provisions

■ 20. Amend § 58.1 by:
■ a. Removing the definition for ''Approved regional method (ARM)''; and
■ b. Revising the definition for ''Traceable.''

The revision reads as follows:

§ 58.1 Definitions.

* * * * *

Traceable means a measurement result from a local standard whereby the result can be related to the International System of Units (SI) through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty. Traceable measurement results must be compared and certified, either directly or via not more than one intermediate standard, to a National Institute of Standards and Technology (NIST)-certified reference standard. Examples include but are not limited to NIST Standard Reference Material (SRM), NIST-traceable Reference Material (NTRM), or a NIST-certified Research Gas Mixture (RGM). Traceability to the SI through other National Metrology Institutes (NMIs) in addition to NIST is allowed if a Declaration of Equivalence (DoE) exists between NIST and that NMI.
* * * * *

Subpart B—Monitoring Network

■ 21. Amend § 58.10 by:
■ a. Revising paragraphs (a)(1) and (b)(10) and (13);
■ b. Adding paragraph (b)(14); and
■ c. Revising paragraph (d).

The revisions and addition read as follows:

§ 58.10 Annual monitoring network plan and periodic network assessment.

(a)(1) Beginning July 1, 2007, the State, or where applicable local, agency shall submit to the Regional Administrator an annual monitoring network plan which shall provide for the documentation of the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations that can include FRM and FEM monitors that are part of SLAMS, NCore, CSN, PAMS, and SPM stations. The plan shall include a statement of whether the operation of each monitor meets the requirements of appendices A, B, C, D, and E to this part, where applicable. The Regional Administrator may require additional information in support of this statement. The annual monitoring network plan must be made available for public inspection and comment for at least 30 days prior to submission to the EPA and the submitted plan shall include and address, as appropriate, any received comments.
* * * * *

(b) * * *

(10) Any monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under appendix D or appendix E to this part. For those monitors where a waiver has been approved, the annual monitoring network plan shall include the date the waiver was approved.
* * * * *

(13) The identification of any $PM_{2.5}$ FEMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the national ambient air quality standards (NAAQS). For required SLAMS where the agency identifies that the $PM_{2.5}$ Class III FEM does not produce data of sufficient quality for comparison to the NAAQS, the monitoring agency must ensure that an operating FRM or filter-based FEM meeting the sample frequency requirements described in § 58.12 or other Class III $PM_{2.5}$ FEM with data of sufficient quality is operating and reporting data to meet the network design criteria described in appendix D to this part.

(14) The identification of any site(s) intended to address being sited in an at-risk community where there are anticipated effects from sources in the area as required in section 4.7.1(b)(3) of appendix D to this part. An initial approach to the question of whether any new or moved sites are needed and to identify the communities in which they intend to add monitoring for meeting the requirement in this paragraph (b)(14), if applicable, shall be submitted in accordance with the requirements of section 4.7.1(b)(3) of appendix D to this part, which includes submission to the EPA Regional Administrator no later than July 1, 2024. Specifics on the resulting proposed new or moved sites for $PM_{2.5}$ network design to address at-risk communities, if applicable, would need to be detailed in annual monitoring network plans due to each applicable EPA Regional office no later than July 1, 2025. The plan shall provide for any required sites to be operational no later than 24 months from date of approval of a plan or January 1, 2027, whichever comes first.
* * * * *

(d) The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of

susceptible individuals (*e.g.,* children with asthma) and other at-risk populations, and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The assessments are due every 5 years beginning July 1, 2010.

* * * * *

■ 22. Amend § 58.11 by revising paragraphs (a)(2) and (e) to read as follows:

§ 58.11 Network technical requirements.

(a) * * *

(2) Beginning January 1, 2009, State and local governments shall follow the quality assurance criteria contained in appendix A to this part that apply to SPM sites when operating any SPM site which uses an FRM or an FEM and meets the requirements of appendix E to this part, unless the Regional Administrator approves an alternative to the requirements of appendix A with respect to such SPM sites because meeting those requirements would be physically and/or financially impractical due to physical conditions at the monitoring site and the requirements are not essential to achieving the intended data objectives of the SPM site. Alternatives to the requirements of appendix A may be approved for an SPM site as part of the approval of the annual monitoring plan, or separately.

* * * * *

(e) State and local governments must assess data from Class III $PM_{2.5}$ FEM monitors operated within their network using the performance criteria described in table C–4 to subpart C of part 53 of this chapter, for cases where the data are identified as not of sufficient comparability to a collocated FRM, and the monitoring agency requests that the FEM data should not be used in comparison to the NAAQS. These assessments are required in the monitoring agency's annual monitoring network plan described in § 58.10(b) for cases where the FEM is identified as not of sufficient comparability to a collocated FRM. For these collocated $PM_{2.5}$ monitors, the performance criteria apply with the following additional provisions:

(1) The acceptable concentration range (Rj), $\mu g/m^3$ may include values down to 0 $\mu g/m^3$.

(2) The minimum number of test sites shall be at least one; however, the number of test sites will generally include all locations within an agency's network with collocated FRMs and FEMs.

(3) The minimum number of methods shall include at least one FRM and at least one FEM.

(4) Since multiple FRMs and FEMs may not be present at each site, the precision statistic requirement does not apply, even if precision data are available.

(5) All seasons must be covered with no more than 36 consecutive months of data in total aggregated together.

(6) The key statistical metric to include in an assessment is the bias (both additive and multiplicative) of the $PM_{2.5}$ continuous FEM(s) compared to a collocated FRM(s). Correlation is required to be reported in the assessment, but failure to meet the correlation criteria, by itself, is not cause to exclude data from a continuous FEM monitor.

■ 23. Amend § 58.12 by revising paragraph (d)(1):

§ 58.12 Operating schedules.

* * * * *

(d) * * *

(1)(i) Manual $PM_{2.5}$ samplers at required SLAMS stations without a collocated continuously operating $PM_{2.5}$ monitor must operate on at least a 1-in-3 day schedule unless a waiver for an alternative schedule has been approved per paragraph (d)(1)(ii) of this section.

(ii) For SLAMS $PM_{2.5}$ sites with both manual and continuous $PM_{2.5}$ monitors operating, the monitoring agency may request approval for a reduction to 1-in-6 day $PM_{2.5}$ sampling or for seasonal sampling from the EPA Regional Administrator. Other requests for a reduction to 1-in-6 day $PM_{2.5}$ sampling or for seasonal sampling may be approved on a case-by-case basis. The EPA Regional Administrator may grant sampling frequency reductions after consideration of factors (including but not limited to the historical $PM_{2.5}$ data quality assessments, the location of current $PM_{2.5}$ design value sites, and their regulatory data needs) if the Regional Administrator determines that the reduction in sampling frequency will not compromise data needed for implementation of the NAAQS. Required SLAMS stations whose measurements determine the design value for their area and that are within plus or minus 10 percent of the annual NAAQS, and all required sites where one or more 24-hour values have exceeded the 24-hour NAAQS each year for a consecutive period of at least 3 years are required to maintain at least a 1-in-3 day sampling frequency until the design value no longer meets the criteria in this paragraph (d)(1)(ii) for 3 consecutive years. A continuously operating FEM $PM_{2.5}$ monitor satisfies the requirement in this paragraph (d)(1)(ii) unless it is identified in the monitoring agency's annual monitoring network plan as not appropriate for comparison to the NAAQS and the EPA Regional Administrator has approved that the data from that monitor may be excluded from comparison to the NAAQS.

(iii) Required SLAMS stations whose measurements determine the 24-hour design value for their area and whose data are within plus or minus 5 percent of the level of the 24-hour $PM_{2.5}$ NAAQS must have an FRM or FEM operate on a daily schedule if that area's design value for the annual NAAQS is less than the level of the annual $PM_{2.5}$ standard. A continuously operating FEM or $PM_{2.5}$ monitor satisfies the requirement in this paragraph (d)(1)(iii) unless it is identified in the monitoring agency's annual monitoring network plan as not appropriate for comparison to the NAAQS and the EPA Regional Administrator has approved that the data from that monitor may be excluded from comparison to the NAAQS. The daily schedule must be maintained until the referenced design values no longer meets the criteria in this paragraph (d)(1)(iii) for 3 consecutive years.

(iv) Changes in sampling frequency attributable to changes in design values shall be implemented no later than January 1 of the calendar year following the certification of such data as described in § 58.15.

* * * * *

■ 24. Revise § 58.15 to read as follows:

§ 58.15 Annual air monitoring data certification.

(a) The State, or where appropriate local, agency shall submit to the EPA Regional Administrator an annual air monitoring data certification letter to certify data collected by FRM and FEM monitors at SLAMS and SPM sites that meet criteria in appendix A to this part from January 1 to December 31 of the previous year. The head official in each monitoring agency, or his or her designee, shall certify that the previous year of ambient concentration and quality assurance data are completely submitted to AQS and that the ambient concentration data are accurate to the best of her or his knowledge, taking into consideration the quality assurance findings. The annual data certification letter is due by May 1 of each year.

(b) Along with each certification letter, the State shall submit to the Regional Administrator an annual

summary report of all the ambient air quality data collected by FRM and FEM monitors at SLAMS and SPM sites. The annual report(s) shall be submitted for data collected from January 1 to December 31 of the previous year. The annual summary serves as the record of the specific data that is the object of the certification letter.

(c) Along with each certification letter, the State shall submit to the Regional Administrator a summary of the precision and accuracy data for all ambient air quality data collected by FRM and FEM monitors at SLAMS and SPM sites. The summary of precision and accuracy shall be submitted for data collected from January 1 to December 31 of the previous year.

Subpart C—Special Purpose Monitors

■ 25. Amend § 58.20 by revising paragraphs (b) through (e) to read as follows:

§ 58.20 Special purpose monitors (SPM).

* * * * *

(b) Any SPM data collected by an air monitoring agency using a Federal reference method (FRM) or Federal equivalent method (FEM) must meet the requirements of §§ 58.11 and 58.12 and appendix A to this part or an approved alternative to appendix A. Compliance with appendix E to this part is optional but encouraged except when the monitoring agency's data objectives are inconsistent with the requirements in appendix E. Data collected at an SPM using a FRM or FEM meeting the requirements of appendix A must be submitted to AQS according to the requirements of § 58.16. Data collected by other SPMs may be submitted. The monitoring agency must also submit to AQS an indication of whether each SPM reporting data to AQS monitor meets the requirements of appendices A and E.

(c) All data from an SPM using an FRM or FEM which has operated for more than 24 months are eligible for comparison to the relevant NAAQS, subject to the conditions of §§ 58.11(e) and 58.30, unless the air monitoring agency demonstrates that the data came from a particular period during which the requirements of appendix A, appendix C, or appendix E to this part were not met, subject to review and EPA Regional Office approval as part of the annual monitoring network plan described in § 58.10.

(d) If an SPM using an FRM or FEM is discontinued within 24 months of start-up, the Administrator will not base a NAAQS violation determination for the $PM_{2.5}$ or ozone NAAQS solely on data from the SPM.

(e) If an SPM using an FRM or FEM is discontinued within 24 months of start-up, the Administrator will not designate an area as nonattainment for the CO, SO_2, NO_2, or 24-hour PM_{10} NAAQS solely on the basis of data from the SPM. Such data are eligible for use in determinations of whether a nonattainment area has attained one of these NAAQS.

* * * * *

■ 26. Amend appendix A to part 58 by:
■ a. Revising section 2.6.1 and adding sections 2.6.1.1 and 2.6.1.2;
■ b. Removing section 3.1.2.2 and redesignating sections 3.1.2.3, 3.1.2.4, 3.1.2.5, and 3.1.2.6 as sections 3.1.2.2, 3.1.2.3, 3.1.2.4, and 3.1.2.5, respectively;
■ c. Revising sections 3.1.3.3, 3.2.4, 4.2.1, and 4.2.5; and
■ d. In section 6 revising References (1), (4), (6), (7), (9), (10), and (11) and table A–1.

The revisions and additions read as follows:

Appendix A to Part 58—Quality Assurance Requirements for Monitors used in Evaluations of National Ambient Air Quality Standards

* * * * *

2.6.1 Gaseous pollutant concentration standards (permeation devices or cylinders of compressed gas) used to obtain test concentrations for CO, SO_2, NO, and NO_2 must be EPA Protocol Gases certified in accordance with one of the procedures given in Reference 4 of this appendix.

2.6.1.1 The concentrations of EPA Protocol Gas standards used for ambient air monitoring must be certified with a 95-percent confidence interval to have an analytical uncertainty of no more than ±2.0 percent (inclusive) of the certified concentration (tag value) of the gas mixture. The uncertainty must be calculated in accordance with the statistical procedures defined in Reference 4 of this appendix.

2.6.1.2 Specialty gas producers advertising certification with the procedures provided in Reference 4 of this appendix and distributing gases as ''EPA Protocol Gas'' for ambient air monitoring purposes must adhere to the regulatory requirements specified in 40 CFR 75.21(g) or not use ''EPA'' in any form of advertising. Monitoring organizations must provide information to the EPA on the specialty gas producers they use on an annual basis. PQAOs, when requested by the EPA, must participate in the EPA Ambient Air Protocol Gas Verification Program at least once every 5 years by sending a new unused standard to a designated verification laboratory.

* * * * *

3.1.3.3 Using audit gases that are verified against the NIST standard reference methods or special review procedures and validated per the certification periods specified in Reference 4 of this appendix (EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards) for CO, SO_2, and NO_2 and using O_3 analyzers that are verified quarterly against a standard reference photometer.

* * * * *

3.2.4 *$PM_{2.5}$ Performance Evaluation Program (PEP) Procedures.* The PEP is an independent assessment used to estimate total measurement system bias. These evaluations will be performed under the national performance evaluation program (NPEP) as described in section 2.4 of this appendix or a comparable program. A prescribed number of Performance evaluation sampling events will be performed annually within each PQAO. For PQAOs with less than or equal to five monitoring sites, five valid performance evaluation audits must be collected and reported each year. For PQAOs with greater than five monitoring sites, eight valid performance evaluation audits must be collected and reported each year. A valid performance evaluation audit means that both the primary monitor and PEP audit concentrations are valid and equal to or greater than 2 µg/m3. Siting of the PEP monitor must be consistent with section 3.2.3.4(c) of this appendix. However, any horizontal distance greater than 4 meters and any vertical distance greater than one meter must be reported to the EPA regional PEP coordinator. Additionally for every monitor designated as a primary monitor, a primary quality assurance organization must:

* * * * *

4.2.1 *Collocated Quality Control Sampler Precision Estimate for PM_{10}, $PM_{2.5}$, and Pb.* Precision is estimated via duplicate measurements from collocated samplers. It is recommended that the precision be aggregated at the PQAO level quarterly, annually, and at the 3-year level. The data pair would only be considered valid if both concentrations are greater than or equal to the minimum values specified in section 4(c) of this appendix. For each collocated data pair, calculate t_i, using equation 6 to this appendix:

Equation 6 to Section 4.2.1 of Appendix A

$$t_i = \frac{X_i - Y_i}{\sqrt{(X_i - Y_i)/2}}$$

Where X_i is the concentration from the primary sampler and Y_i is the concentration value from the audit sampler. The coefficient of variation upper bound is calculated using equation 7 to this appendix:

Equation 7 to Section 4.2.1 of Appendix A

$$CV90_{NAAQS} = 100 * \sqrt{\frac{k \times \sum_{i=1}^{k} t_i^2 - \left(\sum_{i=1}^{k} t_i\right)^2}{2k(k-1)}} \times \sqrt{\frac{k-1}{NAAQS\ Concentration * X^2_{0.1,k-1}}}$$

Where k is the number of valid data pairs being aggregated, and $X^2_{0.1,k-1}$ is the 10th percentile of a chi-squared distribution with k-1 degrees of freedom. The factor of 2 in the denominator adjusts for the fact that each t_i is calculated from two values with error.

* * * * *

4.2.5 *Performance Evaluation Programs Bias Estimate for $PM_{2.5}$.* The bias estimate is calculated using the PEP audits described in section 3.2.4. of this appendix. The bias estimator is based on, s_i, the absolute difference in concentrations divided by the square root of the PEP concentration.

Equation 8 to Section 4.2.5 of Appendix A

$$100 \times \frac{\sum_{i=1}^{n} s_i}{n\sqrt{NAAQS\ concentration}} \quad \text{where} \quad s_i = \frac{meas - audit}{\sqrt{audit}}$$

* * * * *

6. References

(1) American National Standard Institute—Quality Management Systems For Environmental Information And Technology Programs—Requirements With Guidance For Use. ASQ/ANSI E4–2014. February 2014. Available from ANSI Webstore *https://webstore.ansi.org/.*

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(4) EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards. EPA–600/R–12/531. May, 2012. Available from U.S. Environmental Protection Agency, National Risk Management Research Laboratory, Research Triangle Park NC 27711. *https://www.epa.gov/nscep.*

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(6) List of Designated Reference and Equivalent Methods. Available from U.S. Environmental Protection Agency, Center for Environmental Measurements and Modeling, Air Methods and Characterization Division, MD–D205–03, Research Triangle Park, NC 27711. *https://www.epa.gov/amtic/air-monitoring-methods-criteria-pollutants.*

(7) Transfer Standards for the Calibration of Ambient Air Monitoring Analyzers for Ozone. EPA–454/B–13–004 U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, October, 2013. *https://www.epa.gov/sites/default/files/2020-09/documents/ozonetransferstandardguidance.pdf.*

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(9) Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 1—A Field Guide to Environmental Quality Assurance. EPA–600/R–94/038a. April 1994. Available from U.S. Environmental Protection Agency, ORD Publications Office, Center for Environmental Research Information (CERI), 26 W. Martin Luther King Drive, Cincinnati, OH 45268. *https://www.epa.gov/amtic/ambient-air-monitoring-quality-assurance#documents.*

(10) Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Quality Monitoring Program Quality System Development. EPA–454/B–13–003. *https://www.epa.gov/amtic/ambient-air-monitoring-quality-assurance#documents.*

(11) National Performance Evaluation Program Standard Operating Procedures. *https://www.epa.gov/amtic/ambient-air-monitoring-quality-assurance#npep.*

TABLE A–1 TO SECTION 6 OF APPENDIX A—MINIMUM DATA ASSESSMENT REQUIREMENTS FOR NAAQS RELATED CRITERIA POLLUTANT MONITORS

Method	Assessment method	Coverage	Minimum frequency	Parameters reported	AQS assessment type
Gaseous Methods (CO, NO_2, SO_2, O_3):					

TABLE A–1 TO SECTION 6 OF APPENDIX A—MINIMUM DATA ASSESSMENT REQUIREMENTS FOR NAAQS RELATED CRITERIA POLLUTANT MONITORS—Continued

Method	Assessment method	Coverage	Minimum frequency	Parameters reported	AQS assessment type
One-Point QC for SO_2, NO_2, O_3, CO.	Response check at concentration 0.005–0.08 ppm SO_2, NO_2, O_3, and. 0.5 and 5 ppm CO	Each analyzer	Once per 2 weeks [5] ..	Audit concentration [1] and measured concentration.[2].	One-Point QC.
Annual performance evaluation for SO_2, NO_2, O_3, CO.	See section 3.1.2 of this appendix.	Each analyzer	Once per year	Audit concentration [1] and measured concentration [2] for each level.	Annual PE.
NPAP for SO_2, NO_2, O_3, CO.	Independent Audit	20% of sites each year.	Once per year	Audit concentration[1] and measured concentration [2] for each level.	NPAP.
Particulate Methods:					
Continuous [4] method—collocated quality control sampling $PM_{2.5}$.	Collocated samplers	15%	1-in-12 days	Primary sampler concentration and duplicate sampler concentration.[3].	No Transaction reported as raw data.
Manual method—collocated quality control sampling PM_{10}, $PM_{2.5}$, Pb-TSP, Pb-PM_{10}.	Collocated samplers	15%	1-in-12 days	Primary sampler concentration and duplicate sampler concentration.[3].	No Transaction reported as raw data.
Flow rate verification PM_{10} (low Vol) $PM_{2.5}$, Pb-PM_{10}.	Check of sampler flow rate.	Each sampler	Once every month [5] ..	Audit flow rate and measured flow rate indicated by the sampler.	Flow Rate Verification.
Flow rate verification PM_{10} (High-Vol), Pb-TSP.	Check of sampler flow rate.	Each sampler	Once every quarter [5]	Audit flow rate and measured flow rate indicated by the sampler.	Flow Rate Verification.
Semi-annual flow rate audit PM_{10}, TSP, PM_{10}–2.5, $PM_{2.5}$, Pb-TSP, Pb-PM_{10}.	Check of sampler flow rate using independent standard.	Each sampler	Once every 6 months [5].	Audit flow rate and measured flow rate indicated by the sampler.	Semi Annual Flow Rate Audit.
Pb analysis audits Pb-TSP, Pb-PM_{10}.	Check of analytical system with Pb audit strips/filters.	Analytical	Once each quarter [5] ..	Measured value and audit value (ug Pb/filter) using AQS unit code 077.	Pb Analysis Audits.
Performance Evaluation Program $PM_{2.5}$.	Collocated samplers	(1) 5 valid audits for primary QA orgs, with ≤5 sites. (2) 8 valid audits for primary QA orgs, with >5 sites. (3) All samplers in 6 years.	Distributed over all 4 quarters [5].	Primary sampler concentration and performance evaluation sampler concentration.	PEP.
Performance Evaluation Program Pb-TSP, Pb-PM_{10}.	Collocated samplers	(1) 1 valid audit and 4 collocated samples for primary QA orgs, with ≤5 sites. (2) 2 valid audits and 6 collocated samples for primary QA orgs with >5 sites.	Distributed over all 4 quarters [5].	Primary sampler concentration and performance evaluation sampler concentration. Primary sampler concentration and duplicate sampler concentration.	PEP.

[1] Effective concentration for open path analyzers.
[2] Corrected concentration, if applicable for open path analyzers.
[3] Both primary and collocated sampler values are reported as raw data.
[4] $PM_{2.5}$ is the only particulate criteria pollutant requiring collocation of continuous and manual primary monitors.
[5] EPA's recommended maximum number of days that should exist between checks to ensure that the checks are routinely conducted over time and to limit data impacts resulting from a failed check.

* * * * *

■ 27. Amend appendix B to part 58 by:

■ a. Revising section 2.6.1 and adding sections 2.6.1.1 and 2.6.1.2;

■ b. Removing and reserving section 3.1.2.2;

■ c. Revising sections 3.1.3.3 and 3.2.4;
■ d. Adding sections 3.2.4.1 through 3.2.4.3;
■ e. Revising sections 4.2.1, and 4.2.5; and
■ f. In section 6 revising References (1), (4), (6), (7), (9), (10), and (11) and table B–1.

The revisions and additions read as follows:

Appendix B to Part 58—Quality Assurance Requirements for Prevention of Significant Deterioration (PSD) Air Monitoring

* * * * *

2.6.1 Gaseous pollutant concentration standards (permeation devices or cylinders of compressed gas) used to obtain test concentrations for CO, SO_2, NO, and NO_2 must be EPA Protocol Gases certified in accordance with one of the procedures given in Reference 4 of this appendix.

2.6.1.1 The concentrations of EPA Protocol Gas standards used for ambient air monitoring must be certified with a 95-percent confidence interval to have an analytical uncertainty of no more than ±2.0 percent (inclusive) of the certified concentration (tag value) of the gas mixture. The uncertainty must be calculated in accordance with the statistical procedures defined in Reference 4 of this appendix.

2.6.1.2 Specialty gas producers advertising certification with the procedures provided in Reference 4 of this appendix and distributing gases as ''EPA Protocol Gas'' for ambient air monitoring purposes must adhere to the regulatory requirements specified in 40 CFR 75.21(g) or not use ''EPA'' in any form of advertising. The PSD PQAOs must provide information to the PSD reviewing authority on the specialty gas producers they use (or will use) for the duration of the PSD monitoring project. This information can be provided in the QAPP or monitoring plan but must be updated if there is a change in the specialty gas producers used.

* * * * *

3.1.3.3 Using audit gases that are verified against the NIST standard reference methods or special review procedures and validated per the certification periods specified in Reference 4 of this appendix (EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards) for CO, SO_2, and NO_2 and using O_3 analyzers that are verified quarterly against a standard reference photometer.

* * * * *

3.2.4 *$PM_{2.5}$ Performance Evaluation Program (PEP) Procedures.* The PEP is an independent assessment used to estimate total measurement system bias. These evaluations will be performed under the NPEP as described in section 2.4 of this appendix or a comparable program. Performance evaluations will be performed annually within each PQAO. For PQAOs with less than or equal to five monitoring sites, five valid performance evaluation audits must be collected and reported each year. For PQAOs with greater than five monitoring sites, eight valid performance evaluation audits must be collected and reported each year. A valid performance evaluation audit means that both the primary monitor and PEP audit concentrations are valid and equal to or greater than 2 µg/m3. Siting of the PEP monitor must be consistent with section 3.2.3.4(c) of this appendix. However, any horizontal distance greater than 4 meters and any vertical distance greater than one meter must be reported to the EPA regional PEP coordinator. Additionally for every monitor designated as a primary monitor, a primary quality assurance organization must:

3.2.4.1 Have each method designation evaluated each year; and,

3.2.4.2 Have all FRM and FEM samplers subject to a PEP audit at least once every 6 years, which equates to approximately 15 percent of the monitoring sites audited each year.

3.2.4.3 Additional information concerning the PEP is contained in Reference 10 of this appendix. The calculations for evaluating bias between the primary monitor and the performance evaluation monitor for $PM_{2.5}$ are described in section 4.2.5 of this appendix.

* * * * *

4.2.1 *Collocated Quality Control Sampler Precision Estimate for PM_{10}, $PM_{2.5}$, and Pb.* Precision is estimated via duplicate measurements from collocated samplers. It is recommended that the precision be aggregated at the PQAO level quarterly, annually, and at the 3-year level. The data pair would only be considered valid if both concentrations are greater than or equal to the minimum values specified in section 4(c) of this appendix. For each collocated data pair, calculate t_i, using equation 6 to this appendix:

Equation 6 to Section 4.2.1 of Appendix B

$$t_i = \frac{X_i - Y_i}{\sqrt{(X_i - Y_i)/2}}$$

Where X_i is the concentration from the primary sampler and Y_i is the concentration value from the audit sampler. The coefficient of variation upper bound is calculated using equation 7 to this appendix:

Equation 7 to Section 4.2.1 of Appendix B

$$CV90_{NAAQS} = 100 * \sqrt{\frac{k \times \sum_{i=1}^{k} t_i^2 - \left(\sum_{i=1}^{k} t_i\right)^2}{2k(k-1)}} \times \sqrt{\frac{k-1}{NAAQS\ Concentration * X^2_{0.1,k-1}}}$$

Where k is the number of valid data pairs being aggregated, and $X^2_{0.1,k-1}$ is the 10th percentile of a chi-squared distribution with k-1 degrees of freedom. The factor of 2 in the denominator adjusts for the fact that

each t_i is calculated from two values with error.

* * * * *

4.2.5 *Performance Evaluation Programs Bias Estimate for $PM_{2.5}$.* The bias estimate is calculated using the PEP audits described in section 3.2.4. of this appendix. The bias estimator is based on, s_i, the absolute difference in concentrations divided by the square root of the PEP concentration.

Equation 8 to Section 4.2.5 of Appendix B

$$100 \times \frac{\sum_{i=1}^{n} s_i}{n\sqrt{NAAQS\ concentration}} \quad \text{where} \quad s_i = \frac{meas - audit}{\sqrt{audit}}$$

* * * * *

6. References

(1) American National Standard Institute—Quality Management Systems For Environmental Information And Technology Programs—Requirements With Guidance For Use. ASQ/ANSI E4–2014. February 2014. Available from ANSI Webstore *https://webstore.ansi.org/.*

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(4) EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards. EPA–600/R–12/531. May, 2012. Available from U.S. Environmental Protection Agency, National Risk Management Research Laboratory, Research Triangle Park NC 27711. *https://www.epa.gov/nscep.*

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(6) List of Designated Reference and Equivalent Methods. Available from U.S. Environmental Protection Agency, Center for Environmental Measurements and Modeling, Air Methods and Characterization Division, MD–D205–03, Research Triangle Park, NC 27711. *https://www.epa.gov/amtic/air-monitoring-methods-criteria-pollutants.*

(7) Transfer Standards for the Calibration of Ambient Air Monitoring Analyzers for Ozone. EPA–454/B–13–004 U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, October, 2013. *https://www.epa.gov/sites/default/files/2020-09/documents/ozonetransferstandardguidance.pdf.*

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(9) Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 1—A Field Guide to Environmental Quality Assurance. EPA–600/R–94/038a. April 1994. Available from U.S. Environmental Protection Agency, ORD Publications Office, Center for Environmental Research Information (CERI), 26 W. Martin Luther King Drive, Cincinnati, OH 45268. *https://www.epa.gov/amtic/ambient-air-monitoring-quality-assurance#documents.*

(10) Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Quality Monitoring Program Quality System Development. EPA–454/B–13–003. *https://www.epa.gov/amtic/ambient-air-monitoring-quality-assurance#documents.*

(11) National Performance Evaluation Program Standard Operating Procedures. *https://www.epa.gov/amtic/ambient-air-monitoring-quality-assurance#npep.*

TABLE B–1 TO SECTION 6 OF APPENDIX B- MINIMUM DATA ASSESSMENT REQUIREMENTS FOR NAAQS RELATED CRITERIA POLLUTANT PSD MONITORS

Method	Assessment method	Coverage	Minimum frequency	Parameters reported	AQS Assessment type
Gaseous Methods (CO, NO_2, SO_2, O_3):					
One-Point QC for SO_2, NO_2, O_3, CO.	Response check at concentration 0.005–0.08 ppm SO_2, NO_2, O_3, & 0.5 and 5 ppm CO.	Each analyzer	Once per 2 weeks[5] ...	Audit concentration[1] and measured concentration[2].	One-Point QC.
Quarterly performance evaluation for SO_2, NO_2, O_3, CO.	See section 3.1.2 of this appendix.	Each analyzer	Once per quarter[5]	Audit concentration[1] and measured concentration[2] for each level.	Annual PE.
NPAP for SO_2, NO_2, O_3, CO[3].	Independent Audit	Each primary monitor	Once per year	Audit concentration[1] and measured concentration[2] for each level.	NPAP.
Particulate Methods:					
Collocated sampling PM_{10}, $PM_{2.5}$, Pb.	Collocated samplers	1 per PSD Network per pollutant.	Every 6 days or every 3 days if daily monitoring required.	Primary sampler concentration and duplicate sampler concentration[4].	No Transaction reported as raw data.
Flow rate verification PM_{10}, $PM_{2.5}$, Pb.	Check of sampler flow rate.	Each sampler	Once every month[5] ...	Audit flow rate and measured flow rate indicated by the sampler.	Flow Rate Verification.
Semi-annual flow rate audit PM_{10}, $PM_{2.5}$, Pb.	Check of sampler flow rate using independent standard.	Each sampler	Once every 6 months or beginning, middle and end of monitoring[5].	Audit flow rate and measured flow rate indicated by the sampler.	Semi Annual Flow Rate Audit.

TABLE B–1 TO SECTION 6 OF APPENDIX B- MINIMUM DATA ASSESSMENT REQUIREMENTS FOR NAAQS RELATED CRITERIA POLLUTANT PSD MONITORS—Continued

Method	Assessment method	Coverage	Minimum frequency	Parameters reported	AQS Assessment type
Pb analysis audits Pb-TSP, Pb-PM_{10}.	Check of analytical system with Pb audit strips/filters.	Analytical	Each quarter[5]	Measured value and audit value (ug Pb/filter) using AQS unit code 077 for parameters:. 14129—Pb (TSP) LC FRM/FEM. 85129—Pb (TSP) LC Non-FRM/FEM..	Pb Analysis Audits.
Performance Evaluation Program $PM_{2.5}$[3].	Collocated samplers	(1) 5 valid audits for PQAOs with <= 5 sites.. (2) 8 valid audits for PQAOs with > 5 sites.. (3) All samplers in 6 years.	Over all 4 quarters[5] ..	Primary sampler concentration and performance evaluation sampler concentration.	PEP.
Performance Evaluation Program Pb[3].	Collocated samplers	(1) 1 valid audit and 4 collocated samples for PQAOs, with <=5 sites.. (2) 2 valid audits and 6 collocated samples for PQAOs with >5 sites..	Over all 4 quarters[5] ..	Primary sampler concentration and performance evaluation sampler concentration. Primary sampler concentration and duplicate sampler concentration.	PEP.

[1] Effective concentration for open path analyzers.
[2] Corrected concentration, if applicable for open path analyzers.
[3] NPAP, $PM_{2.5}$, PEP, and Pb-PEP must be implemented if data is used for NAAQS decisions otherwise implementation is at PSD reviewing authority discretion.
[4] Both primary and collocated sampler values are reported as raw data
[5] A maximum number of days should be between these checks to ensure the checks are routinely conducted over time and to limit data impacts resulting from a failed check.

■ 28. Amend appendix C to part 58 by:
■ a. Adding sections 2.2 and 2.2.1 through 2.2.19;
■ b. Removing and reserving sections 2.4, 2.4.1;
■ c. Removing sections 2.4.1.1 through 2.4.1.7; and
■ d. Revising section 2.7.1.

The additions and revision reads as follows:

Appendix C to Part 58—Ambient Air Quality Monitoring Methodology

* * * * *

2.2 PM_{10}, $PM_{2.5}$, or $PM_{10-2.5}$ continuous FEMs with existing valid designations may be calibrated using network data from collocated FRM and continuous FEM data under the following provisions:

2.2.1 Data to demonstrate a calibration may include valid data from State, local, or Tribal air agencies or data collected by instrument manufacturers in accordance with 40 CFR 53.35 or other data approved by the Administrator.

2.2.2 A request to update a designated methods calibration may be initiated by the instrument manufacturer of record or the EPA Administrator. State, local, Tribal, and multijusistincional organizations of these entities may work with an instrument manufacture to update a designated method calibration.

2.2.3 Requests for approval of an updated PM_{10}, $PM_{2.5}$, or $PM_{10-2.5}$ continuous FEM calibration must meet the general submittal requirements of section 2.7 of this appendix.

2.2.4 Data included in the request should represent a subset of representative locations where the method is operational. For cases with a small number of collocated FRMs and continuous FEMs sites, an updated candidate calibration may be limited to the sites where both methods are in use.

2.2.5 Data included in a candidate method updated calibration may include a subset of sites where there is a large grouping of sites in one part of the country such that the updated calibration would be representative of the country as a whole.

2.2.6 Improvements should be national in scope and ideally implemented through a firmware change.

2.2.7 The goal of a change to a methods calibration is to increase the number of sites meeting measurements quality objectives of the method as identified in section 2.3.1.1 of appendix A to this part.

2.2.8 For meeting measurement quality objectives (MQOs), the primary objective is to meet the bias goal as this statistic will likely have the most influence on improving the resultant data collected.

2.2.9 Precision data are to be included, but so long as precision data are at least as good as existing network data or meet the MQO referenced in section 2.2.8 of this appendix, no further work is necessary with precision.

2.2.10 Data available to use may include routine primary and collocated data.

2.2.11 Audit data may be useful to confirm the performance of a candidate updated calibration but should not be used as the basis of the calibration to keep the independence of the audit data.

2.2.12 Data utilized as the basis of the updated calibration may be obtained by accessing EPA's AQS database or future analogous EPA database.

2.2.13 Years of data to use in a candidate method calibration should include two recent years where we are past the certification period for the previous year's data, which is May 1 of each year.

2.2.14 Data from additional years is to be used to test an updated calibration such that the calibration is independent of the test years of interest. Data from these additional years need to minimally demonstrate that a larger number of sites are expected to meet bias MQO especially at sites near the level of the NAAQS for the PM indicator of interest.

2.2.15 Outliers may be excluded using routine outlier tests.

2.2.16 The range of data used in a calibration may include all data available or alternatively use data in the range from the lowest measured data available up to 125% of the 24-hour NAAQS for the PM indicator of interest.

2.2.17 Other improvements to a PM continuous method may be included as part of a recommended update so long as appropriate testing is conducted with input from EPA's Office of Research and Development (ORD) Reference and Equivalent (R&E) Methods Designation program.

2.2.18 EPA encourages early communication by instrument manufacturers considering an update to a PM method. Instrument companies should initiate such dialogue by contacting EPA's ORD R&E Methods Designation program. The contact information for this can be found at 40 CFR 53.4.

2.2.19 Manufacturers interested in improving instrument's performance through an updated factory calibration must submit a written modification request to EPA with supporting rationale. Because the testing requirements and acceptance criteria of any field and/or lab tests can depend upon the nature and extent of the intended modification, applicants should contact EPA's R&E Methods Designation program for guidance prior to development of the modification request.

* * * * *

2.7.1 Requests for approval under sections 2.2, 2.4, 2.6.2, or 2.8 of this appendix must be submitted to: Director, Center for Environmental Measurement and Modeling, Reference and Equivalent Methods Designation Program (MD–D205–03), U.S. Environmental Protection Agency, P.O. Box 12055, Research Triangle Park, North Carolina 27711.

■ 29. Amend appendix D to part 58 by revising sections 1 and 1.1(b), the introductory text before the table in section 4.7.1(a), and sections 4.7.1(b)(3) and 4.7.2 to read as follows:

Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring

* * * * *

1. Monitoring Objectives and Spatial Scales

The purpose of this appendix is to describe monitoring objectives and general criteria to be applied in establishing the required SLAMS ambient air quality monitoring stations and for choosing general locations for additional monitoring sites. This appendix also describes specific requirements for the number and location of FRM and FEM sites for specific pollutants, NCore multipollutant sites, PM_{10} mass sites, $PM_{2.5}$ mass sites, chemically-speciated $PM_{2.5}$ sites, and O_3 precursor measurements sites (PAMS). These criteria will be used by EPA in evaluating the adequacy of the air pollutant monitoring networks.

1.1 * * *

(b) Support compliance with ambient air quality standards and emissions strategy development. Data from FRM and FEM monitors for NAAQS pollutants will be used for comparing an area's air pollution levels against the NAAQS. Data from monitors of various types can be used in the development of attainment and maintenance plans. SLAMS, and especially NCore station data, will be used to evaluate the regional air quality models used in developing emission strategies, and to track trends in air pollution abatement control measures' impact on improving air quality. In monitoring locations near major air pollution sources, source-oriented monitoring data can provide insight into how well industrial sources are controlling their pollutant emissions.

* * * * *

4.7.1 * * *

(a) State and where applicable, local, agencies must operate the minimum number of required $PM_{2.5}$ SLAMS sites listed in table D–5 to this appendix. The NCore sites are expected to complement the $PM_{2.5}$ data collection that takes place at non-NCore SLAMS sites, and both types of sites can be used to meet the minimum $PM_{2.5}$ network requirements. For many State and local networks, the total number of $PM_{2.5}$ sites needed to support the basic monitoring objectives of providing air pollution data to the general public in a timely manner, support compliance with ambient air quality standards and emission strategy development, and support for air pollution research studies will include more sites than the minimum numbers required in table D–5 to this appendix. Deviations from these $PM_{2.5}$ monitoring requirements must be approved by the EPA Regional Administrator.

* * * * *

(b) * * *

(3) For areas with additional required SLAMS, a monitoring station is to be sited in an at-risk community with poor air quality, particularly where there are anticipated effects from sources in the area (*e.g.,* a major industrial area, point source(s), port, rail yard, airport, or other transportation facility or corridor).

* * * * *

4.7.2 Requirement for Continuous $PM_{2.5}$ Monitoring. The State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in table D–5 to this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM monitors, unless at least one of the required FRM/FEM monitors is itself a continuous FEM monitor in which case no collocation requirement applies. State and local air monitoring agencies must use methodologies and quality assurance/quality control (QA/QC) procedures approved by the EPA Regional Administrator for these required continuous analyzers.

* * * * *

■ 30. Revise appendix E to part 58 to read as follows:

Appendix E to Part 58—Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring

1. Introduction

1.1 Applicability

(a) This appendix contains specific location criteria applicable to ambient air quality monitoring probes, inlets, and optical paths of SLAMS, NCore, PAMS, and other monitor types whose data are intended to be used to determine compliance with the NAAQS. These specific location criteria are relevant after the general location has been selected based on the monitoring objectives and spatial scale of representation discussed in appendix D to this part. Monitor probe material and sample residence time requirements are also included in this appendix. Adherence to these siting criteria is necessary to ensure the uniform collection of compatible and comparable air quality data.

(b) The probe and monitoring path siting criteria discussed in this appendix must be followed to the maximum extent possible. It is recognized that there may be situations where some deviation from the siting criteria may be necessary. In any such case, the reasons must be thoroughly documented in a written request for a waiver that describes whether the resulting monitoring data will be representative of the monitoring area and how and why the proposed or existing siting must deviate from the criteria. This documentation should help to avoid later questions about the validity of the resulting monitoring data. Conditions under which the EPA would consider an application for waiver from these siting criteria are discussed in section 4 of this appendix.

(c) The pollutant-specific probe and monitoring path siting criteria generally apply to all spatial scales except where noted otherwise. Specific siting criteria that are phrased with ''shall'' or ''must'' are defined as requirements and exceptions must be granted through the waiver provisions. However, siting criteria that are phrased with ''should'' are defined as goals to meet for consistency but are not requirements.

2. Monitors and Samplers with Probe Inlets

2.1 Horizontal and Vertical Placement

(a) For O_3 and SO_2 monitoring, and for neighborhood or larger spatial scale Pb, PM_{10}, $PM_{10–2.5}$, $PM_{2.5}$, NO_2, and CO sites, the probe must be located greater than or equal to 2.0 meters and less than or equal to 15 meters above ground level.

(b) Middle scale CO and NO_2 monitors must have sampler inlets greater than or equal to 2.0 meters and less than or equal to 15 meters above ground level.

(c) Middle scale $PM_{10–2.5}$ sites are required to have sampler inlets greater than or equal to 2.0 meters and less than or equal to 7.0 meters above ground level.

(d) Microscale Pb, PM_{10}, $PM_{10–2.5}$, and $PM_{2.5}$ sites are required to have sampler inlets greater than or equal to 2.0 meters and less than or equal to 7.0 meters above ground level.

(e) Microscale near-road NO_2 monitoring sites are required to have sampler inlets greater than or equal to 2.0 meters and less than or equal to 7.0 meters above ground level.

(f) The probe inlets for microscale carbon monoxide monitors that are being used to

measure concentrations near roadways must be greater than or equal to 2.0 meters and less than or equal to 7.0 meters above ground level. Those probe inlets for microscale carbon monoxide monitors measuring concentrations near roadways in downtown areas or urban street canyons must be greater than or equal to 2.5 meters and less than or equal to 3.5 meters above ground level. The probe must be at least 1.0 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, etc., and away from dusty or dirty areas. If the probe is located near the side of a building or wall, then it should be located on the windward side of the building relative to the prevailing wind direction during the season of highest concentration potential for the pollutant being measured.

2.2 Spacing From Minor Sources

(a) It is important to understand the monitoring objective for a particular site in order to interpret this requirement. Local minor sources of a primary pollutant, such as SO_2, lead, or particles, can cause high concentrations of that particular pollutant at a monitoring site. If the objective for that monitoring site is to investigate these local primary pollutant emissions, then the site will likely be properly located nearby. This type of monitoring site would, in all likelihood, be a microscale-type of monitoring site. If a monitoring site is to be used to determine air quality over a much larger area, such as a neighborhood or city, a monitoring agency should avoid placing a monitor probe inlet near local, minor sources, because a plume from a local minor source should not be allowed to inappropriately impact the air quality data collected at a site. Particulate matter sites should not be located in an unpaved area unless there is vegetative ground cover year-round, so that the impact of windblown dusts will be kept to a minimum.

(b) Similarly, local sources of nitric oxide (NO) and ozone-reactive hydrocarbons can have a scavenging effect causing unrepresentatively low concentrations of O_3 in the vicinity of probes for O_3. To minimize these potential interferences from nearby minor sources, the probe inlet should be placed at a distance from furnace or incineration flues or other minor sources of SO_2 or NO. The separation distance should take into account the heights of the flues, type of waste or fuel burned, and the sulfur content of the fuel.

2.3 Spacing From Obstructions

(a) Obstacles may scavenge SO_2, O_3, or NO_2, and can act to restrict airflow for any pollutant. To avoid this interference, the probe inlet must have unrestricted airflow pursuant to paragraph (b) of this section and should be located at a distance from obstacles. The horizontal distance from the obstacle to the probe inlet must be at least twice the height that the obstacle protrudes above the probe inlet. An obstacle that does not meet the minimum distance requirement is considered an obstruction that restricts airflow to the probe inlet. The EPA does not generally consider objects or obstacles such as flag poles or site towers used for NOy convertors and meteorological sensors, etc. to be deemed obstructions.

(b) A probe inlet located near or along a vertical wall is undesirable because air moving along the wall may be subject to removal mechanisms. A probe inlet must have unrestricted airflow with no obstructions (as defined in paragraph (a) of this section) in a continuous arc of at least 270 degrees. An unobstructed continuous arc of 180 degrees is allowable when the applicable network design criteria specified in appendix D of this part require monitoring in street canyons and the probe is located on the side of a building. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. For particle sampling, there must be a minimum of 2.0 meters of horizontal separation from walls, parapets, and structures for rooftop site placement.

(c) A sampling station with a probe inlet located closer to an obstacle than required by the criteria in this section should be classified as middle scale or microscale, rather than neighborhood or urban scale, since the measurements from such a station would more closely represent these smaller scales.

(d) For near-road monitoring stations, the monitor probe shall have an unobstructed air flow, where no obstacles exist at or above the height of the monitor probe, between the monitor probe and the outside nearest edge of the traffic lanes of the target road segment.

2.4 Spacing From Trees

(a) Trees can provide surfaces for SO_2, O_3, or NO_2 adsorption or reactions and surfaces for particle deposition. Trees can also act as obstructions in locations where the trees are between the air pollutant sources or source areas and the monitoring site and where the trees are of a sufficient height and leaf canopy density to interfere with the normal airflow around the probe inlet. To reduce this possible interference/obstruction, the probe inlet should be 20 meters or more from the drip line of trees and must be at least 10 meters from the drip line of trees. If a tree or group of trees is an obstacle, the probe inlet must meet the distance requirements of section 2.3 of this appendix.

(b) The scavenging effect of trees is greater for O_3 than for other criteria pollutants. Monitoring agencies must take steps to consider the impact of trees on ozone monitoring sites and take steps to avoid this problem.

(c) Beginning January 1, 2024, microscale sites of any air pollutant shall have no trees or shrubs located at or above the line-of-sight fetch between the probe and the source under investigation, *e.g.,* a roadway or a stationary source.

2.5 Spacing From Roadways

TABLE E–1 TO SECTION 2.5 OF APPENDIX E—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O_3) AND OXIDES OF NITROGEN (NO, NO_2, NO_X, NO_y)

Roadway average daily traffic, vehicles per day	Minimum distance[1] [3] (meters)	Minimum distance[1] [2] [3] (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

[1] Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count./ TNOTE≤

[2] Applicable for ozone monitors whose placement was not approved as of December 18, 2006.

[3] All distances listed are expressed as having 2 significant figures. When rounding is performed to assess compliance with these siting requirements, the distance measurements will be rounded such as to retain at least two significant figures.

2.5.1 Spacing for Ozone Probes

In siting an O_3 monitor, it is important to minimize destructive interferences from sources of NO, since NO readily reacts with O_3. Table E–1 of this appendix provides the required minimum separation distances between a roadway and a probe inlet for various ranges of daily roadway traffic. A sampling site with a monitor probe located closer to a roadway than allowed by the Table E–1 requirements should be classified as middle scale or microscale, rather than neighborhood or urban scale, since the measurements from such a site would more closely represent these smaller scales.

2.5.2 Spacing for Carbon Monoxide Probes

(a) Near-road microscale CO monitoring sites, including those located in downtown areas, urban street canyons, and other near-road locations such as those adjacent to highly trafficked roads, are intended to provide a measurement of the influence of the immediate source on the pollution exposure on the adjacent area.

(b) Microscale CO monitor probe inlets in downtown areas or urban street canyon locations shall be located a minimum distance of 2.0 meters and a maximum distance of 10 meters from the edge of the nearest traffic lane.

(c) Microscale CO monitor probe inlets in downtown areas or urban street canyon locations shall be located at least 10 meters from an intersection, preferably at a midblock location. Midblock locations are preferable to intersection locations because intersections represent a much smaller portion of downtown space than do the streets between

them. Pedestrian exposure is probably also greater in street canyon/corridors than at intersections.

(d) Neighborhood scale CO monitor probe inlets in downtown areas or urban street canyon locations shall be located according to the requirements in Table E–2 of this appendix.

TABLE E–2 TO SECTION 2.5.2 OF APPENDIX E—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND PROBES FOR MONITORING NEIGHBORHOOD SCALE CARBON MONOXIDE

Roadway average daily traffic, vehicles per day	Minimum distance [1] [2] (meters)
≤10,000	10
15,000	25
20,000	45
30,000	80
40,000	115
50,000	135
≥60,000	150

[1] Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

[2] All distances listed are expressed as having 2 significant figures. When rounding is performed to assess compliance with these siting requirements, the distance measurements will be rounded such as to retain at least two significant figures.

2.5.3 Spacing for Particulate Matter ($PM_{2.5}$, $PM_{2.5–10}$, PM_{10}, Pb) Inlets

(a) Since emissions associated with the operation of motor vehicles contribute to urban area particulate matter ambient levels, spacing from roadway criteria are necessary for ensuring national consistency in PM sampler siting.

(b) The intent is to locate localized hot-spot sites in areas of highest concentrations, whether it be caused by mobile or multiple stationary sources. If the area is primarily affected by mobile sources and the maximum concentration area(s) is judged to be a traffic corridor or street canyon location, then the monitors should be located near roadways with the highest traffic volume and at separation distances most likely to produce the highest concentrations. For microscale traffic corridor sites, the location must be greater than or equal 5.0 meters and less than or equal to 15 meters from the major roadway. For the microscale street canyon site, the location must be greater than or equal 2.0 meters and less than or equal to 10 meters from the roadway. For the middle scale site, a range of acceptable distances from the roadway is shown in Figure E–1 of this appendix. This figure also includes separation distances between a roadway and neighborhood or larger scale sites by default. Any PM probe inlet at a site, 2.0 to 15 meters high, and further back than the middle scale requirements will generally be neighborhood, urban or regional scale. For example, according to Figure E–1 of this appendix, if a PM sampler is primarily influenced by roadway emissions and that sampler is set back 10 meters from a 30,000 ADT (average daily traffic) road, the site should be classified as microscale, if the sampler's inlet height is between 2.0 and 7.0 meters. If the sampler's inlet height is between 7.0 and 15 meters, the site should be classified as middle scale. If the sampler is 20 meters from the same road, it will be classified as middle scale; if 40 meters, neighborhood scale; and if 110 meters, an urban scale.

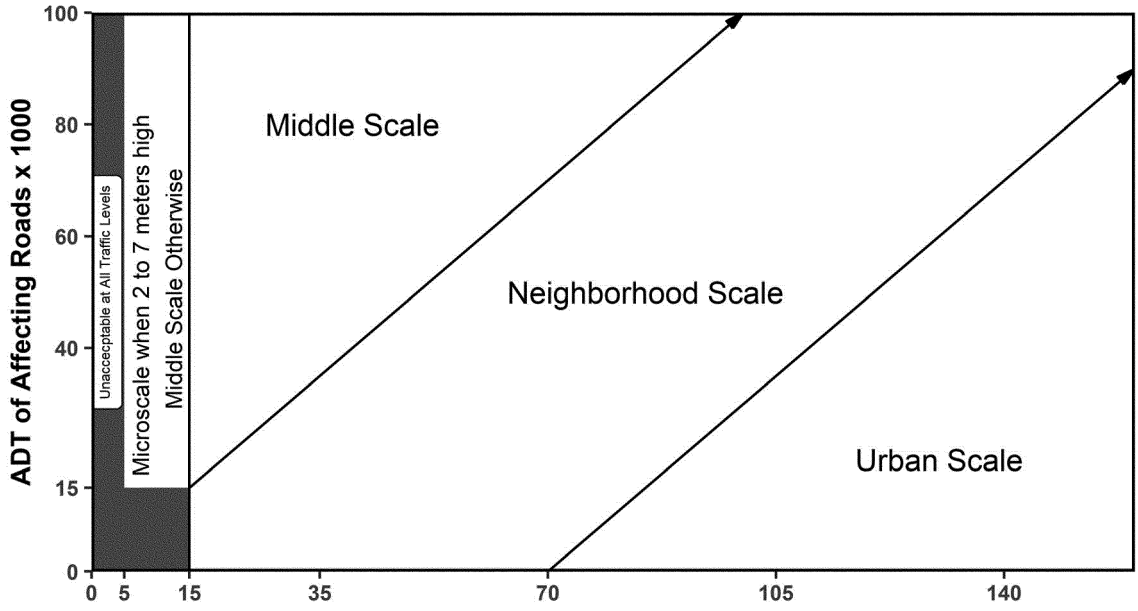

Figure E-1. Distance of PM Samplers to nearest traffic lane (meters)

Notes: Microscale street canyon sites must reside between 2 and 10 meters from the roadway.
Near-Road sites must be within 50 meters of the roadway.
The slopes of the lines between monitoring scales are one to one.

2.5.4 Spacing for Nitrogen Dioxide (NO_2) Probes

(a) In siting near-road NO_2 monitors as required in section 4.3.2 of appendix D of this part, the monitor probe shall be as near as practicable to the outside nearest edge of the traffic lanes of the target road segment but shall not be located at a distance greater than 50 meters, in the horizontal, from the outside nearest edge of the traffic lanes of the target road segment. Where possible, the near-road NO_2 monitor probe should be within 20 meters of the target road segment.

(b) In siting NO_2 monitors for neighborhood and larger scale monitoring, it is important to minimize near-road influences. Table E–1 of this appendix provides the required minimum separation distances between a roadway and a probe inlet for various ranges of daily roadway traffic. A site with a monitor probe located closer to a roadway than allowed by the Table E–1 requirements should be classified

as microscale or middle scale rather than neighborhood or urban scale.

2.6 Probe Material and Pollutant Sampler Residence Time

(a) For the reactive gases (SO_2, NO_2, and O_3), approved probe materials must be used for monitors. Studies[25 34] have been conducted to determine the suitability of materials such as polypropylene, polyethylene, polyvinyl chloride, Tygon®, aluminum, brass, stainless steel, copper, borosilicate glass, polyvinylidene fluoride (PVDF), polytetrafluoroethylene (PTFE), perfluoroalkoxy (PFA), and fluorinated ethylene propylene (FEP) for use as intake sampling lines. Of the above materials, only borosilicate glass, PVDF, PTFE, PFA, and FEP have been found to be acceptable for use as intake sampling lines for all the reactive gaseous pollutants. Furthermore, the EPA [25] has specified borosilicate glass, FEP Teflon®, or their equivalents as the only acceptable probe materials for delivering test atmospheres in the determination of reference or equivalent methods. Therefore, borosilicate glass, PVDF, PTFE, PFA, FEP, or their equivalents must be the only material in the sampling train (from probe inlet to the back of the monitor) that can be in contact with the ambient air sample for reactive gas monitors. Nafion™, which is composed primarily of PTFE, can be considered equivalent to PTFE; it has been shown in tests to exhibit virtually no loss of ozone at 20-second residence times.[35]

(b) For volatile organic compound (VOC) monitoring at PAMS, FEP Teflon® is unacceptable as the probe material because of VOC adsorption and desorption reactions on the FEP Teflon®. Borosilicate glass, stainless steel, or their equivalents are the acceptable probe materials for VOC and carbonyl sampling. Care must be taken to ensure that the sample residence time is kept to 20 seconds or less.

(c) No matter how nonreactive the sampling probe material is initially, after a period of use, reactive particulate matter is deposited on the probe walls. Therefore, the time it takes the gas to transfer from the probe inlet to the sampling device is critical. Ozone in the presence of nitrogen oxide (NO) will show significant losses, even in the most inert probe material, when the residence time exceeds 20 seconds.[26] Other studies [27 28]indicate that a 10-second or less residence time is easily achievable. Therefore, sampling probes for all reactive gas monitors for SO_2, NO_2, and O_3 must have a sample residence time less than 20 seconds.

2.7 Summary

Table E–3 of this appendix presents a summary of the general requirements for probe siting criteria with respect to distances and heights. Table E–3 requires different elevation distances above the ground for the various pollutants. The discussion in this appendix for each of the pollutants describes reasons for elevating the monitor or probe inlet. The differences in the specified range of heights are based on the vertical concentration gradients. For source oriented and near-road monitors, the gradients in the vertical direction are very large for the microscale, so a small range of heights are used. The upper limit of 15 meters is specified for the consistency between pollutants and to allow the use of a single manifold for monitoring more than one pollutant.

TABLE E–3 TO SECTION 2.7 OF APPENDIX E—SUMMARY OF PROBE SITING CRITERIA

Pollutant	Scale [9]	Height from ground to probe [8] (meters)	Horizontal or vertical distance from supporting structures [1 8] to probe inlet (meters)	Distance from drip line of trees to probe [8] (meters)	Distance from roadways to probe [8] (meters)
SO_2 [2 3 4 5]	Middle, Neighborhood, Urban, and Regional.	2.0–15	≥1.0	≥10	N/A.
CO [3 4 6]	Micro [downtown or street canyon sites].	2.5–3.5			2.0–10 for downtown areas or street canyon microscale.
	Micro [Near-Road sites]	2.0–7.0	≥1.0	≥10	≤50 for near-road microscale.
	Middle and Neighborhood	2.0–15			*See* Table E–2 of this appendix for middle and neighborhood scales.
O_3 [2 3 4]	Middle, Neighborhood, Urban, and Regional.	2.0–15	≥1.0	≥10	*See* Table E–1.
	Micro	2.0–7.0			≤50 for near-road micro-scale.
NO_2 [2 3 4]	Middle, Neighborhood, Urban, and Regional.	2.0–15	≥1.0	≥10	*See* Table E–1.
PAMS [2 3 4] Ozone precursors	Neighborhood and Urban	2.0–15	≥1.0	≥10	*See* Table E–1.
PM, Pb [2 3 4 7]	Micro	2.0–7.0			
	Middle, Neighborhood, Urban and Regional.	2.0–15	≥2.0 (horizontal distance only)	≥10	*See* Figure E–1.

N/A—Not applicable.

[1] When a probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on the roof.

[2] Should be greater than 20 meters from the dripline of tree(s) and must be 10 meters from the dripline.

[3] Distance from sampler or probe inlet to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler or probe inlet. Sites not meeting this criterion may be classified as microscale or middle scale (*see* paragraphs 2.3(a) and 2.3(c)).

[4] Must have unrestricted airflow in a continuous arc of at least 270 degrees around the probe or sampler; 180 degrees if the probe is on the side of a building or a wall for street canyon monitoring.

[5] The probe or sampler should be away from minor sources, such as furnace or incineration flues. The separation distance is dependent on the height of the minor source emission point(s), the type of fuel or waste burned, and the quality of the fuel (sulfur, ash, or lead content). This criterion is designed to avoid undue influences from minor sources.

[6] For microscale CO monitoring sites, the probe must be ≥10 meters from a street intersection and preferably at a midblock location.

[7] Collocated monitor inlets must be within 4.0 meters of each other and at least 2.0 meters apart for flow rates greater than 200 liters/min or at least 1.0 meter apart for samplers having flow rates less than 200 liters/min to preclude airflow interference, unless a waiver has been granted by the Regional Administrator pursuant to paragraph 3.3.4.2(c) of appendix A of part 58. For $PM_{2.5}$, collocated monitor inlet heights should be within 1.0 meter of each other vertically.

[8] All distances listed are expressed as having 2 significant figures. When rounding is performed to assess compliance with these siting requirements, the distance measurements will be rounded such as to retain at least two significant figures.

[9] See section 1.2 of appendix D for definitions of monitoring scales.

3. Open Path Analyzers

3.1 Horizontal and Vertical Placement

(a) For all O_3 and SO_2 monitoring sites and for neighborhood or larger spatial scale NO_2, and CO sites, at least 80 percent of the monitoring path must be located greater than or equal 2.0 meters and less than or equal to 15 meters above ground level.

(b) Middle scale CO and NO_2 sites must have monitoring paths greater than or equal 2.0 meters and less than or equal to 15 meters above ground level.

(c) Microscale near-road monitoring sites are required to have monitoring paths greater than or equal 2.0 meters and less than or equal to 7.0 meters above ground level.

(d) For microscale carbon monoxide monitors that are being used to measure concentrations near roadways, the monitoring path must be greater than or equal 2.0 meters and less than or equal to 7.0 meters above ground level. If the microscale carbon monoxide monitors measuring concentrations near roadways are in downtown areas or urban street canyons, the monitoring path must be greater than or equal 2.5 meters and less than or equal to 3.5 meters above ground level and at least 90

percent of the monitoring path must be at least 1.0 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, etc., and away from dusty or dirty areas. If a significant portion of the monitoring path is located near the side of a building or wall, then it should be located on the windward side of the building relative to the prevailing wind direction during the season of highest concentration potential for the pollutant being measured.

3.2 Spacing From Minor Sources

(a) It is important to understand the monitoring objective for a particular site in order to interpret this requirement. Local minor sources of a primary pollutant, such as SO_2 can cause high concentrations of that particular pollutant at a monitoring site. If the objective for that monitoring site is to investigate these local primary pollutant emissions, then the site will likely be properly located nearby. This type of monitoring site would, in all likelihood, be a microscale type of monitoring site. If a monitoring site is to be used to determine air quality over a much larger area, such as a neighborhood or city, a monitoring agency should avoid placing a monitoring path near local, minor sources, because a plume from a local minor source should not be allowed to inappropriately impact the air quality data collected at a site.

(b) Similarly, local sources of nitric oxide (NO) and ozone-reactive hydrocarbons can have a scavenging effect causing unrepresentatively low concentrations of O_3 in the vicinity of monitoring paths for O_3. To minimize these potential interferences from nearby minor sources, at least 90 percent of the monitoring path should be at a distance from furnace or incineration flues or other minor sources of SO_2 or NO. The separation distance should take into account the heights of the flues, type of waste or fuel burned, and the sulfur content of the fuel.

3.3 Spacing From Obstructions

(a) Obstacles may scavenge SO_2, O_3, or NO_2, and can act to restrict airflow for any pollutant. To avoid this interference, at least 90 percent of the monitoring path must have unrestricted airflow and should be located at a distance from obstacles. The horizontal distance from the obstacle to the monitoring path must be at least twice the height that the obstacle protrudes above the monitoring path. An obstacle that does not meet the minimum distance requirement is considered an obstruction that restricts airflow to the monitoring path. The EPA does not generally consider objects or obstacles such as flag poles or site towers used for NOy convertors and meteorological sensors, etc. to be deemed obstructions.

(b) A monitoring path located near or along a vertical wall is undesirable because air moving along the wall may be subject to removal mechanisms. At least 90 percent of the monitoring path for open path analyzers must have unrestricted airflow with no obstructions (as defined in paragraph (a) of this section) in a continuous arc of at least 270 degrees. An unobstructed continuous arc of 180 degrees is allowable when the applicable network design criteria specified in appendix D of this part require monitoring in street canyons and the monitoring path is located on the side of a building. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential.

(c) Special consideration must be given to the use of open path analyzers given their inherent potential sensitivity to certain types of interferences and optical obstructions. A monitoring path must be clear of all trees, brush, buildings, plumes, dust, or other optical obstructions, including potential obstructions that may move due to wind, human activity, growth of vegetation, etc. Temporary optical obstructions, such as rain, particles, fog, or snow, should be considered when siting an open path analyzer. Any of these temporary obstructions that are of sufficient density to obscure the light beam will negatively affect the ability of the open path analyzer to continuously measure pollutant concentrations. Transient, but significant obscuration of especially longer measurement paths, could occur as a result of certain meteorological conditions (*e.g.,* heavy fog, rain, snow) and/or aerosol levels that are of a sufficient density to prevent the open path analyzer's light transmission. If certain compensating measures are not otherwise implemented at the onset of monitoring (*e.g.,* shorter path lengths, higher light source intensity), data recovery during periods of greatest primary pollutant potential could be compromised. For instance, if heavy fog or high particulate levels are coincident with periods of projected NAAQS-threatening pollutant potential, the representativeness of the resulting data record in reflecting maximum pollution concentrations may be substantially impaired despite the fact that the site may otherwise exhibit an acceptable, even exceedingly high, overall valid data capture rate.

(d) A sampling station with a monitoring path located closer to an obstacle than required by the criteria in this section should be classified as middle scale or microscale, rather than neighborhood or urban scale, since the measurements from such a station would more closely represent these smaller scales.

(e) For near-road monitoring stations, the monitoring path shall have an unobstructed air flow, where no obstacles exist at or above the height of the monitoring path, between the monitoring path and the outside nearest edge of the traffic lanes of the target road segment.

3.4 Spacing From Trees

(a) Trees can provide surfaces for SO_2, O_3, or NO_2 adsorption or reactions. Trees can also act as obstructions in locations where the trees are located between the air pollutant sources or source areas and the monitoring site, and where the trees are of a sufficient height and leaf canopy density to interfere with the normal airflow around the monitoring path. To reduce this possible interference/obstruction, at least 90 percent of the monitoring path should be 20 meters or more from the drip line of trees and must be at least 10 meters from the drip line of trees. If a tree or group of trees could be considered an obstacle, the monitoring path must meet the distance requirements of section 3.3 of this appendix.

(b) The scavenging effect of trees is greater for O_3 than for other criteria pollutants. Monitoring agencies must take steps to consider the impact of trees on ozone monitoring sites and take steps to avoid this problem.

(c) Beginning January 1, 2024, microscale sites of any air pollutant shall have no trees or shrubs located at or above the line-of-sight fetch between the monitoring path and the source under investigation, *e.g.,* a roadway or a stationary source.

3.5 Spacing from Roadways

TABLE E–4 OF SECTION 3.5 OF APPENDIX E—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND MONITORING PATHS FOR MONITORING NEIGHBORHOOD AND URBAN SCALE OZONE (O**3**) AND OXIDES OF NITROGEN (NO, NO**2**, NO**X**, NO**y**)

Roadway average daily traffic, vehicles per day	Minimum distance [1] [3] (meters)	Minimum distance [1] [2] [3] (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

[1] Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

[2] Applicable for ozone open path monitors whose placement was not approved as of December 18, 2006.

[3] All distances listed are expressed as having 2 significant figures. When rounding is performed to assess compliance with these siting requirements, the distance measurements will be rounded such as to retain at least two significant figures.

3.5.1 Spacing for Ozone Monitoring Paths

In siting an O_3 open path analyzer, it is important to minimize destructive interferences form sources of NO, since NO readily reacts with O_3. Table E–4 of this appendix provides the required minimum separation distances between a roadway and at least 90 percent of a monitoring path for various ranges of daily roadway traffic. A monitoring site with a monitoring path located closer to a roadway than allowed by the Table E–4 requirements should be classified as microscale or middle scale, rather than neighborhood or urban scale, since the measurements from such a site would more closely represent these smaller scales. The monitoring path(s) must not cross over a roadway with an average daily traffic count of 10,000 vehicles per day or more. For locations where a monitoring path crosses a roadway with fewer than 10,000 vehicles per day, monitoring agencies must consider the entire segment of the monitoring path in the area of potential atmospheric interference from automobile emissions. Therefore, this

calculation must include the length of the monitoring path over the roadway plus any segments of the monitoring path that lie in the area between the roadway and minimum separation distance, as determined from Table E–4 of this appendix. The sum of these distances must not be greater than 10 percent of the total monitoring path length.

3.5.2 Spacing for Carbon Monoxide Monitoring Paths

(a) Near-road microscale CO monitoring sites, including those located in downtown areas, urban street canyons, and other near-road locations such as those adjacent to highly trafficked roads, are intended to provide a measurement of the influence of the immediate source on the pollution exposure on the adjacent area.

(b) Microscale CO monitoring paths in downtown areas or urban street canyon locations shall be located a minimum distance of 2.0 meters and a maximum distance of 10 meters from the edge of the nearest traffic lane.

(c) Microscale CO monitoring paths in downtown areas or urban street canyon locations shall be located at least 10 meters from an intersection, preferably at a midblock location. Midblock locations are preferable to intersection locations because intersections represent a much smaller portion of downtown space than do the streets between them. Pedestrian exposure is probably also greater in street canyon/corridors than at intersections.

(d) Neighborhood scale CO monitoring paths in downtown areas or urban street canyon locations shall be located according to the requirements in Table E–5 of this appendix.

TABLE E–5 SECTION 3.5.2 OF APPENDIX E—MINIMUM SEPARATION DISTANCE BETWEEN ROADWAYS AND MONITORING PATHS FOR MONITORING NEIGHBORHOOD SCALE CARBON MONOXIDE

Roadway average daily traffic, vehicles per day	Minimum distance [1] [2] (meters)
≤10,000	10
15,000	25
20,000	45
30,000	80
40,000	115
50,000	135
≥60,000	150

[1] Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

[2] All distances listed are expressed as having 2 significant figures. When rounding is performed to assess compliance with these siting requirements, the distance measurements will be rounded such as to retain at least two significant figures.

3.5.3 Spacing for Nitrogen Dioxide (NO_2) Monitoring Paths

(a) In siting near-road NO_2 monitors as required in section 4.3.2 of appendix D of this part, the monitoring path shall be as near as practicable to the outside nearest edge of the traffic lanes of the target road segment but shall not be located at a distance greater than 50 meters, in the horizontal, from the outside nearest edge of the traffic lanes of the target road segment.

(b) In siting NO_2 open path monitors for neighborhood and larger scale monitoring, it is important to minimize near-road influences. Table E–5 of this appendix provides the required minimum separation distances between a roadway and at least 90 percent of a monitoring path for various ranges of daily roadway traffic. A site with a monitoring path located closer to a roadway than allowed by the Table E–4 requirements should be classified as microscale or middle scale rather than neighborhood or urban scale. The monitoring path(s) must not cross over a roadway with an average daily traffic count of 10,000 vehicles per day or more. For locations where a monitoring path crosses a roadway with fewer than 10,000 vehicles per day, monitoring agencies must consider the entire segment of the monitoring path in the area of potential atmospheric interference form automobile emissions. Therefore, this calculation must include the length of the monitoring path over the roadway plus any segments of the monitoring path that lie in the area between the roadway and minimum separation distance, as determined from Table E–5 of this appendix. The sum of these distances must not be greater than 10 percent of the total monitoring path length.

3.6 Cumulative Interferences on a Monitoring Path

The cumulative length or portion of a monitoring path that is affected by minor sources, trees, or roadways must not exceed 10 percent of the total monitoring path length.

3.7 Maximum Monitoring Path Length

The monitoring path length must not exceed 1.0 kilometer for open path analyzers in neighborhood, urban, or regional scale. For middle scale monitoring sites, the monitoring path length must not exceed 300 meters. In areas subject to frequent periods of dust, fog, rain, or snow, consideration should be given to a shortened monitoring path length to minimize loss of monitoring data due to these temporary optical obstructions. For certain ambient air monitoring scenarios using open path analyzers, shorter path lengths may be needed in order to ensure that the monitoring site meets the objectives and spatial scales defined in appendix D to this part. The Regional Administrator may require shorter path lengths, as needed on an individual basis, to ensure that the SLAMS sites meet the appendix D requirements. Likewise, the Administrator may specify the maximum path length used at NCore monitoring sites.

3.8 Summary

Table E–6 of this appendix presents a summary of the general requirements for monitoring path siting criteria with respect to distances and heights. Table E–6 requires different elevation distances above the ground for the various pollutants. The discussion in this appendix for each of the pollutants describes reasons for elevating the monitoring path. The differences in the specified range of heights are based on the vertical concentration gradients. For source oriented and near-road monitors, the gradients in the vertical direction are very large for the microscale, so a small range of heights are used. The upper limit of 15 meters is specified for the consistency between pollutants and to allow the use of a monitoring path for monitoring more than one pollutant.

TABLE E–6 SECTION 3.8 OF APPENDIX E—SUMMARY OF MONITORING PATH SITING CRITERIA

Pollutant	Maximum monitoring path length [9] [10]	Height from ground to 80% of monitoring path [1] [8] (meters)	Horizontal or vertical distance from supporting structures [2] to 90% of monitoring path [1] [8] (meters)	Distance from trees to 90% of monitoring path [1] [8] (meters)	Distance from roadways to monitoring path [1] [8] (meters)
SO_2 [3] [4] [5] [6]	<= 300 m for Middle	2.0–15	≥1.0	≥10	N/A.
	<= 1.0 km for Neighborhood, Urban, and Regional				
CO [4] [5] [7]	<= 300 m for Micro [downtown or street canyon sites].	2.5–3.5	≥1.0	≥10	2.0–10 for downtown areas or street canyon microscale.
	<= 300 m for Micro [Near-Road sites].	2.0–7.0			≤50 for near-road microscale.

TABLE E–6 SECTION 3.8 OF APPENDIX E—SUMMARY OF MONITORING PATH SITING CRITERIA—Continued

Pollutant	Maximum monitoring path length [9] [10]	Height from ground to 80% of monitoring path [1] [8] (meters)	Horizontal or vertical distance from supporting structures [2] to 90% of monitoring path [1] [8] (meters)	Distance from trees to 90% of monitoring path [1] [8] (meters)	Distance from roadways to monitoring path [1] [8] (meters)
	<= 300 m for Middle	2.0–15			*See* Table E–5 of this appendix for middle and neighborhood scales.
	<= 1.0 km for Neighborhood.				
O_3 [3] [4] [5]	<= 300 m for Middle.				
	<= 1.0 km for Neighborhood, Urban, and Regional.	2.0–15	≥1.0	≥10	*See* Table E–4.
NO_2 [3] [4] [5]	Between 50 m–300 m for Micro (Near-Road).	2.0–7.0			≤50 for near-road micro-scale.
	<= 300 m for Middle		≥1.0	≥10	
	<= 1.0 km for Neighborhood, Urban, and Regional.	2.0–15			*See* Table E–4.
PAMS [3] [4] [5] Ozone precursors	<= 1.0 km for Neighborhood and Urban.	2.0–15	≥1.0	≥10	*See* Table E–4.

N/A—Not applicable.

[1] Monitoring path for open path analyzers is applicable only to middle or neighborhood scale CO monitoring, middle, neighborhood, urban, and regional scale NO_2 monitoring, and all applicable scales for monitoring SO_2, O_3, and O_3 precursors.

[2] When the monitoring path is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

[3] At least 90 percent of the monitoring path should be greater than 20 meters from the dripline of tree(s) and must be 10-meters from the dripline.

[4] Distance from 90 percent of monitoring path to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the monitoring path. Sites not meeting this criterion may be classified as microscale or middle scale (*see* text).

[5] Must have unrestricted airflow 270 degrees around at least 90 percent of the monitoring path; 180 degrees if the monitoring path is adjacent to the side of a building or a wall for street canyon monitoring.

[6] The monitoring path should be away from minor sources, such as furnace or incineration flues. The separation distance is dependent on the height of the minor source's emission point (such as a flue), the type of fuel or waste burned, and the quality of the fuel (sulfur, ash, or lead content). This criterion is designed to avoid undue influences from minor sources.

[7] For microscale CO monitoring sites, the monitoring path must be ≥10. meters from a street intersection and preferably at a midblock location.

[8] All distances listed are expressed as having 2 significant figures. When rounding is performed to assess compliance with these siting requirements, the distance measurements will be rounded such as to retain at least two significant figures.

[9] See section 1.2 of appendix D for definitions of monitoring scales.

[10] See section 3.7 of this appendix.

4. Waiver Provisions

Most sampling probes or monitors can be located so that they meet the requirements of this appendix. New sites, with rare exceptions, can be located within the limits of this appendix. However, some existing sites may not meet these requirements and may still produce useful data for some purposes. The EPA will consider a written request from the State, or where applicable local, agency to waive one or more siting criteria for some monitoring sites providing that the State or their designee can adequately demonstrate the need (purpose) for monitoring or establishing a monitoring site at that location.

4.1 For a proposed new site, a waiver may be granted only if both the following criteria are met:

4.1.1 The proposed new site can be demonstrated to be as representative of the monitoring area as it would be if the siting criteria were being met.

4.1.2 The monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints (*e.g.,* inability to locate the required type of site the necessary distance from roadways or obstructions).

4.2 For an existing site, a waiver may be granted if either the criterion in section 4.1.1 or the criterion in 4.1.2 of this appendix is met.

4.3 Cost benefits, historical trends, and other factors may be used to add support to the criteria in sections 4.1.1 and 4.1.2 of this appendix; however, by themselves, they will not be acceptable reasons for the EPA to grant a waiver. Written requests for waivers must be submitted to the Regional Administrator. Granted waivers must be renewed minimally every 5 years and ideally as part of the network assessment as defined in § 58.10(d). The approval date of the waiver must be documented in the annual monitoring network plan to support the requirements of § 58.10(a)(1) and 58.10(b)(10).

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■ 31. Revise appendix G to part 58 to read as follows:

Appendix G to Part 58—Uniform Air Quality Index (AQI) and Daily Reporting

1. General Information
2. Reporting Requirements
3. Data Handling

1. General Information

1.1 *AQI Overview.* The AQI is a tool that simplifies reporting air quality to the public in a nationally uniform and easy to understand manner. The AQI converts concentrations of pollutants, for which the EPA has established a national ambient air quality standard (NAAQS), into a uniform scale from 0–500. These pollutants are ozone (O_3), particulate matter ($PM_{2.5}$, PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2). The scale of the index is divided into general categories that are associated with health messages.

2. Reporting Requirements

2.1 *Applicability.* The AQI must be reported daily for a metropolitan statistical area (MSA) with a population over 350,000. When it is useful and possible, it is recommended, but not required for an area to report a sub-daily AQI as well.

2.2 *Contents of AQI Report.*

2.2.1 *Content of AQI Report Requirements.* An AQI report must contain the following:

a. The reporting area(s) (the MSA or subdivision of the MSA).

b. The reporting period (the day for which the AQI is reported).

c. The main pollutant (the pollutant with the highest index value).

d. The AQI (the highest index value).

e. The category descriptor and index value associated with the AQI and, if choosing to report in a color format, the associated color. Use only the following descriptors and colors for the six AQI categories:

TABLE 1 TO SECTION 2 OF APPENDIX G—AQI CATEGORIES

For this AQI	Use this descriptor	And this color [1]
0 to 50	"Good"	Green.
51 to 100	"Moderate"	Yellow.
101 to 150	"Unhealthy for Sensitive Groups"	Orange.
151 to 200	"Unhealthy"	Red.
201 to 300	"Very Unhealthy"	Purple.
301 and above	"Hazardous"	Maroon[1].

[1]Specific color definitions can be found in the most recent reporting guidance (Technical Assistance Document for the Reporting of Daily Air Quality), which can be found at *https://www.airnow.gov/publications/air-quality-index/technical-assistance-document-for-reporting-the-daily-aqi/.*

f. The pollutant specific sensitive groups for any reported index value greater than 100. The sensitive groups for each pollutant are identified as part of the periodic review of the air quality criteria and the NAAQS. For convenience, the EPA lists the relevant groups for each pollutant in the most recent reporting guidance (Technical Assistance Document for the Reporting of Daily Air Quality), which can be found at *https://www.airnow.gov/publications/air-quality-index/technical-assistance-document-for-reporting-the-daily-aqi/.*

2.2.2 *Contents of AQI Report When Applicable.* When appropriate, the AQI report may also contain the following, but such information is not required:

a. Appropriate health and cautionary statements.

b. The name and index value for other pollutants, particularly those with an index value greater than 100.

c. The index values for sub-areas of your MSA.

d. Causes for unusually high AQI values.

e. Pollutant concentrations.

f. Generally, the AQI report applies to an area's MSA only. However, if a significant air quality problem exists (AQI greater than 100) in areas significantly impacted by the MSA but not in it (for example, O_3 concentrations are often highest downwind and outside an urban area), the report should identify these areas and report the AQI for these areas as well.

2.3. *Communication, Timing, and Frequency of AQI Report.* The daily AQI must be reported 7 days per week and made available via website or other means of public access. The daily AQI report represents the air quality for the previous day. Exceptions to this requirement are in section 2.4 of this appendix.

a. Reporting the AQI sub-daily is recommended, but not required, to provide more timely air quality information to the public for making health-protective decisions.

b. Submitting hourly data in real-time to the EPA's AirNow (or future analogous) system is recommended, but not required, and assists the EPA in providing timely air quality information to the public for making health-protective decisions.

c. Submitting hourly data for appropriate monitors (referenced in section 3.2 of this appendix) satisfies the daily AQI reporting requirement because the AirNow system makes daily and sub-daily AQI reports widely available through its website and other communication tools.

d. Forecasting the daily AQI provides timely air quality information to the public and is recommended but not required. Sub-daily forecasts are also recommended, especially when air quality is expected to vary substantially throughout the day, like during wildfires. Long-term (multi-day) forecasts can also be made available when useful.

2.4. *Exceptions to Reporting Requirements.*

a. If the index value for a particular pollutant remains below 50 for a season or year, then it may be excluded from the calculation of the AQI in section 3 of this appendix.

b. If all index values remain below 50 for a year, then the AQI may be reported at the discretion of the reporting agency. In subsequent years, if pollutant levels rise to where the AQI would be above 50, then the AQI must be reported as required in section 2 of this appendix.

c. As previously mentioned in section 2.3 of this appendix, submitting hourly data in real-time from appropriate monitors (referenced in section 3.2 of this appendix) to the EPA's AirNow (or future analogous) system satisfies the daily AQI reporting requirement.

3. Data Handling.

3.1 *Relationship of AQI and pollutant concentrations.* For each pollutant, the AQI transforms ambient concentrations to a scale from 0 to 500. As appropriate, the AQI is associated with the NAAQS for each pollutant. In most cases, the index value of 100 is associated with the numerical level of the short-term standard (*i.e.,* averaging time of 24-hours or less) for each pollutant. The index value of 50 is associated with the numerical level of the annual standard for a pollutant, if there is one, at one-half the level of the short-term standard for the pollutant or at the level at which it is appropriate to begin to provide guidance on cautionary language. Higher categories of the index are based on the potential for increasingly serious health effects to occur following exposure and increasing proportions of the population that are likely to be affected. The reported AQI corresponds to the pollutant with the highest calculated AQI. For the purposes of reporting the AQI, the sub-indexes for PM_{10} and $PM_{2.5}$ are to be considered separately. The pollutant responsible for the highest index value (the reported AQI) is called the ''main'' pollutant for that day.

3.2 *Monitors Used for AQI Reporting.* Concentration data from State/Local Air Monitoring Station (SLAMS) or parts of the SLAMS required by 40 CFR 58.10 must be used for each pollutant except PM. For PM, calculate and report the AQI on days for which air quality data has been measured (*e.g.,* from continuous $PM_{2.5}$ monitors required in appendix D to this part). PM measurements may be used from monitors that are not reference or equivalent methods (for example, continuous PM_{10} or $PM_{2.5}$ monitors). Detailed guidance for relating non-approved measurements to approved methods by statistical linear regression is referenced here:

Reference for relating non-approved PM measurements to approved methods (Eberly, S., T. Fitz-Simons, T. Hanley, L. Weinstock., T. Tamanini, G. Denniston, B. Lambeth, E. Michel, S. Bortnick. Data Quality Objectives (DQOs) For Relating Federal Reference Method (FRM) and Continuous $PM_{2.5}$ Measurements to Report an Air Quality Index (AQI). U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA–454/B–02–002, November 2002).

3.3 *AQI Forecast.* The AQI can be forecasted at least 24-hours in advance using the most accurate and reasonable procedures considering meteorology, topography, availability of data, and forecasting expertise. The guidance document, ''Guidelines for Developing an Air Quality (Ozone and $PM_{2.5}$) Forecasting Program,'' can be found at *https://www.airnow.gov/publications/weathercasters/guidelines-developing-air-quality-forecasting-program/.*

3.4 *Calculation and Equations.*

a. The AQI is the highest value calculated for each pollutant as follows:

i. Identify the highest concentration among all of the monitors within each reporting area and truncate as follows:

(A) Ozone—truncate to 3 decimal places
$PM_{2.5}$—truncate to 1 decimal place
PM_{10}—truncate to integer
CO—truncate to 1 decimal place
SO_2—truncate to integer
NO_2—truncate to integer

(B) [Reserved]

ii. Using table 2 to this appendix, find the two breakpoints that contain the concentration.

iii. Using equation 1 to this appendix, calculate the index.

iv. Round the index to the nearest integer.

TABLE 2 TO SECTION 3.4 OF APPENDIX G—BREAKPOINTS FOR THE AQI

These breakpoints							Equal these AQI's	
O_3 (ppm) 8-hour	O_3 (ppm) 1-hour[1]	$PM_{2.5}$ (µg/m^3) 24-hour	PM_{10} (µg/m^3) 24-hour	CO (ppm) 8-hour	SO_2 (ppb) 1-hour	NO_2 (ppb) 1-hour	AQI	Category
0.000–0.054	.....	0.0–9.0	0–54	0.0–4.4	0–35	0–53	0–50	Good.
0.055–0.070	.....	9.1–35.4	55–154	4.5–9.4	36–75	54–100	51–100	Moderate.
0.071–0.085	0.125–0.164	35.5–55.4	155–254	9.5–12.4	76–185	101–360	101–150	Unhealthy for Sensitive Groups.
0.086–0.105	0.165–0.204	55.5–125.4	255–354	12.5–15.4	[3]186–304	361–649	151–200	Unhealthy.
0.106–0.200	0.205–0.404	125.5—225.4	355–424	15.5–30.4	[3]305–604	650–1249	201–300	Very Unhealthy.

TABLE 2 TO SECTION 3.4 OF APPENDIX G—BREAKPOINTS FOR THE AQI—Continued

These breakpoints							Equal these AQI's	
O_3 (ppm) 8-hour	O_3 (ppm) 1-hour[1]	$PM_{2.5}$ (µg/m³) 24-hour	PM_{10} (µg/m³) 24-hour	CO (ppm) 8-hour	SO_2 (ppb) 1-hour	NO_2 (ppb) 1-hour	AQI	Category
0.201 – (2)	0.405+	225.5+	425+	30.5+	[3] 605+	1250+	301+	[4] Hazardous.

[1] Areas are generally required to report the AQI based on 8-hour ozone values. However, there are a small number of areas where an AQI based on 1-hour ozone values would be more precautionary. In these cases, in addition to calculating the 8-hour ozone index value, the 1-hour ozone index value may be calculated, and the maximum of the two values reported.
[2] 8-hour O_3 concentrations do not define higher AQI values (≤301). AQI values > 301 are calculated with 1-hour O_3 concentrations.
[3] 1-hr SO_2 concentrations do not define higher AQI values (≥200). AQI values of 200 or greater are calculated with 24-hour SO_2 concentration.
[4] AQI values between breakpoints are calculated using equation 1 to this appendix. For AQI values in the hazardous category, AQI values greater than 500 should be calculated using equation 1 and the concentration specified for the AQI value of 500. The AQI value of 500 are as follows: O_3 1-hour—0.604 ppm; $PM_{2.5}$ 24-hour—325.4 µg/m³; PM_{10} 24-hour—604 µg/m³; CO ppm—50.4 ppm; SO_2 1-hour—1004 ppb; and NO_2 1-hour—2049 ppb.

b. If the concentration is equal to a breakpoint, then the index is equal to the corresponding index value in table 2 to this appendix. However, equation 1 to this appendix can still be used. The results will be equal. If the concentration is between two breakpoints, then calculate the index of that pollutant with equation 1. It should also be noted that in some areas, the AQI based on 1-hour O_3 will be more precautionary than using 8-hour values (*see* footnote 1 to table 2). In these cases, the 1-hour values as well as 8-hour values may be used to calculate index values and then use the maximum index value as the AQI for O_3.

Equation 1 to Appendix G to Part 58

$$I_p = \frac{I_{Hi} - I_{Lo}}{BP_{Hi} - BP_{Lo}}\left(C_p - BP_{Lo}\right) + I_{Lo}$$

Where:
I_p = the index value for pollutant$_p$.
C_p = the truncated concentration of pollutant$_p$.
BP_{Hi} = the breakpoint that is greater than or equal to C_p.
BP_{Lo} = the breakpoint that is less than or equal to C_p.
I_{Hi} = the AQI value corresponding to BP_{Hi}.
I_{lo} = the AQI value corresponding to BP_{Lo}.

c. If the concentration is larger than the highest breakpoint in table 2 to this appendix then the last two breakpoints in table 2 may be used when equation 1 to this appendix is applied.
Example:

d. Using table 2 and equation 1 to this appendix, calculate the index value for each of the pollutants measured and select the one that produces the highest index value for the AQI. For example, if a PM_{10} value of 210 µg/m³ is observed, a 1-hour O_3 value of 0.156 ppm, and an 8-hour O_3 value of 0.130 ppm, then do this:

i. Find the breakpoints for PM_{10} at 210 µg/m³ as 155 µg/m³ and 254 µg/m³, corresponding to index values 101 and 150;

ii. Find the breakpoints for 1-hour O_3 at 0.156 ppm as 0.125 ppm and 0.164 ppm, corresponding to index values 101 and 150;

iii. Find the breakpoints for 8-hour O_3 at 0.130 ppm as 0.116 ppm and 0.374 ppm, corresponding to index values 201 and 300;

iv. Apply equation 21 to this appendix for 210 µg/m³, PM_{10}:

Equation 2 to Appendix G to Part 58

$$\frac{150 - 101}{254 - 155}(210 - 155) + 101 = 128$$

v. Apply equation 3 to this appendix for 0.156 ppm, 1-hour O_3:

Equation 3 to Appendix G to Part 58

$$\frac{150 - 101}{0.164 - 0.125}(0.156 - 0.125) + 101 = 140$$

vi. Apply equation 4 to this appendix for 0.130 ppm, 8-hour O_3:

Equation 4 to Appendix G to Part 58

$$\frac{300 - 201}{0.374 - 0.116}(0.130 - 0.116) + 201 = 206$$

vii. Find the maximum, 206. This is the AQI. A minimal AQI report could read: ''Today, the AQI for my city is 206, which is Very Unhealthy, due to ozone.'' It would then reference the associated sensitive groups.

[FR Doc. 2024–02637 Filed 3–5–24; 8:45 am]

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NAAQS in separate rulemakings, and will consider the emissions reductions associated with the Smog Check Contingency Measure at that time. We will accept comments from the public on this proposal until January 19, 2024.

If finalized as proposed, this action would add the Smog Check Contingency Measure and the related statutory provision to the federally-enforceable California SIP.

III. Incorporation by Reference

In this action, the EPA is proposing to include in a final EPA rule regulatory text that includes incorporation by reference. In accordance with requirements of 1 CFR 51.5, the EPA is proposing to incorporate by reference California Health & Safety Code section 44011(a)(4)(A) and (B), which authorizes CARB to narrow the newer model vehicle Smog Check inspection exemption. The EPA has made, and will continue to make, these materials available through *https://www.regulations.gov* and at the EPA Region IX Office (please contact the person identified in the **FOR FURTHER INFORMATION CONTACT** section of this preamble for more information).

IV. Statutory and Executive Order Reviews

Under the CAA, the Administrator is required to approve a SIP submission that complies with the relevant provisions of the Act and applicable federal regulations. 42 U.S.C. 7410(k); 40 CFR 52.02(a). Thus, in reviewing SIP submissions, the EPA's role is to approve state choices, provided that they meet the criteria of the CAA. Accordingly, this proposed action merely proposes to approve a state measure as meeting federal requirements and does not impose additional requirements beyond those imposed by state law. For that reason, this proposed action:

- Is not a ''significant regulatory action'' subject to review by the Office of Management and Budget under Executive Orders 12866 (58 FR 51735, October 4, 1993), 13563 (76 FR 3821, January 21, 2011) and 14094 (88 FR 21879, April 11, 2023);
- Does not impose an information collection burden under the provisions of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*);
- Is certified as not having a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*);
- Does not contain any unfunded mandate or significantly or uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4);
- Does not have federalism implications as specified in Executive Order 13132 (64 FR 43255, August 10, 1999);
- Is not an economically significant regulatory action based on health or safety risks subject to Executive Order 13045 (62 FR 19885, April 23, 1997);
- Is not a significant regulatory action subject to Executive Order 13211 (66 FR 28355, May 22, 2001); and
- Is not subject to requirements of Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) because application of those requirements would be inconsistent with the CAA.

In addition, the SIP is not approved to apply on any Indian reservation land or in any other area where the EPA or an Indian tribe has demonstrated that a tribe has jurisdiction. In those areas of Indian country, the proposed rule does not have tribal implications and will not impose substantial direct costs on tribal governments or preempt tribal law as specified by Executive Order 13175 (65 FR 67249, November 9, 2000).

Executive Order 12898 (Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations, 59 FR 7629, Feb. 16, 1994) directs Federal agencies to identify and address ''disproportionately high and adverse human health or environmental effects'' of their actions on minority populations and low-income populations to the greatest extent practicable and permitted by law. The EPA defines environmental justice (EJ) as ''the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.'' The EPA further defines the term fair treatment to mean that ''no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental, and commercial operations or programs and policies.''

CARB evaluated environmental justice considerations as part of its SIP submission given that the CAA and applicable implementing regulations neither prohibit nor require such an evaluation. The EPA reviewed and considered the air agency's evaluation of environmental justice considerations of this action, as is described above in the section titled, ''Environmental Justice Considerations'' as part of the EPA's review. Due to the nature of the action being taken here, this proposed action is expected to have a neutral to positive impact on the air quality of the affected areas. In addition, there is no information in the record inconsistent with the stated goal of E.O. 12898 of achieving environmental justice for people of color, low-income populations, and Indigenous peoples.

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Incorporation by reference, Intergovernmental relations, Nitrogen oxides, Ozone, Particulate matter, Reporting and recordkeeping requirements, Volatile organic compounds.

Authority: 42 U.S.C. 7401 *et seq.*

Dated: December 12, 2023.

Martha Guzman Aceves,

Regional Administrator, Region IX.

[FR Doc. 2023–27688 Filed 12–19–23; 8:45 am]

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[EPA–R09–OAR–2023–0477; FRL–11532–01–R9]

Clean Air Plans; Contingency Measures for the Fine Particulate Matter Standards; San Joaquin Valley, California

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: The Environmental Protection Agency (EPA) is proposing to approve two state implementation plan (SIP) submissions under the Clean Air Act (CAA) that address the contingency measures requirements for the 1997 annual, 2006 24-hour, and 2012 annual fine particulate matter ($PM_{2.5}$) national ambient air quality standards (NAAQS or ''standards'') for the San Joaquin Valley $PM_{2.5}$ nonattainment area. The two SIP submissions include the area's contingency measure plan element and two specific contingency measures that would apply to residential wood burning heaters and fireplaces and non-agricultural, rural open areas. A third contingency measure, applicable to light-duty on-road motor vehicles, is the subject of a separate action by the EPA, but the related emissions reductions from the third measure are accounted for in this proposed rule. The EPA is proposing approval of the SIP submissions because the Agency has

determined that they are in accordance with the applicable requirements for such SIP submissions under the CAA and EPA implementation regulations for the $PM_{2.5}$ NAAQS. The proposed approval, if finalized, would incorporate the two contingency measures into the federally enforceable SIP. The EPA will accept comments on this proposed rule during a 30-day public comment period.

DATES: Comments must be received by January 19, 2024.

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–R09–OAR–2023–0477 at *https://www.regulations.gov.* For comments submitted at *Regulations.gov*, follow the online instructions for submitting comments. Once submitted, comments cannot be edited or removed from *Regulations.gov*. The EPA may publish any comment received to its public docket. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (*e.g.,* audio or video) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. The EPA will generally not consider comments or comment contents located outside of the primary submission (*i.e.,* on the web, cloud, or other file sharing system). For additional submission methods, please contact the person identified in the **FOR FURTHER INFORMATION CONTACT** section. For the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit *https://www.epa.gov/dockets/commenting-epa-dockets.* If you need assistance in a language other than English or if you are a person with a disability who needs a reasonable accommodation at no cost to you, please contact the person identified in the **FOR FURTHER INFORMATION CONTACT** section.

FOR FURTHER INFORMATION CONTACT: Rory Mays, Planning and Analysis Branch (AIR–2), Air and Radiation Division, EPA Region IX, 75 Hawthorne Street, San Francisco, CA 94105. By phone: (415) 972–3227 or by email at *mays.rory@epa.gov.*

SUPPLEMENTARY INFORMATION: Throughout this document, ''we,'' ''us,'' and ''our'' refer to the EPA.

Table of Contents

I. Background for Proposed Action

A. Standards, Designations, Classifications, and Plans

Under section 109 of the Clean Air Act (CAA or ''Act''), the EPA has established national ambient air quality standards (NAAQS or ''standards'') for certain pervasive air pollutants (referred to as ''criteria pollutants'') and conducts periodic reviews of the NAAQS to determine whether they should be revised or whether new NAAQS should be established. To date, the EPA has established NAAQS for particulate matter, ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide and lead. Under CAA section 110, states have primary responsibility for meeting the NAAQS within the state, and must submit an implementation plan that specifies the manner in which the state will attain and maintain the NAAQS. These implementation plans are referred to as ''state implementation plans'' or ''SIPs.''

Periodically, states must make SIP submissions of different types to meet additional CAA requirements. For example, after the EPA promulgates a new or revised NAAQS, under CAA section 110(a)(1) and (2), states are required to adopt and submit to the EPA a state implementation plan that provides for implementation, maintenance, and enforcement of the NAAQS. Such plans are referred to as ''infrastructure SIPs.'' Similarly, after the EPA promulgates designations for a new or revised NAAQS, states with designated nonattainment areas must make SIP submissions that meet additional requirements for such nonattainment areas, under CAA section 172(c) and, in the case of the $PM_{2.5}$ NAAQS, CAA sections 188 and 189. This type of SIP submission is referred to as an ''attainment plan.''

Under CAA section 110(k), the EPA is charged with evaluation of each SIP submission submitted by states for compliance with applicable CAA requirements, and for approval or disapproval (in whole or in part) of the submission. The EPA evaluates SIP submissions and takes action to approve, disapprove, or conditionally approve them through notice-and-comment rulemaking published in the **Federal Register**. Where appropriate, the EPA may act on specific parts of a SIP submission in separate rulemaking actions.

In 1997, the EPA promulgated new NAAQS for fine particulate matter, using particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers (''$PM_{2.5}$'') as the indicator.[1] The EPA established primary and secondary annual and 24-hour standards for $PM_{2.5}$. The EPA set the 1997 annual $PM_{2.5}$ NAAQS, both primary and secondary standards, at 15.0 micrograms per cubic meter (μg/m^3), based on a 3-year average of annual mean $PM_{2.5}$ concentrations. The EPA set the 1997 24-hour $PM_{2.5}$ NAAQS, both primary and secondary standards, at 65 μg/m^3, based on the 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations. Collectively, we refer herein to the 1997 24-hour and annual $PM_{2.5}$ NAAQS as the ''1997 $PM_{2.5}$ NAAQS.'' In 2006, the EPA promulgated a new, more stringent 24-hour NAAQS for $PM_{2.5}$ by lowering the primary and secondary standards level from 65 μg/m^3 to 35 μg/m^3 (referred to herein as the ''2006 24-hour $PM_{2.5}$ NAAQS'').[2] In 2012, the EPA promulgated a new, more stringent annual NAAQS for $PM_{2.5}$ by lowering the primary standards level from 15.0 μg/m^3 to 12.0 μg/m^3 (herein referred to as the ''2012 annual $PM_{2.5}$

[1] 62 FR 38652 (July 18, 1997) and 40 CFR 50.7.

[2] 71 FR 61144 (October 17, 2006) and 40 CFR 50.13.

NAAQS'').[3] Each iteration of the $PM_{2.5}$ NAAQS remains in effect, and states with designated nonattainment areas for each of them are obligated to meet applicable attainment plan requirements for them.

The EPA established each of these NAAQS after considering substantial evidence from numerous health studies demonstrating that serious health effects are associated with exposures to $PM_{2.5}$ concentrations above these levels. Epidemiological studies have shown statistically significant correlations between elevated $PM_{2.5}$ levels and premature mortality. Other important health effects associated with $PM_{2.5}$ exposure include aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days), changes in lung function, and increased respiratory symptoms. Individuals particularly sensitive to $PM_{2.5}$ exposure include older adults, people with heart and lung disease, and children.[4] $PM_{2.5}$ can be particles emitted by sources directly into the atmosphere as a solid or liquid particle (''primary $PM_{2.5}$'' or ''direct $PM_{2.5}$''), or can be particles that form in the atmosphere as a result of various chemical reactions involving $PM_{2.5}$ precursor emissions emitted by sources (''secondary $PM_{2.5}$''). The EPA has identified the precursors of $PM_{2.5}$ to be oxides of nitrogen (''NO_X''), sulfur oxides (''SO_X''), volatile organic compounds (VOCs), and ammonia.[5]

Following promulgation of a new or revised NAAQS, the EPA is required under CAA section 107(d) to designate areas throughout the Nation as attaining or not attaining the NAAQS. As noted previously, for areas the EPA has designated nonattainment, states are required under the CAA to submit attainment plan SIP submissions. These SIP submissions must provide for, among other elements, reasonable further progress (RFP) towards attainment of the NAAQS, attainment of the NAAQS no later than the applicable attainment date, and implementation of contingency measures to take effect if the state fails to meet RFP or to attain the NAAQS by the applicable attainment date.

The San Joaquin Valley is located in the southern half of California's Central Valley and includes all of San Joaquin, Stanislaus, Merced, Madera, Fresno, Tulare, and Kings Counties, and the valley portion of Kern County.[6] The area is home to four million people and is the Nation's leading agricultural region. Stretching over 250 miles from north to south and averaging 80 miles wide, it is partially enclosed by the Coast Mountain range to the west, the Tehachapi Mountains to the south, and the Sierra Nevada range to the east. In 2005, the EPA designated the San Joaquin Valley as nonattainment for the 1997 annual $PM_{2.5}$ NAAQS and nonattainment for the 1997 24-hour $PM_{2.5}$ NAAQS.[7]

The local air district with primary responsibility for developing attainment plan SIP submissions for the $PM_{2.5}$ NAAQS in this area is the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD or ''District''). Once the District adopts the regional plan, the District submits the plan to the California Air Resources Board (CARB) for adoption as part of the California SIP. CARB is the State agency responsible for adopting and revising the California SIP and for submitting the SIP and SIP revisions to the EPA. Generally speaking, under California law, CARB is responsible for regulation of mobile sources while the local air districts are responsible for regulation of stationary sources.

Originally, the EPA designated areas for the 1997 annual and 24-hour $PM_{2.5}$ NAAQS under subpart 1 (of part D of title I of the CAA), *i.e.,* without specifying the classifications of nonattainment required by subpart 4. Later, in response to a court decision,[8] the EPA classified nonattainment areas for the 1997 annual and 24-hour $PM_{2.5}$ NAAQS, consistent with the classifications set forth in subpart 4. With respect to San Joaquin Valley, in 2014, the EPA classified the San Joaquin Valley as a ''Moderate'' nonattainment area,[9] and then in 2015, reclassified the area as a ''Serious'' nonattainment area for the 1997 annual and 24-hour $PM_{2.5}$ NAAQS.[10]

In 2016, the EPA determined that the San Joaquin Valley had failed to attain the 1997 annual and 24-hour $PM_{2.5}$ NAAQS by the applicable ''Serious'' area attainment date.[11] As a result, the State of California was required, under CAA section 189(d), to submit a new SIP submission that, among other elements, provides for expeditious attainment of the 1997 annual and 24-hour $PM_{2.5}$ NAAQS and for a minimum five percent annual reduction in the emissions of direct $PM_{2.5}$ or a $PM_{2.5}$ plan precursor pollutant in the San Joaquin Valley (herein, referred to as a ''Five Percent Plan''). The Five Percent Plan for the 1997 annual and 24-hour $PM_{2.5}$ NAAQS was due no later than December 31, 2016.[12]

With respect to the 2006 24-hour $PM_{2.5}$ NAAQS, the EPA initially designated San Joaquin Valley as nonattainment under subpart 1 (*i.e.,* without classification) [13] but, in 2014, in response to the court decision referred to previously, the EPA classified the area as Moderate.[14] In 2016, the EPA reclassified San Joaquin Valley as a Serious nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS based on the EPA's determination that the area could not practicably attain these NAAQS by the applicable attainment date of December 31, 2015.[15] The EPA established an August 21, 2017 deadline for California to adopt and submit a SIP submission addressing the Serious nonattainment area requirements for the 2006 24-hour $PM_{2.5}$ NAAQS.[16]

With respect to the 2012 annual $PM_{2.5}$ NAAQS, the EPA designated San Joaquin Valley as a Moderate nonattainment area in 2015.[17] Under CAA section 189 and the EPA's $PM_{2.5}$ SIP Requirements Rule,[18] the deadline for the state to submit an attainment plan SIP submission addressing the Moderate nonattainment area requirements for the 2012 annual $PM_{2.5}$ NAAQS is 18 months from the effective date of the designation of the area.[19] The effective date of the designation of the San Joaquin Valley as a Moderate nonattainment area for the 2012 annual $PM_{2.5}$ NAAQS was April 15, 2015, and thus, the deadline for a SIP submission addressing the Moderate area requirements was October 15, 2016.

[3] 78 FR 3086 (January 15, 2013) and 40 CFR 50.18.

[4] 78 FR 3086, 3088.

[5] EPA, Air Quality Criteria for Particulate Matter, No. EPA/600/P–99/002aF and EPA/600/P–99/002bF, October 2004.

[6] For a precise description of the geographic boundaries of the San Joaquin Valley nonattainment area, see 40 CFR 81.305.

[7] 70 FR 944 (January 5, 2005), codified at 40 CFR 81.305.

[8] In *Natural Resources Defense Council* v. *EPA,* 706 F.3d 428 (D.C. Cir. 2013), the U.S. Court of Appeals for D.C. Circuit concluded that the EPA erred in implementing the 1997 $PM_{2.5}$ NAAQS solely pursuant to the general implementation requirements of subpart 1, without also considering the requirements specific to PM_{10} nonattainment areas in subpart 4, part D of title I of the CAA.

[9] 79 FR 31566 (June 2, 2014).

[10] 80 FR 18528 (April 7, 2015).

[11] 81 FR 84481 (November 23, 2016).

[12] Id. at 84482.

[13] 74 FR 58688 (November 13, 2009).

[14] 79 FR 31566.

[15] 81 FR 2993 (January 20, 2016).

[16] Id. at 3000.

[17] 80 FR 2206 (January 15, 2015).

[18] 81 FR 58010 (August 24, 2016); codified at 40 CFR part 51, subpart Z.

[19] 40 CFR 51.1003(a).

B. Findings and Contingency Measure Disapprovals

In the wake of these EPA actions, CARB and the District worked together to prepare a comprehensive SIP submission to address the nonattainment area requirements for the 1997, 2006, and 2012 $PM_{2.5}$ NAAQS for San Joaquin Valley, but did not meet the various SIP submission deadlines. In late 2018, the EPA issued a finding of failure to submit to the State for the required attainment plan SIP submissions for the 1997 annual and 24-hour $PM_{2.5}$ NAAQS, the 2006 24-hour $PM_{2.5}$ NAAQS, and the 2012 annual $PM_{2.5}$ NAAQS for the San Joaquin Valley.[20] The EPA's finding of failure to submit was effective January 7, 2019. Under CAA section 110(c), the EPA is obligated to promulgate a Federal Implementation Plan (FIP) within two years of a finding that a state has failed to make a required SIP submission, unless the state submits a SIP submission that corrects the deficiency, and the EPA approves that SIP submission, before the EPA promulgates such FIP.[21] In this case, the finding of failure to submit established a deadline of January 7, 2021, for the EPA to promulgate a FIP to address all applicable attainment plan requirements for the 1997 annual and 24-hour $PM_{2.5}$ NAAQS, the 2006 24-hour $PM_{2.5}$ NAAQS, and 2012 annual $PM_{2.5}$ NAAQS for San Joaquin Valley, for which the EPA had not received and approved an adequate SIP submission from the State.

To address a portion of current FIP obligation, the EPA recently proposed a FIP to address the contingency measures requirements for the San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS.[22] In short, the proposed contingency measure FIP includes two specific contingency measures, one of which would extend certain wood-burning curtailment restrictions Valley-wide and another which would extend certain fugitive dust requirements to certain open areas that are not currently subject to control requirements.

On May 10, 2019, CARB submitted two SIP submissions to address the nonattainment area requirements for all four of the relevant $PM_{2.5}$ NAAQS for the San Joaquin Valley, including the contingency measure requirement.[23] On November 8, 2021, CARB submitted a third SIP submission to amend the portions of the May 10, 2019 SIP submissions that pertain to the 1997 annual $PM_{2.5}$ NAAQS.[24] As discussed in the following paragraph, the EPA has previously taken a series of actions on these SIP submissions to address different nonattainment area requirements for each of the NAAQS. In this proposed action, we are focused only on the contingency measure requirements.

In 2020, the EPA approved the portion of the SIP submissions related to the 2006 24-hour $PM_{2.5}$ NAAQS, but deferred action on the contingency measure element.[25] In 2021, the EPA approved the portion of the SIP submissions related to the Moderate area requirements for the 2012 annual $PM_{2.5}$ NAAQS except for the contingency measure element, which the EPA disapproved.[26] The EPA also disapproved the previously-deferred contingency measure element for the 2006 24-hour $PM_{2.5}$ NAAQS.[27] In another 2021 action, the EPA disapproved the portion of the SIP submissions related to the 1997 annual $PM_{2.5}$ NAAQS except for the emissions inventory, which the Agency approved.[28] In 2022, the EPA approved the portion of the SIP submission related to the 1997 24-hour $PM_{2.5}$ NAAQS, with the exception of the contingency measure element.[29] In our action on the SIP submission related to the 1997 24-hour $PM_{2.5}$ NAAQS, we disapproved the contingency measure element, but also found that the contingency measure requirement was moot for that particular $PM_{2.5}$ NAAQS because of the EPA's concurrent determination of attainment by the applicable attainment date for San Joaquin Valley for the 1997 24-hour $PM_{2.5}$ NAAQS.[30]

In July 2023, the EPA proposed approval of the portions of the three SIP submissions that pertain to the 1997 annual $PM_{2.5}$ NAAQS in the San Joaquin Valley nonattainment area.[31] More recently, we took action to finalize our approval of the SIP submissions for the 1997 annual $PM_{2.5}$ NAAQS, as proposed; however, our recent action on various elements of the San Joaquin Valley $PM_{2.5}$ plan for the 1997 annual $PM_{2.5}$ NAAQS did not address the contingency measures requirements for that particular $PM_{2.5}$ NAAQS.[32]

With respect to contingency measure elements, the State's May 10, 2019 $PM_{2.5}$ SIP submissions for San Joaquin Valley relied upon contingency provisions included in District Rule 4901 (''Wood Burning Fireplaces and Wood Burning Heaters''), specifically section 5.7.3 of the rule, and a demonstration that the emissions reductions from the contingency measure would be sufficient to meet the contingency measure SIP requirements of CAA section 172(c)(9) if the reductions were viewed together with ''surplus'' [33] emissions reductions from already-implemented measures.[34] We disapproved the contingency measure elements for San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS because the contingency provision (*i.e.,* section 5.7.3) in Rule 4901 did not address the potential for State failures to meet RFP, to meet a quantitative milestone, or to submit a quantitative milestone report. In addition, the contingency measure provision of Rule 4901 was not structured to achieve any additional emissions reductions if the EPA were to find that the monitoring locations in the ''hot spot'' counties (*i.e.,* Fresno, Kern, or Madera) are the only counties in the San Joaquin Valley that are violating the $PM_{2.5}$ NAAQS as of the attainment date.[35] In addition, the contingency

[20] 83 FR 62720 (December 6, 2018).

[21] The finding of failure to submit also started an 18-month new source review (NSR) offset sanction clock and a 24-month highway sanction clock for the State of California. CAA section 179(a) and 40 CFR 52.31.

[22] 88 FR 53431 (August 8, 2023).

[23] The SIP revisions submitted on May 10, 2019, include the ''2016 Moderate Area Plan for the 2012 $PM_{2.5}$ Standard'' (''2016 $PM_{2.5}$ Plan'') and the ''2018 Plan for the 1997, 2006, and 2012 $PM_{2.5}$ Standards'' (''2018 $PM_{2.5}$ Plan''), which incorporates by reference the ''San Joaquin Valley Supplement to the 2016 State Strategy for the State Implementation Plan'' (''Valley State SIP Strategy''). On February 11, 2020, CARB submitted a revised version of Appendix H (''RFP, Quantitative Milestones, and Contingency'') that replaces the version submitted with the 2018 $PM_{2.5}$ Plan on May 10, 2019. The EPA found the SIP submissions complete in a letter dated June 24, 2020, from Elizabeth J. Adams, Director, EPA Region IX, to Richard W. Corey, Executive Officer, CARB. The EPA's completeness determination terminated the NSR offsets and highway sanctions started by the December 6, 2018 finding of failure to submit but did not affect the FIP obligation.

[24] The SIP revision submitted on November 8, 2021, is titled ''Attainment Plan Revision for the 1997 Annual $PM_{2.5}$ Standard'' (''15 $\mu g/m^3$ SIP Revision'').

[25] 85 FR 44192 (July 22, 2020).

[26] 86 FR 67343 (November 26, 2021).

[27] Id.

[28] 86 FR 67329 (November 26, 2021).

[29] 87 FR 4503 (January 28, 2022).

[30] Id.

[31] 88 FR 45276 (July 14, 2023).

[32] EPA, ''Air Quality State Implementation Plans; Approvals and Promulgations: California; 1997 Annual Fine Particulate Matter Serious and Clean Air Act Section 189(d) Nonattainment Area Requirements; San Joaquin Valley, CA,'' Final rule, signed December 5, 2023.

[33] In this context, ''surplus'' refers to emissions reductions not otherwise relied upon for RFP or attainment demonstrations.

[34] See 86 FR 38652, 38668–38669 (July 22, 2021); 86 FR 49100, 49123–49124 and 49132–49133 (September 1, 2021).

[35] See 86 FR 38652, 38669–38670 (proposed disapproval of the contingency measure element for

Continued

measure elements did not provide sufficient justification as to why the one adopted contingency measure (in Rule 4901) would suffice to meet the CAA requirements for contingency measures for the $PM_{2.5}$ NAAQS for San Joaquin Valley notwithstanding the fact that the one measure would not achieve one year's worth of RFP, as recommended in longstanding EPA guidance.[36] [37]

In our final rules disapproving the contingency measure elements for San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS, we indicated that the disapprovals would begin an 18-month clock for imposition of the offset sanction in CAA section 179(b)(2) and a 24-month clock for imposition of the highway funding sanction in CAA section 179(b)(1) unless the State submits, and the EPA approves, a SIP revision that corrects the deficiencies that we identified in our final actions prior to implementation of the sanctions.[38]

II. Summary of SIP Submissions and Evaluation for Compliance With SIP Revision Procedural Requirements

A. Summary of SIP Submissions

On June 8, 2023, CARB submitted the ''$PM_{2.5}$ Contingency Measure State Implementation Plan Revision (May 18, 2023)'' (herein referred to as the ''SJV $PM_{2.5}$ Contingency Measure SIP'') to the EPA as a revision to the California SIP.[39] Also on June 8, 2023, CARB submitted revisions to Rule 4901 that add $PM_{2.5}$ NAAQS contingency provisions that we refer to herein as the ''Residential Wood Burning Contingency Measure.'' The District adopted the SJV $PM_{2.5}$ Contingency Measure SIP and Residential Wood Burning Contingency Measure on May 18, 2023, and submitted them to CARB for adoption and submission to the EPA as SIP revisions. The District adopted the SJV $PM_{2.5}$ Contingency Measure SIP and Residential Wood Burning Contingency Measure to correct the deficiencies identified by the EPA in the November 26, 2021 disapprovals of the contingency measure elements for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS and the previously adopted contingency provisions of Rule 4901. In this document, we are proposing action on both the SJV $PM_{2.5}$ Contingency Measure SIP and the Residential Wood Burning Contingency Measure.

The June 8, 2023 SIP submission includes the two specific SIP revisions (*i.e.,* the SJV $PM_{2.5}$ Contingency Measure SIP and the Residential Wood Burning Contingency Measure), as well as supporting material including the resolutions of adoption, CARB evaluation and completeness forms, and evidence of public notice and hearing. The SJV $PM_{2.5}$ Contingency Measure SIP includes a general discussion of contingency measures and related requirements and guidance, context for this particular SIP revision, and feasibility analyses developed by the District and CARB to identify potential contingency measures for the $PM_{2.5}$ NAAQS for the San Joaquin Valley. (In our evaluation of the latter, we refer to the State's feasibility analyses herein as infeasibility demonstrations.) The SJV $PM_{2.5}$ Contingency Measure SIP includes appendices that provide further detailed information and documentation for, among other things, the emissions reductions estimated for the Residential Wood Burning Contingency Measure. The District also attached excerpts from certain previously submitted SIPs to provide support for the conclusions drawn by the District and CARB with respect to the infeasibility of adopting additional contingency measures for the San Joaquin Valley. The June 8, 2023 SIP submission of the SJV $PM_{2.5}$ Contingency Measure SIP and Residential Wood Burning Contingency Measure was deemed administratively complete by operation of law on December 8, 2023, consistent with CAA section 110(k)(1).[40]

Through adoption of the SJV $PM_{2.5}$ Contingency Measure SIP, the District committed to evaluating revisions to a specific fugitive dust rule, District Rule 8051 (''Open Areas''), for potential as a second contingency measure for the $PM_{2.5}$ NAAQS for the SJV.[41] On September 21, 2023, the District adopted revisions to Rule 8051 to add contingency provisions that we refer to herein as the ''Rural Open Areas Contingency Measure.'' The District adopted the Rural Open Areas Contingency Measure to supplement the SJV $PM_{2.5}$ Contingency Measure SIP by providing additional emissions reductions for the San Joaquin Valley if triggered by one of the contingency events. On October 16, 2023, CARB submitted the Rural Open Areas Contingency Measure to the EPA as a revision to the California SIP.[42] In this document, we are also proposing action on the Rural Open Areas Contingency Measure.

The October 16, 2023 SIP submission includes the SIP revision itself (*i.e.,* the Rural Open Areas Contingency Measure) as well as supporting material including the resolutions of adoption, CARB evaluation and completeness forms, and evidence of public notice and hearing. The EPA has reviewed the October 16, 2023 SIP submission of the Rural Open Areas Contingency Measure and finds it to be administratively complete for the purposes of CAA section 110(k)(1), effective upon publication of this proposed rule.[43]

B. Evaluation for Compliance With SIP Revision Procedural Requirements

Under CAA section 110(l), SIP revisions must be adopted by the state, and the state must provide for reasonable public notice and hearing prior to adoption. Pursuant to 40 CFR 51.102, states must provide at least 30-days' notice of any public hearing to be held on a proposed SIP revision. States must provide the opportunity to submit written comments and allow the public the opportunity to request a public hearing within that period.[44]

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the 1997 annual $PM_{2.5}$ NAAQS); and 86 FR 49100, 49124–49125 (proposed disapproval of the contingency measure element for the 2012 annual $PM_{2.5}$ NAAQS) and 49133–49134 (proposed disapproval of the contingency measure element for the 2006 24-hour $PM_{2.5}$ NAAQS) (September 1, 2021). The proposed disapprovals were finalized at 86 FR 67329 (1997 annual $PM_{2.5}$ NAAQS); 86 FR 67343 (2012 annual $PM_{2.5}$ NAAQS and 2006 24-hour $PM_{2.5}$ NAAQS).

[36] Id.

[37] 81 FR 58010, 58066. See also 57 FR 13498, 13511, 13543–13544 (April 16, 1992), and 59 FR 41998, 42014–42015 (August 16, 1994).

[38] 86 FR 67329, 67341 (1997 annual $PM_{2.5}$ NAAQS); 86 FR 67343, 67346–67347 (2012 annual $PM_{2.5}$ NAAQS and 2006 24-hour $PM_{2.5}$ NAAQS).

[39] CARB adopted the SJV $PM_{2.5}$ Contingency Measure SIP and Residential Wood Burning Contingency Measure as SIP revisions on June 7, 2023, through Executive Order S–23–010 and submitted the SIP revisions to the EPA electronically on June 8, 2023, as attachments to a letter dated June 7, 2023, from Steven S. Cliff, Ph.D., Executive Officer, CARB to Martha Guzman, Regional Administrator, EPA Region IX.

[40] In addition, see EPA Region IX SIP Completeness Checklist, October 13, 2023.

[41] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 31–32.

[42] CARB adopted the Rural Open Areas Contingency Measure as a SIP revision on October 13, 2023, through Executive Order S–23–014 and submitted the SIP revision to the EPA electronically on October 16, 2023, as an attachment to a letter dated October 13, 2023, from Steven S. Cliff, Ph.D., Executive Officer, CARB to Martha Guzman, Regional Administrator, EPA Region IX.

[43] EPA Region IX SIP Completeness Checklist, October 18, 2023.

[44] In addition to establishing procedural requirements for SIP revisions, CAA section 110(l) prohibits the EPA from approving any SIP revision that would interfere with any applicable requirement for reasonable further progress (RFP) or attainment or any other applicable requirement of the CAA. In this instance, the Residential Wood Burning Contingency Measure and the Rural Open Areas Contingency Measure would provide emissions reductions beyond those needed for RFP and attainment of the NAAQS in San Joaquin Valley and, thus, would not interfere with the RFP and attainment demonstrations for the area.

The District adopted the SJV $PM_{2.5}$ Contingency Measure SIP and the Residential Wood Burning Contingency Measure on May 18, 2023, through Resolution No. 2023–5–7, following a public hearing held on the same day. Prior to adoption, the District published notice of the May 18, 2023 public hearing in newspapers of general circulation in each of the eight counties that comprise the San Joaquin Valley, and provided more than 30 days for submission of written comments. CARB subsequently adopted the SJV $PM_{2.5}$ Contingency Measure SIP and the Residential Wood Burning Contingency Measure as a revision to the SIP on June 7, 2023, through Executive Order S–23–010. CARB then submitted the SJV $PM_{2.5}$ Contingency Measure SIP and the Residential Wood Burning Contingency Measure to the EPA on June 8, 2023, as an attachment to a transmittal letter dated June 7, 2023.

The District adopted the Rural Open Areas Contingency Measure on September 21, 2023, through Resolution No. 2023–9–9, following a public hearing held on the same day. Prior to adoption, the District published notice of the September 21, 2023 public hearing in newspapers of general circulation in each of the eight counties that comprise the San Joaquin Valley, and provided more than 30 days for submission of written comments. CARB subsequently adopted the Rural Open Areas Contingency Measure as a revision to the SIP on October 13, 2023, through Executive Order S–23–014. CARB then submitted the Rural Open Areas Contingency Measure to the EPA on October 16, 2023, as an attachment to a transmittal letter dated October 13, 2023.

Based on the materials provided in the June 8, 2023 and October 16, 2023 SIP submissions, we propose to find that the District and the CARB have met the procedural requirements for adoption and submission of SIP revisions under CAA section 110(l) and 40 CFR 51.102.

III. Contingency Measure Requirements, Guidance, and Legal Precedent

The EPA first provided its views on the CAA's requirements for particulate matter plans under part D, title I of the Act in the following guidance documents: (1) ''State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990'' (''General Preamble'');[45] (2) ''State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990; Supplemental'';[46] and (3) ''State Implementation Plans for Serious PM–10 Nonattainment Areas, and Attainment Date Waivers for PM–10 Nonattainment Areas Generally; Addendum to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990'' (''General Preamble Addendum'').[47] More recently, in the $PM_{2.5}$ SIP Requirements Rule, the EPA established regulatory requirements and provided further interpretive guidance on the statutory SIP requirements that apply to areas designated nonattainment for all $PM_{2.5}$ NAAQS.[48]

A. Statutory and Regulatory Requirements

Under CAA section 172(c)(9), states required to make an attainment plan SIP submission must include contingency measures to be implemented if the area fails to meet RFP (''RFP contingency measures'') or fails to attain the NAAQS by the applicable attainment date (''attainment contingency measures''). Under the $PM_{2.5}$ SIP Requirements Rule, states must include contingency measures that provide that the state will implement them following a determination by the EPA that the state has failed: (1) to meet any RFP requirement in the approved SIP; (2) to meet any quantitative milestone (QM) in the approved SIP; (3) to submit a required QM report; or (4) to attain the applicable $PM_{2.5}$ NAAQS by the applicable attainment date.[49] Contingency measures must be fully adopted rules or control measures that are ready to be implemented quickly upon failure to meet RFP or failure of the area to meet the relevant NAAQS by the applicable attainment date.[50] In general, we expect all actions needed to effect full implementation of the measures to occur within 60 days after the EPA notifies the state of a failure to meet RFP or to attain.[51] Moreover, we expect the additional emissions reductions from the contingency measures to be achieved within a year of the triggering event.[52]

The purpose of contingency measures is to continue progress in reducing emissions while a state revises its SIP to meet the missed RFP requirement or to correct ongoing nonattainment. Neither the CAA nor the EPA's implementing regulations establish a specific level of emission reductions that implementation of contingency measures must achieve, but the EPA recommends that contingency measures should provide for emission reductions equivalent to approximately one year of reductions needed for RFP in the nonattainment area.[53] For $PM_{2.5}$ NAAQS SIP planning purposes, the EPA recommends that RFP should be calculated as the overall level of reductions needed to demonstrate attainment divided by the number of years from the base year to the attainment year.[54] As part of the attainment plan SIP submission, the EPA expects states to explain the amount of anticipated emissions reductions that the contingency measures will achieve. In the event that a state is unable to identify and adopt contingency measures that will provide for approximately one year's worth of emissions reductions, then EPA recommends that the state provide a reasoned justification why the smaller amount of emissions reductions is appropriate.[55]

To satisfy the contingency measure requirements of 40 CFR 51.1014, the contingency measures adopted as part of a $PM_{2.5}$ NAAQS attainment plan must consist of control measures for the area that are not otherwise required to meet other attainment plan requirements (*e.g.,* to meet reasonably available control measure (RACM)/reasonably available control technology (RACT) requirements). By definition, contingency measures are measures that are over and above what a state must adopt and impose to meet RFP and to provide for attainment by the applicable attainment date.

Contingency measures serve the purpose of providing additional emission reductions during the period after a failure to meet RFP or failure to attain as the state prepares a new SIP submission to rectify the problem. Accordingly, contingency measures must provide such additional emission reductions during an appropriate period and must specify the timeframe within which their requirements would become effective following any of the EPA determinations specified in 40 CFR 51.1014(a).

[45] 57 FR 13498 (April 16, 1992).

[46] 57 FR 18070 (April 28, 1992).

[47] 59 FR 41998 (August 16, 1994).

[48] 81 FR 58010.

[49] 40 CFR 51.1014(a).

[50] 81 FR 58010, 58066 and General Preamble Addendum, 42015.

[51] 81 FR 58010, 58066. See also General Preamble 13512, 13543–13544, and General Preamble Addendum, 42014–42015.

[52] General Preamble, 13511.

[53] 81 FR 58010, 58066. See also General Preamble, 13511, 13543–13544, and General Preamble Addendum, 42014–42015.

[54] 81 FR 58010, 58066.

[55] 81 FR 58010, 58067.

In addition, to comply with CAA section 172(c)(9), contingency measures must be both conditional and prospective, so that they will go into effect and achieve emission reductions only in the event of a future triggering event such as a failure to meet RFP or a failure to attain. In a 2016 decision called *Bahr* v. *EPA,*[56] the Ninth Circuit Court of Appeals held that CAA section 172(c)(9) does not allow EPA approval of already-implemented control measures as contingency measures. Thus, already-implemented measures cannot serve as contingency measures under CAA section 172(c)(9). For purposes of the $PM_{2.5}$ NAAQS, a state must develop, adopt, and submit one or more contingency measures to be triggered upon a failure to meet any RFP requirement, failure to meet a quantitative milestone requirement, or failure to attain the NAAQS by the applicable attainment date, regardless of the extent to which already-implemented measures would achieve surplus emission reductions beyond those necessary to meet RFP or quantitative milestone requirements and beyond those predicted to achieve attainment of the NAAQS.

In a recent decision on the EPA's approval of a SIP contingency measure element for the ozone NAAQS, the Ninth Circuit Court of Appeals held that, under the EPA's current guidance, the surplus emissions reductions from already-implemented measures cannot be relied upon to justify the approval of a contingency measure that would achieve far less than one year's worth of RFP as sufficient by itself to meet the contingency measure requirements of CAA sections 172(c)(9) and 182(c)(9) for the nonattainment area.[57]

B. Draft Revised Contingency Measure Guidance

In March 2023, the EPA published notice of availability announcing a new draft guidance addressing the contingency measures requirement of section 172(c)(9), entitled ''Draft: Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter (DRAFT—3/17/23—Public Review Version)'' (herein referred to as the ''Draft Revised Contingency Measure Guidance'') and opportunity for public comment.[58] The principal differences between the draft revised guidance and existing guidance on contingency measures relate to the EPA's recommendations concerning the specific amount of emission reductions that implementation of contingency measures should achieve, and the timing for when the emissions reductions from the contingency measures should occur. The Draft Revised Contingency Measure Guidance also provides recommended procedures for developing a demonstration, if applicable, that the area lacks sufficient feasible measures to achieve one year's worth of reductions, building on existing guidance that the state provide a reasoned justification why the smaller amount of emissions reductions is appropriate.

Under the Draft Revised Contingency Measure Guidance, the recommended level of emissions reductions that contingency measures should achieve would represent one year's worth of ''progress'' as opposed to one year's worth of RFP.[59] One year's worth of ''progress'' is calculated by determining the average annual reductions between the base year emissions inventory and the projected attainment year emissions inventory, determining what percentage of the base year emissions inventory this amount represents, then applying that percentage to the projected attainment year emissions inventory to determine the amount of reductions needed to ensure ongoing progress if contingency measures are triggered.

With respect to the time period within which reductions from contingency measures should occur, the EPA previously recommended that contingency measures take effect within 60 days of being triggered, and that the resulting emission reductions generally occur within one year of the triggering event. Under the Draft Revised Contingency Measure Guidance, in instances where there are insufficient contingency measures available to achieve the recommended amount of emissions reductions within one year of the triggering event, the EPA believes that contingency measures that provide reductions within up to two years of the triggering event would be appropriate to consider towards achieving the recommended amount of emissions reductions. The Draft Revised Contingency Measure Guidance does not alter the 60-day recommendation for the contingency measures to take initial effect.

If, after adequately evaluating additional control measures, the state is unable to identify contingency measures that would provide approximately one year's worth of emissions reductions, the Draft Revised Contingency Measure Guidance recommends that the state should provide a reasoned justification (referred to herein as an ''infeasibility demonstration'') that explains and documents how it has evaluated all existing and potential control measures relevant to the appropriate source categories and pollutants in the nonattainment area and has reached reasonable conclusions regarding whether such measures are feasible.[60]

As explained in the Draft Revised Contingency Measure Guidance, while the EPA notes that CAA section 172(c)(9) and section 182(c)(9) do not explicitly provide for consideration of whether specific measures are feasible, the Agency believes that it is reasonable to infer that the statute does not require control measures regardless of any technological or cost constraints whatsoever.[61] It is more reasonable to interpret the contingency measure requirement not to require air agencies to adopt and impose infeasible measures. The statutory provisions applicable to other nonattainment area plan control measure requirements, including RACM/RACT (for ozone and PM), best available control measure (BACM)/best available control technology (BACT) (for PM), and most stringent measures (MSM) (for PM), allow air agencies to exclude certain control measures that are deemed unreasonable or infeasible (depending on the requirement). For example, the MSM provision in CAA section 188(e) requires plans to include ''the most stringent measures that are included in the implementation plan of any state or are achieved in practice in any state, and can feasibly be implemented in the area.'' The EPA considers it reasonable to conclude that Congress similarly did not expect air agencies to satisfy the contingency measure requirement with infeasible measures. Thus, the EPA anticipates that a demonstrated lack of feasible measures would be a reasoned justification for adopting contingency measures that only achieve a lesser amount of emission reductions.

[56] *Bahr* v. *EPA,* 836 F.3d 1218, 1235–1237 (9th Cir. 2016). See also *Sierra Club* v. *EPA,* 21 F.4th 815, 827–28 (D.C. Cir. 2021).

[57] *Assoc. of Irritated Residents* v. *EPA,* 10 F.4th 937, 946–47 (9th Cir. 2021) (''*AIR* v. *EPA*'' or ''*AIR*'').

[58] 88 FR 17571 (March 23, 2023). The Draft Revised Contingency Measure Guidance is available at *https://www.epa.gov/air-quality-implementation-plans/draft-contingency-measures-guidance.*

[59] Draft Revised Contingency Measure Guidance, p. 22.

[60] Draft Revised Contingency Measure Guidance, p. 29.

[61] Id.

IV. EPA Review of San Joaquin Valley Contingency Measures

We provide our review of two specific contingency measures—the Residential Wood Burning Contingency Measure and the Rural Open Areas Contingency Measure—in sections IV.A and IV.B of this document, respectively. As noted previously, we are reviewing and proposing approval of a third contingency measure, the Smog Check Contingency Measure,[62] in a separate rulemaking; [63] however, we provide a summary of the Smog Check Contingency Measure in section IV.C for informational purposes. Because we are proposing approval of the contingency measures, we take into account the measures' anticipated emission reductions in our evaluation of the SJV $PM_{2.5}$ Contingency Measure SIP, which we present in section V of this proposed rule.

A. Residential Wood Burning Contingency Measure

1. Background and Regulatory History

Residential wood burning includes wood-burning heaters (*i.e.,* woodstoves, pellet stoves, and wood-burning fireplace inserts), which are used primarily for heat generation, and wood-burning fireplaces, which are used primarily for aesthetic purposes. All of these devices emit direct $PM_{2.5}$ and NO_X. However, wood-burning heaters, that are certified under the EPA's New Source Performance Standards (NSPS) emit lower levels of $PM_{2.5}$ compared to wood-burning fireplaces and non-certified heaters when properly installed, operated, and maintained.

Residential wood-burning is included within the ''Residential Fuel Combustion'' emissions inventory category within the 2018 $PM_{2.5}$ Plan's emissions inventories. In the 2018 $PM_{2.5}$ Plan, the District estimates emissions of 2.82 tons per day (tpd) of $PM_{2.5}$ and 0.42 tpd NO_X (annual average) specifically from residential wood burning for each year from 2017 onward. However, these estimates do not account for the effect of 2019 amendments to Rule 4901, discussed in the following section of this document.

Rule 4901 (''Wood Burning Fireplaces and Wood Burning Heaters'') establishes requirements for the sale/transfer, operation, and installation of wood-burning devices and on the advertising of wood for sale intended for burning in a wood-burning fireplace, wood-burning heater, or outdoor wood-burning device within the San Joaquin Valley. One of the most effective ways to reduce wintertime smoke is a curtailment program that restricts use of wood-burning heaters and fireplaces on days that are conducive to buildup of PM concentrations (*i.e.,* days where ambient $PM_{2.5}$ and/or PM_{10} concentrations are forecast to be above a particular level, known as a ''curtailment threshold'').

Rule 4901 includes a tiered mandatory curtailment program that establishes different curtailment thresholds based on the type of devices (*i.e.,* registered clean-burning devices [64] vs. unregistered devices) and different counties (*i.e.,* hot spot vs. non-hot spot). During a Level One Episodic Wood Burning Curtailment, operation of wood-burning fireplaces and other unregistered wood-burning heaters or devices is prohibited, but properly operated, registered wood-burning heaters may be used.[65] During a Level Two Episodic Wood Burning Curtailment, operation of any wood-burning device is prohibited.[66] However, the rule includes an exemption from the curtailment provisions for (1) locations where piped natural gas service is not available and (2) residences for which a wood-burning fireplace or wood-burning heater is the sole available source of heat.[67]

In order to implement the curtailment program under Rule 4901, the District develops daily air quality forecasts, based on EPA and CARB guidance, which include a projection of the maximum $PM_{2.5}$ concentration in each county for the following day.[68] District staff then compare this maximum county $PM_{2.5}$ concentration forecast with the curtailment thresholds in Rule 4901. If a county's $PM_{2.5}$ forecast exceeds the applicable threshold, then the District's Air Pollution Control Officer declares a curtailment for the county for the following day.

In 2019, the District lowered the curtailment thresholds in Madera, Fresno, and Kern counties, which the District identified as ''hot spot'' counties, because they were ''either new areas of gas utility or areas deemed to have persistently poor air quality.'' [69] Table 1 presents the residential curtailment thresholds in Rule 4901, as revised in 2019.

TABLE 1—RESIDENTIAL WOOD BURNING CURTAILMENT THRESHOLDS IN RULE 4901

[As amended in 2019]

Episodic wood burning curtailment levels	Hot spot counties (Madera, Fresno, and Kern)	Non-hot spot counties (San Joaquin, Stanislaus, Merced, Kings, and Tulare)
Level One (No Burning Unless Registered)	12 $\mu g/m^3$	20 $\mu g/m^3$.
Level Two (No Burning for All)	35 $\mu g/m^3$	65 $\mu g/m^3$.

The 2019 revision by the District also added a provision to the rule to operate as a contingency measure, which would lower the curtailment thresholds for any county that failed to attain the applicable standards to levels consistent with current thresholds for hot spot counties. However, the EPA disapproved this provision because it did not meet all of the CAA requirements for contingency measures.[70] Specifically, it did not address three of the four required triggers for contingency measures in 40 CFR 51.1014(a) and was not structured to achieve any additional emissions reductions if the EPA found that the monitoring locations in the ''hot spot''

[62] CARB, ''California Smog Check Contingency Measure State Implementation Plan Revision,'' release date September 15, 2023, (''Smog Check Contingency Measure'').

[63] EPA, ''Air Plan Revision; California; Motor Vehicle Inspection and Maintenance Program Contingency Measure,'' Proposed rule, published in this **Federal Register**.

[64] In order to be registered, a device must either be certified under the NSPS at time of purchase or installation and at least as stringent as Phase II requirements or be a pellet-fueled wood burning heater exempt from EPA certification requirements at the time of purchase or installation (Rule 4901, section 5.9.1). The rule includes requirements for documentation and inspection to verify compliance with these standards (Rule 4901, sections 5.9.2 and 5.10).

[65] Rule 4901, section 5.7.1.

[66] Rule 4901, section 5.7.2.

[67] Rule 4901, section 5.7.4.

[68] Email dated October 9, 2019, from Jon Klassen, SJVUAPCD to Meredith Kurpius, EPA Region IX, Subject: ''RE: Info to support Rule 4901.''

[69] 2018 $PM_{2.5}$ Plan, Appendix J, 60.

[70] 86 FR 67329, 67338 (for the 1997 annual $PM_{2.5}$ NAAQS) and 86 FR 67343, 67345 (for the 2006 24-hour $PM_{2.5}$ NAAQS and 2012 annual $PM_{2.5}$ NAAQS).

counties (*i.e.,* Fresno, Kern, or Madera) were the only counties in the San Joaquin Valley that are violating the applicable $PM_{2.5}$ NAAQS as of the attainment date.[71] In addition, with respect to the 1997 annual $PM_{2.5}$ NAAQS in particular, the EPA also disapproved the contingency provision in Rule 4901 because the EPA was concurrently disapproving the RFP and attainment demonstrations and, thus, was unable to determine whether the emissions reductions from the contingency provision were in fact surplus to the reductions that would be needed to provide for RFP and attainment for the 1997 annual $PM_{2.5}$ NAAQS in the SJV.[72] Accordingly, the SIP-approved version of Rule 4901 does not include any contingency provision.

2. Summary of State Submission

On May 18, 2023, the District amended the contingency measure in section 5.7.3 of Rule 4901, and CARB submitted the amended rule as part of the June 8, 2023 SIP Submission. The contingency measure would be triggered by a final determination by the EPA that the District failed to meet one or more of the following triggering events for the applicable $PM_{2.5}$ NAAQS:

(1) Any Reasonable Further Progress requirement;

(2) Any quantitative milestone;

(3) Submission of a quantitative milestone report; or

(4) Attainment of the applicable $PM_{2.5}$ NAAQS by the applicable attainment date.

Following the first such triggering event, the measure would lower the thresholds for the non-hot spot counties to the current thresholds for hot spot counties (*i.e.,* from 20 μg/m^3 to 12 μg/m^3 for unregistered devices; and from 65 μg/m^3 to 35 μg/m^3 for registered devices). Following the second such event, the measure would further lower the threshold for unregistered devices in all counties of the San Joaquin Valley from 12 μg/m^3 to 11 μg/m^3.

The District estimates that the Residential Wood Burning Contingency Measure for the first triggering event would achieve annual average emissions reductions of 0.5793 tpd direct $PM_{2.5}$ and 0.0817 tpd NO_X in the SJV and the second triggering event would achieve additional reductions of 0.1078 tpd direct $PM_{2.5}$ and 0.0148 tpd NO_X.[73]

3. EPA Evaluation

Through the revisions adopted by the District to Rule 4901 on May 18, 2023, the District has corrected the deficiencies in the contingency provision of Rule 4901 that we identified in our November 26, 2021 final actions. Namely, the contingency provision in the rule (section 5.7.3) has been revised to address all the determinations for which contingency measures are required under 40 CFR 51.1014(a) and has been revised to achieve emissions reductions under all circumstances, *i.e.,* if triggered by one of the specific EPA determinations. In addition, we find that the contingency provision in section 5.7.3 of Rule 4901 is surplus to the RFP and attainment demonstrations for the annual 1997 $PM_{2.5}$ NAAQS based on the conclusions in our recent final action approving the RFP and attainment demonstrations in the State's 15 μg/m^3 SIP Revision.[74]

In our previous actions, we found that the contingency provision in Rule 4901 met the other specific criteria used to evaluate contingency measures.[75] Specifically, the contingency provision in Rule 4901 (the Residential Wood Burning Contingency Measure) is structured to be both conditional and prospective, to be implemented quickly following a triggering event (*i.e.,* within 60 days) and to be implemented without significant further action by the State or the EPA. The revisions to section 5.7.3 of Rule 4901 that were adopted on May 18, 2023 do not affect those features of the contingency provision, and thus we propose to re-affirm those findings in this proposed rule.

We also note that the contingency provisions do not require the replacement or installation of an emissions control device and can therefore achieve emission reductions upon the rule taking effect. For example, if the EPA were to determine that the San Joaquin Valley failed to attain a given $PM_{2.5}$ NAAQS, effective in July of a given year, the more stringent curtailment thresholds would take effect in September of that year, prior to the seasonal start of the No Burn Day program on November 1st. Thus, the emission reductions from the Residential Wood Burning Contingency Measure would be achieved within one year of the triggering event. Based on our review of the contingency provisions, as revised, we propose to re-affirm those findings.

Contingency measures must also be designed to provide emissions reductions (if triggered) that are not otherwise required to meet other attainment plan requirements and not relied upon to demonstrate RFP and attainment. In this regard, we note that none of the SJV plans for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS relied upon the contingency provision in Rule 4901 to meet any plan element (other than the contingency measure element) and that none of the plans relied on the related emissions reductions from the contingency provision to provide for RFP or attainment. Based on our previous approvals of the San Joaquin Valley plans for the 2006 24-hour $PM_{2.5}$ NAAQS in 2020 and 2012 annual $PM_{2.5}$ NAAQS in 2021,[76] and the recent approval of the San Joaquin Valley plan for the 1997 annual $PM_{2.5}$ NAAQS, including the various plan elements such as the BACM, RFP, and attainment demonstrations, we find that the Residential Wood Burning Contingency Measure is not otherwise required for these $PM_{2.5}$ NAAQS and that the associated emissions reductions would be surplus to the $PM_{2.5}$-related RFP and attainment needs of the San Joaquin Valley.

Therefore, for the reasons provided in the preceding paragraphs, we propose to approve Rule 4901, as revised, because we find that the Residential Wood Burning Contingency Measure set forth in section 5.7.3 of the rule now meets all the applicable requirements for a contingency measure for the San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS.

Lastly, we reviewed the emissions reduction estimates for the Residential Wood Burning Contingency Measure that were prepared by the District and included in Appendix C (''Emission Reduction Analysis for Rule 4901'') of the SJV $PM_{2.5}$ Contingency Measure SIP and find the estimates to be reasonable and adequately documented. As described in Appendix C of the SJV $PM_{2.5}$ Contingency Measure SIP, the District has estimated the reductions from the two triggering events provided for in the Residential Wood Burning Contingency Measure by taking into account many different factors, such as the number of fireplaces and wood stoves in the individual counties within

[71] Id. See also 86 FR 38652, 38669 (proposed rule on contingency measures element for the 1997 annual $PM_{2.5}$ NAAQS) and 86 FR 49100, 49125 and 49133–49134 (proposed rule on contingency measures element for the 2012 annual $PM_{2.5}$ NAAQS and 2006 24-hour $PM_{2.5}$ NAAQS, respectively).

[72] 86 FR 67329, 67338.

[73] SJV $PM_{2.5}$ Contingency Measure SIP, p. C–15.

[74] EPA, ''Air Quality State Implementation Plans; Approvals and Promulgations: California; 1997 Annual Fine Particulate Matter Serious and Clean Air Act Section 189(d) Nonattainment Area Requirements; San Joaquin Valley, CA,'' Final rule, signed December 5, 2023.

[75] See, *e.g.,* 86 FR 38652, 38669.

[76] 85 FR 44192 and 86 FR 67343.

the San Joaquin Valley, the different types of wood stoves (registered and unregistered, certified and uncertified), and the number of additional curtailment days under various scenarios, among other factors. Taking into account these various factors, the District estimates the Residential Wood Burning Contingency Measure would achieve annual average emissions reductions of 0.5793 tpd direct $PM_{2.5}$ and 0.0817 tpd NO_X in the SJV following the first triggering event and additional reductions of 0.1078 tpd direct $PM_{2.5}$ and 0.0148 tpd NO_X following the second triggering event.

Because we are proposing to find that the Residential Wood Burning Contingency Measure meets the requirements for individual contingency measures, the associated emissions reductions can be taken into account by the EPA when determining whether CARB and the District have met the requirements for the San Joaquin Valley as a whole with respect to the contingency measure SIP requirements of CAA section 172(c)(9) and 40 CFR 51.1014 for $PM_{2.5}$ nonattainment areas. Section V of this document presents our evaluation of the SJV $PM_{2.5}$ Contingency Measure SIP for compliance with these requirements for the San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS, and, as part of that evaluation, we have taken into account the District's estimates of emissions reductions from the Residential Wood Burning Contingency Measure.

B. Rural Open Areas Contingency Measure

1. Background and Regulatory History

In areas where there is open, uncovered land, a natural crust will form and minimize dust emissions. However, activities such as earthmoving activities, material dumping, weed abatement, and vehicle traffic will disturb otherwise naturally stable land and allow windblown fugitive dust emissions to occur.

The District adopted fugitive dust control requirements in Regulation VIII (containing the 8000 series rules) on November 15, 2001, to address RACM/RACT and BACM/BACT attainment plan requirements for the 1987 p.m.$_{10}$ NAAQS.[77] The EPA found that new provisions in Regulation VIII ''significantly strengthened'' the prior existing rules by tightening standards, covering more activities, and adding more requirements to control dust-producing activities.[78] Subsequently, the District adopted amendments to Regulation VIII on August 19, 2004, and September 16, 2004, that the EPA approved into the San Joaquin Valley portion of the California SIP in 2006.[79] More recently the EPA has reviewed Regulation VIII for RACM/RACT, BACM/BACT, and MSM requirements in acting on the San Joaquin Valley plan for the 2006 24-hour $PM_{2.5}$ NAAQS.[80]

Among the rules of Regulation VIII, Rule 8051 (''Open Areas'') applies to vacant portions of residential and commercial lots and contiguous parcels and the 2004 amendments added applicability thresholds for rural and urban areas required to meet both the conditions for a stabilized surface (defined in Rule 8011) and a 20% opacity standard. Rule 8051 applies to any open area having 0.5 acres or more within urban areas, or 3.0 acres or more within rural areas, that contains at least 1,000 square feet of disturbed surface area.[81] In addition, under Rule 8051, upon evidence of vehicle trespass, owners/operators must apply a measure(s) that effectively prevents access to the lot. Rule 8051 does not apply to agricultural areas, which are subject to other fugitive dust controls such as those under Rule 4550 (''Conservation Management Practices'') and Rule 8081 (''Agricultural Sources'').

2. Summary of State Submission

On September 21, 2023, the District adopted a new contingency measure in section 7.0 of District Rule 8051 (referred to herein as the ''Rural Open Areas Contingency Measure''), and CARB submitted Rule 8051, as amended, to include the Rural Open Areas Contingency Measure, as a supplement to the SJV $PM_{2.5}$ Contingency Measure SIP. The Rural Open Areas Contingency Measure would be triggered by a final determination by the EPA that the District failed to meet one or more of the following triggering events for the applicable $PM_{2.5}$ NAAQS:

(1) Any Reasonable Further Progress requirement;

(2) Any quantitative milestone;

(3) Submission of a quantitative milestone report; or

(4) Attainment of the applicable $PM_{2.5}$ NAAQS by the applicable attainment date.

The Rural Open Areas Contingency Measure would lower the applicability threshold for rural open areas from 3.0 acres to 1.0 acres, thereby reducing windblown fugitive dust, including the direct $PM_{2.5}$ portion of such dust emissions. The State estimates that the newly subject total acreage would be 18,816 acres. The Rural Open Areas Contingency Measure would be effective 60 days after an EPA determination under 40 CFR 51.1014(a) that triggers contingency measures. At such time, Rule 8051 would require any rural open area having 1.0 acre or more and containing at least 1,000 square feet of disturbed surface area (notwithstanding exemptions in section 4.0 of the rule) to meet section 5.0 of the rule, which requires that:

> Whenever open areas are disturbed or vehicles are used in open areas, an owner/operator shall implement one or a combination of control measures indicated in Table 8051–1 to comply with the conditions of a stabilized surface at all times and to limit VDE to 20% opacity. In addition to the requirements of this rule, a person shall comply with all other applicable requirements of Regulation VIII.[82]

Table 8051–1 contains the following control measures for open areas:

> A. Open Areas:
>
> Implement, apply, maintain, and reapply if necessary, at least one or a combination of the following control measures to comply at all times with the conditions for a stabilized surface and limit VDE to 20% opacity as defined in Rule 8011:
>
> A1. Apply and maintain water or dust suppressant(s) to all unvegetated areas; and/or
>
> A2. Establish vegetation on all previously disturbed areas; and/or
>
> A3. Pave, apply and maintain gravel, or apply and maintain chemical/organic stabilizers/suppressant(s).
>
> B. Vehicle Use in Open Areas:
>
> Upon evidence of trespass, prevent unauthorized vehicle access by:
>
> Posting 'No Trespassing' signs or installing physical barriers such as fences, gates, posts, and/or other appropriate barriers to effectively prevent access to the area.

The Rural Open Areas Contingency Measure is narrowed by the addition of

[77] Regulation VIII includes eight rules. Rule 8011 (''General Requirements'') provides definitions and the general requirements on which the seven other rules rely. In turn, those seven rules apply to different sources of fugitive windblown dust based on activity type. They include Rule 8021 (''Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities''), Rule 8031 (''Bulk Materials''), Rule 8041 (''Carryout and Trackout''), Rule 8051 (''Open Areas''), Rule 8061 (''Paved and Unpaved Roads''), Rule 8071 (Unpaved Vehicle/Equipment Traffic Area''), and Rule 8081 (''Agricultural Sources''). In this proposed rule, the EPA proposes to approve Rule 8051, as amended to include a contingency provision, as a revision to the California SIP.

[78] 67 FR 15345, 15346–15447 (April 1, 2002) (proposed rule on 2001 version of Regulation VIII).

[79] 71 FR 8461 (February 17, 2006).

[80] See, *e.g.,* 85 FR 17382, 17431 (March 27, 2020) (proposal on BACM/BACT and MSM for the 2006 24-hour $PM_{2.5}$ NAAQS); and EPA Region IX, ''Technical Support Document, EPA Evaluation of BACM/MSM, San Joaquin Valley $PM_{2.5}$ Plan for the 2006 $PM_{2.5}$ NAAQS,'' February 2020.

[81] Rule 8051, section 2.1.

[82] VDE is Visible Dust Emissions.

a new exemption in section 4.2 of Rule 8051 that exempts owners or operators of rural parcels between 1.0 acres to 3.0 acres that implement fire prevention activities required by a Federal, State, or local agency by mowing or cutting (if three inches or more of stubble remains after moving or cutting) or discing (if no more than two passes are made).

The District estimates that the Rural Open Burning Contingency Measure would achieve annual average emissions reductions of 0.008 tpd direct $PM_{2.5}$.[83]

3. EPA Evaluation

As discussed further in the EPA's technical support document that documents our evaluation of amended Rule 8051,[84] we find that the Rural Open Areas Contingency Measure now included as section 7.0 of Rule 8051 meets the applicable requirements for contingency measures. First, we note that the expansion of the control requirements to rural parcels between one (1.0) to three (3.0) acres under section 7.0 of Rule 8051 is conditional and prospective by design and is not required to meet existing control requirements (*i.e.,* RACM or BACM)[85] nor relied upon by the area as part of the area's $PM_{2.5}$ RFP or attainment demonstrations. Moreover, the exemption for owners or operators of certain rural parcels of 1.0 to 3.0 acres in size from the requirements of the rule that would otherwise be included if the Rural Open Areas Contingency Measure were triggered is narrowly drawn and limited such that the exemption will have essentially no impact on the emissions reductions expected from implementation of the Rural Open Areas Contingency Measure. This is because the exemption applies only to owners and operators acting in response to a Federal, State, or local agency that is requiring implementation of fire prevention activities and is further limited by specifying the methods that must be followed to be covered by the exemption.

Second, the Rural Open Areas Contingency Measure includes a trigger mechanism (''. . . final determination by EPA that the District has failed to meet any of the following elements for any of the $PM_{2.5}$ NAAQS . . .'') that addresses all of the specific types of determinations listed in 40 CFR 51.1014(a). Third, the Rural Open Areas Contingency Measure specifies a schedule for timely implementation (''Upon 60 days after the issuance of a final determination . . .''). While the extension of the control requirements to rural parcels between 1.0 to 3.0 acres under section 7.0 is self-executing (*i.e.,* does not require additional rulemaking), the District will need as a practical matter to provide notice to the affected owners/operators that the contingency measure has been triggered. However, we do not find that providing such notice constitutes ''further action'' by the state for the purposes of CAA section 172(c)(9). Lastly, given the nature of the controls required under Rule 8051 (such as watering, establishing vegetation, applying gravel, or fencing (if needed)), we find that the associated emissions reductions from implementation of the Rural Open Areas Contingency Measure can be achieved within a year of the triggering event.

Therefore, for the reasons provided in the preceding paragraphs, we propose to approve Rule 8051, as revised, because we find that the Rural Open Areas Contingency Measure meets all the applicable requirements for a contingency measure for the San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS.

We have also reviewed the emissions reduction estimates for the Rural Open Areas Contingency Measure that were prepared by the District and included in Appendix B (''Emission Reduction and Cost Effectiveness Analysis for Proposed Amendments to Rule 8051 (Open Areas)'') of the Final Draft Staff Report and find the estimates to be reasonable and adequately documented. As documented in Appendix B of the Final Draft Staff Report, the District took into account county-specific parcel size data, among other relevant factors to develop the emissions reduction estimate of 0.008 tpd of direct $PM_{2.5}$ for the Rural Open Areas Contingency Measure.[86]

Because we are proposing to find that the Rural Open Areas Contingency Measure meets the requirements for individual contingency measures, the associated emissions reductions can be taken into account by the EPA when determining whether CARB and District have met the requirements for the San Joaquin Valley as a whole with respect to the contingency measure requirements of CAA section 172(c)(9) and 40 CFR 51.1014 for $PM_{2.5}$ nonattainment areas. Section V of this document presents our evaluation of the SJV $PM_{2.5}$ Contingency Measure SIP for compliance with these requirements for the San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS, and, as part of that evaluation, we have taken into account the District's estimates of emissions reductions from the Rural Open Areas Contingency Measure.

C. Smog Check Contingency Measure

The general purpose of motor vehicle inspection and maintenance (I/M) programs is to reduce emissions from in-use motor vehicles in need of repairs and thereby contribute to state and local efforts to improve air quality and to attain the NAAQS. California has operated an I/M program, also known as the ''Smog Check'' program, in certain areas of the state for over 30 years. Under the current California Smog Check program, certain vehicles are exempt from the biennial inspection requirement, including vehicles eight or fewer model years old.

On November 13, 2023, CARB submitted a third contingency measure for San Joaquin Valley for the $PM_{2.5}$ NAAQS, which we refer to herein as the Smog Check Contingency Measure. Under the Smog Check Contingency Measure, CARB would, within 30 days of the effective date of an EPA determination that an applicable triggering event has occurred for San Joaquin Valley for the $PM_{2.5}$ NAAQS, transmit a letter to the California Bureau of Automotive Repair and Department of Motor Vehicles that, in effect, would narrow the newer vehicle exemption from eight or fewer model years old to seven or fewer model years old throughout the San Joaquin Valley.[87] CARB estimates that the Smog Check Contingency Measure would, after the first triggering event and adjusting slightly for the effect on foregone emission reductions from Carl Moyer

[83] SJVUAPCD, Final Draft Staff Report, ''Proposed Amendments to Rule 8051 (Open Areas),'' September 21, 2023, p. B–7.

[84] EPA Region IX, ''Technical Support Document for EPA's Rulemaking for the California State Implementation Plan, San Joaquin Valley Air Pollution Control District Rule 8051 ('Open Areas'),'' December 2023.

[85] As noted previously, the RACM and BACM demonstrations that the EPA has approved for the 1997 annual, 2006 24-hour, and the 2012 annual $PM_{2.5}$ NAAQS included review of Regulation VIII, including Rule 8051. See 85 FR 44192, 86 FR 67343, and EPA, ''Air Quality State Implementation Plans; Approvals and Promulgations: California; 1997 Annual Fine Particulate Matter Serious and Clean Air Act Section 189(d) Nonattainment Area Requirements; San Joaquin Valley, CA,'' Final rule, signed December 5, 2023.

[86] SJVUAPCD, Final Draft Staff Report, ''Proposed Amendments to Rule 8051 (Open Areas),'' September 21, 2023, p. B–7. The District's estimate compares favorably with the EPA's own estimate of 0.01 tpd for essentially the same contingency measure in EPA's proposed $PM_{2.5}$ contingency measure FIP for San Joaquin Valley. 88 FR 53431, 53444.

[87] Smog Check Contingency Measure, section 4. The Smog Check Contingency Measure is structured to further narrow the newer vehicle exemption by another year upon a second triggering event.

funding,[88] achieve annual average emission reductions of 0.113 tpd NO_X for the 1997 annual $PM_{2.5}$ NAAQS, 0.116 tpd NO_X for the 2006 24-hour $PM_{2.5}$ NAAQS, and 0.083 tpd NO_X for the 2012 annual $PM_{2.5}$ NAAQS in the San Joaquin Valley.[89]

In a separate proposed rule published in this **Federal Register**, we are proposing to approve the Smog Check Contingency Measure and, therefore, its associated emissions reductions can be taken into account by the EPA when determining whether the State and District have met the contingency measure requirements of CAA section 172(c)(9) and 40 CFR 51.1014 for $PM_{2.5}$ nonattainment areas for the San Joaquin Valley as a whole. Section V of this document presents our evaluation of the SJV $PM_{2.5}$ Contingency Measure SIP for compliance with these requirements for the San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS, and as part of that evaluation, we have taken into account CARB's estimates of emissions reductions from the Smog Check Contingency Measure.

V. EPA Review of San Joaquin Valley $PM_{2.5}$ Contingency Measure Plan Element

A. Background and Regulatory History

In light of the nonattainment designation for San Joaquin Valley for the $PM_{2.5}$ NAAQS, the State of California was required under CAA section 172(c)(9) and 40 CFR 51.1014 to adopt and submit a SIP revision providing for implementation of contingency measures to take effect in the San Joaquin Valley if the EPA determines that the area has failed to meet an RFP requirement, failed to submit a quantitative milestone report, failed to meet a quantitative milestone, or failed to attain the $PM_{2.5}$ NAAQS by the applicable attainment date.

In 2019, as discussed in section I.B of this document, CARB submitted a SIP revision that included contingency measure plan elements for San Joaquin Valley for the 1997 annual and 24-hour, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS. The contingency measure plan elements relied on an earlier version of the Residential Wood Burning Contingency Measure and justified reliance on that single measure notwithstanding the fact that the measure alone would not achieve emissions reductions equivalent to one year's worth of RFP by reference to larger planning context for the area and related surplus emissions reductions expected to be achieved from already-implemented control measures.

In 2021, the EPA disapproved the contingency measure plan elements for the applicable $PM_{2.5}$ NAAQS because the plan elements did not include a contingency measure that addressed all four triggering events for the $PM_{2.5}$ NAAQS under 40 CFR 51.1014; that would ensure that emissions reductions would be achieved, once triggered; or, for the 1997 annual $PM_{2.5}$ NAAQS, that would be surplus to the area's needs for RFP and attainment.[90] We proposed disapproval of the contingency measure elements before the Ninth Circuit's *Assoc. of Irritated Residents (AIR)* v. *EPA* decision [91] was published and, thus, did not identify the contingency measure elements' reliance on surplus emissions reductions from already-implemented measures (to justify adoption of a single contingency measure which would not, on its own, achieve one year's worth of RFP) as a specific deficiency.

B. Summary of State Submission

In response to the disapprovals of the previous contingency measure elements, the District and CARB prepared the SJV $PM_{2.5}$ Contingency Measure SIP, which CARB adopted as part of the California SIP and submitted for EPA approval on June 8, 2023. In the SJV $PM_{2.5}$ Contingency Measure SIP, the District and CARB present their evaluation of potential contingency measures, amendments to the previous contingency provisions in the District's residential wood burning rule (*i.e.,* the Residential Wood Burning Contingency Measure), a commitment to evaluate potential contingency provisions for Rule 8051 (''Open Areas''), analysis of one year's worth of emission reductions, and infeasibility demonstrations for rejecting other potential contingency measures. In light of the *AIR* v. *EPA* decision, the District and CARB do not justify the selection of the contingency measures on the basis of surplus emissions reductions from already-implemented measures, as had been the case previously, but rather ''due to a scarcity of available, qualifying measures,'' and the time period in which emission reductions should occur.[92] Subsequent to the submission of the SJV $PM_{2.5}$ Contingency Measure SIP, the District and CARB have supplemented the contingency measure elements for the applicable $PM_{2.5}$ NAAQS with the adoption and submission of two additional contingency measures—the Rural Open Areas Contingency Measure and the Smog Check Contingency Measure.

1. General Considerations

''General Considerations,'' for the purposes of this proposed action, includes identification of the relevant pollutants, the use of contingency measures for more than one triggering event and for more than one NAAQS, and the magnitude of emissions reductions. Contingency measure feasibility analyses are addressed in a separate subsection.

a. $PM_{2.5}$ and $PM_{2.5}$ Precursors

CARB and the District have concluded, based on CARB modeling, that sulfur oxides (SO_X), volatile organic compounds (VOCs), and ammonia are not significant precursors for $PM_{2.5}$ formation in the San Joaquin Valley. Therefore, their contingency measure submissions address sources of direct $PM_{2.5}$ and NO_X emissions.

b. Using Same Contingency Measures for More Than One Triggering Event, NAAQS

The contingency measures that CARB and the District rely upon in the SJV $PM_{2.5}$ Contingency Measure SIP are not limited to one $PM_{2.5}$ NAAQS, but rather cover all three of the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS (*i.e.,* the same set of contingency measures has been submitted to address the contingency measure requirements for more than one $PM_{2.5}$ NAAQS).

c. Magnitude of Emissions Reductions

To evaluate the sufficiency of the Residential Wood Burning Contingency Measure with respect to the magnitude of emissions reductions that the contingency measures should achieve, the SJV $PM_{2.5}$ Contingency Measure SIP

[88] The Carl Moyer Program distributes incentive grants to fund the incremental cost of cleaner-than-required engines, equipment, and other technology. The slight adjustment to emission reductions mentioned results from a decrease in funding to the Carl Moyer program. If the contingency measure were triggered, fewer vehicles would be exempt from the Smog Check program, and thus fewer vehicles would be subject to the Smog Check abatement fee (which is only assessed on vehicles exempted from Smog Check testing). That fee provides funding to the Carl Moyer Program. For more information on the program, see *https://ww2.arb.ca.gov/carl-moyer-program-apply*.

[89] Smog Check Contingency Measure, Table 28 and Table 31.

[90] 86 FR 38652, 38669–38670; and 86 FR 49100, 49124–49125 and 49133–49134.

[91] In *AIR* v. *EPA,* the Ninth Circuit held that, under the EPA's current guidance, the surplus emissions reductions from already-implemented measures cannot be relied upon to justify the approval of a contingency measure that would achieve far less than one year's worth of RFP as sufficient by itself to meet the contingency measure requirements of CAA sections 172(c)(9) and 182(c)(9) for the nonattainment area. 10 F.4th at 946–47.

[92] SJV $PM_{2.5}$ Contingency Measure SIP, p. 5.

includes calculations of one year's worth of RFP for the relevant $PM_{2.5}$ NAAQS for the San Joaquin Valley. To do this, the District calculated the change in annual average emission reductions from the base year to the attainment year for the 1997 annual $PM_{2.5}$ NAAQS (from 2013 to 2023) and 2006 24-hour $PM_{2.5}$ NAAQS (from 2013 to 2024), and the outermost Moderate area RFP year for the 2012 annual $PM_{2.5}$ NAAQS (from 2013 to 2022), and divided those by the number of years between the base year and applicable attainment or RFP year. The State's estimates of one year's worth of RFP in the SJV $PM_{2.5}$ Contingency Measure SIP are as follows: 0.44 tpd direct $PM_{2.5}$ and 16.7 tpd NO_X (for the 1997 annual $PM_{2.5}$ NAAQS); 0.58 tpd direct $PM_{2.5}$ and 18.4 tpd NO_X (for the 2006 24-hour $PM_{2.5}$ NAAQS); and 0.46 tpd direct $PM_{2.5}$ and 15.3 tpd NO_X (for the 2012 annual $PM_{2.5}$ NAAQS).[93]

Per the EPA's Draft Revised Contingency Measure Guidance, the SJV $PM_{2.5}$ Contingency Measure SIP also includes estimates of one year's worth of progress that were made by calculating one year's worth of RFP as a percentage of the base year emissions inventory and applying that percentage to the attainment year emissions inventory for the 1997 annual and 2006 24-hour $PM_{2.5}$ NAAQS, and to the outermost Moderate area RFP year for the 2012 annual $PM_{2.5}$ NAAQS. The estimates of one year's worth of progress in the SJV $PM_{2.5}$ Contingency Measure SIP are as follows: 0.41 tpd direct $PM_{2.5}$ and 7.91 tpd NO_X (for the 1997 annual $PM_{2.5}$ NAAQS); 0.52 tpd direct $PM_{2.5}$ and 6.66 tpd NO_X (for the 2006 24-hour $PM_{2.5}$ NAAQS); and 0.43 tpd direct $PM_{2.5}$ and 8.65 tpd NO_X (for the 2012 annual $PM_{2.5}$ NAAQS).[94]

CARB and the District present their comparison of emission reductions from the Residential Wood Burning Contingency Measure to those needed for one year's worth of progress in Table 17 of the SJV $PM_{2.5}$ Contingency Measure SIP.[95] They conclude that this contingency measure would achieve emission reductions of 0.69 tpd direct $PM_{2.5}$ and 0.1 tpd NO_X (including reductions following both first and second triggering events) and that such reductions would exceed those needed for one year's worth of progress for direct $PM_{2.5}$ but would fall short of those needed for one year's worth of progress for NO_X.

Noting the direct $PM_{2.5}$ surplus, CARB and the District then trade the surplus direct $PM_{2.5}$ emission reductions at a ratio of 6:1 (*i.e.,* 6 tpd NO_X for each excess 1 tpd direct $PM_{2.5}$),[96] based on analyses in their 2021 ''Progress Report and Technical Submittal for the 2012 $PM_{2.5}$ Standard San Joaquin Valley'' (''2021 Progress Report'').[97] CARB and the District note that direct $PM_{2.5}$ emission reductions are a more efficient and cost-effective way to reduce ambient $PM_{2.5}$ in the San Joaquin Valley than NO_X emission reductions.[98] The report presented analysis of the relative effect of reducing 30% direct $PM_{2.5}$ (annual average) emissions versus 30% NO_X (annual average) emissions on ambient annual average $PM_{2.5}$ concentrations (as modeled for 2024) at each regulatory monitoring site in the San Joaquin Valley using data from the precursor sensitivity analyses in the 2018 $PM_{2.5}$ Plan.[99] CARB and the District examined several methods for calculating the ratio based on varying combinations of monitoring sites. They concluded that 6:1 was a conservative ratio as it was less than the average ratio for the two sites with the highest modeled (annual average) ambient $PM_{2.5}$ concentrations in 2025 (6.1:1), the average ratio of sites with modeled 2025 concentrations over 11.00 $\mu g/m^3$ (6.4:1), and the average ratio of sites with a 2020 design value over 12 $\mu g/m^3$ (6.6:1).[100] They also conclude that a ratio of 6:1 would be conservative as it was less than the 8.1:1 ratio for the modeled design value for the Bakersfield-Planz site (*i.e.,* the site with the highest modeled 2025 concentration).

Applying this 6:1 trading ratio, CARB and the District estimate that, after achieving the full one year's worth of progress for direct $PM_{2.5}$ emission reductions, the shortfall of NO_X emissions for one year's worth of progress would be as follows: 6.13 tpd (compared to 7.91 tpd for the 1997 annual $PM_{2.5}$ NAAQS), 5.54 tpd (compared to 6.66 tpd for the 2006 24-hour $PM_{2.5}$ NAAQS), and 6.99 tpd (compared to 8.65 tpd for the 2012 annual $PM_{2.5}$ NAAQS).[101] The NO_X equivalent emissions reductions equate to a range of 17% to 23% of one year's worth of progress for NO_X.

In light of the shortfall of NO_X emissions reductions, the SJV $PM_{2.5}$ Contingency Measure SIP includes feasibility analyses by the District for stationary and area sources and by CARB for mobile sources to justify the reliance on a contingency measure that would not provide for one year's worth of progress (*i.e.,* for NO_X). We summarize the feasibility analyses prepared by the District and CARB in the following section of this document.

2. Contingency Measure Feasibility Analyses

The District states that it has already implemented rules for sources that meet or go beyond federal requirements and that few measures remain to explore as contingency measures. The District describes the relative stringency of their stationary and area source measures by noting the EPA's 2020 approval of the State's demonstration of BACM and MSM for the 2006 24-hour $PM_{2.5}$ NAAQS; highlights the District's tighter limits for certain industrial sources compared to the EPA's national emission limits to address the interstate transport of air pollution; and describes the numerous regulatory measures and incentive-based measures adopted since and in fulfillment of the 2018 $PM_{2.5}$ Plan.[102]

More specifically, the District analyzed the wide range of stationary and area sources for contingency measure opportunities, including identification of potential control measures, analysis of the technological and economic feasibility of such measures, assessment of the time required to develop and implement such measures within 60 days and achieve emission reductions within one to two years, and discussion of whether the District could adopt such measures

[93] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 5–6; see ''Step 1b'' emissions estimates in the ''Step 1'' table for one year's worth of RFP.

[94] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 5–6; see the ''Step 3'' table for one year's worth of progress.

[95] SJV $PM_{2.5}$ Contingency Measure SIP, Table 17.

[96] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 73–74.

[97] CARB and SJVUAPCD, ''Progress Report and Technical Submittal for the 2012 $PM_{2.5}$ Standard San Joaquin Valley,'' October 19, 2021 (''2021 Progress Report''). See pages 34–38 for the State's ''$PM_{2.5}$ Precursor Sensitivity Modeling Analysis and Trading Ratios.'' Transmitted to the EPA by letter dated October 20, 2021, from Richard W. Corey, Executive Officer, CARB, to Deborah Jordan, Acting Regional Administrator, EPA Region IX.

[98] 2021 Progress Report, p. 34.

[99] See Appendix K (''Modeling Attainment Demonstration'') of the 2018 $PM_{2.5}$ Plan, including Table 14 (annual average modeled emissions inventory) and Table 49 (precursor sensitivity analysis for annual average ambient $PM_{2.5}$ concentration in 2024).

[100] At the time, the modeled 2025 $PM_{2.5}$ concentrations corresponded to the attainment year in the State's Serious area plan for the 2012 annual $PM_{2.5}$ NAAQS, which was later withdrawn on October 27, 2022. Letter dated October 27, 2022, from Steven S. Cliff, Executive Officer, CARB, to Martha Guzman, Regional Administrator, EPA Region IX.

[101] SJV $PM_{2.5}$ Contingency Measure SIP, p. 74.

[102] SJV $PM_{2.5}$ Contingency Measure SIP, section 4.1 (''Stringency of District's Regulatory Program''). See also 87 FR 20036 (April 6, 2022) (proposed rule for the interstate transport FIP for the 2015 ozone NAAQS); and 88 FR 36654 (June 5, 2023) (final rule for interstate transport FIP for the 2015 ozone NAAQS).

and secure EPA approval prior to the EPA promulgating a contingency measure FIP for $PM_{2.5}$ in the San Joaquin Valley. For the potential control measures identified through this process, the District further analyzed possible contingency measures for wood burning fireplaces and wood burning heaters, rural open areas, commercial charbroiling, almond harvesting, and oil and gas production combustion equipment. Based on this analysis, the District adopted the Residential Wood Burning Contingency Measure and concluded that the other possible contingency measures were infeasible or untimely but committed to further evaluate the rural open areas rule as a potential contingency measure. Subsequently, the District fulfilled the Agency's commitment to further evaluate the rural open areas rule and adopted the Rural Open Areas Contingency Measure to supplement the SJV $PM_{2.5}$ Contingency Measure SIP.

In turn, CARB states that its mobile source control programs often set the standard for other states to follow and that more than half of mobile source NO_X emissions in the San Joaquin Valley are from primarily federally regulated sources, which limit opportunities for contingency measures that would achieve one year's worth of progress in emission reductions. CARB further notes that a relatively limited portion (of NO_X) emissions are regulated by local air districts in California and that, even if discounting the emission reductions needed for contingency measures by primarily federally regulated emission sources, additional control measures to achieve the one year's worth of emission reductions are scarce or nonexistent.

CARB states that if such measures were identified, they would be adopted to improve air quality and help attain the NAAQS, rather than held in reserve as contingency measures, and that control measures to achieve large emission reductions often take longer than two years to implement—beyond the one- to two-year timeframe for achieving emission reductions for contingency purposes. For example, CARB states that the three largest NO_X reduction measures committed to in the 2022 State SIP Strategy [103] rely on accelerated turnover of engines and trucks and shifting to zero-emission equipment, which is limited by infrastructure and equipment options. CARB further states that a central difficulty in considering contingency measures is that CARB has already committed to zero emission standards where feasible and as expeditiously as possible to fulfill goals established in California Executive Order N–79–20 for mobile sources ranging from light-duty cars by 2035 to heavy-duty trucks by 2045.[104]

More specifically, CARB analyzed all sources under its authority to identify potential contingency measures using three criteria, per CAA requirements, court decisions, and the EPA's Draft Revised Contingency Measure Guidance. First, CARB assessed whether the measure could be implemented within 60 days of a triggering event and emission reductions achieved within one to two years. Second, CARB assessed the technological and economic feasibility of implementing the measure, particularly within the one- to two-year timeframe. Third, CARB evaluated whether it could adopt the measure and secure EPA approval by the September 30, 2024 consent decree deadline for the EPA to promulgate a FIP or alternatively approve contingency measure SIP submissions meeting the contingency measure requirements.

Regarding mobile source contingency measures, CARB describes several challenges that limit the control measure options that would meet contingency measure requirements. For new engine standards, CARB states that engine manufacturers need lead time to ''design, plan, certify, manufacture, and deploy cleaner engines.'' For fleet regulations, CARB states that manufacturing must be mature to provide sufficient supply and that owners and operators must ''plan, purchase, and deploy new, often zero-emission, equipment'' that may involve changes to business operations and infrastructure. Based on the time required for implementing such measures, CARB concludes that new engine standards and fleet regulations are not appropriate for contingency measures.

Furthermore, CARB states that its regulations are technology-forcing, which requires time for industry to plan, develop, and implement new technologies, and that it is driving mobile sources to zero-emissions where feasible to achieve criteria, air toxic, and climate pollutant goals. Similarly, CARB argues that the technology-forcing and zero-emission-based nature of its mobile source regulations reduce or eliminate opportunities for contingency measure emission reductions. Lastly, CARB states that its full rulemaking process for most mobile source measures takes about five years to develop and adopt, which would not be possible prior to the September 30, 2024 consent decree deadline for the EPA to promulgate a FIP, or approve contingency measure SIP submissions meeting the contingency measure requirements.

CARB concludes that there are no feasible mobile source contingency measures for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS (as of the April 2023 public notice for the SJV $PM_{2.5}$ Contingency Measure SIP) yet continued to assess opportunities for feasible contingency measures. Per a June 2023 commitment letter by CARB's Executive Officer, and as further described in section IV.C of this proposed rule, CARB has since completed the development of and adopted the state-wide Smog Check Contingency Measure that complements the District contingency measures for residential wood burning and rural open areas.

3. Conclusion

Based on achieving the full one year's worth of progress for direct $PM_{2.5}$ emission reductions, a portion of one year's worth of progress for NO_X emission reductions, and their contingency measure feasibility analyses, CARB and the District conclude that the SJV $PM_{2.5}$ Contingency Measure SIP, and related infeasibility demonstrations, and the Residential Wood Burning Contingency Measure fulfill the contingency measure requirements for the $PM_{2.5}$ NAAQS.[105]

C. EPA Evaluation

We propose to find that CARB and the District have corrected the specific deficiencies that we identified in the previously submitted contingency measure elements for the applicable $PM_{2.5}$ NAAQS and that were the bases for our previous disapprovals of the contingency measure element. Our proposed conclusion in this regard recognizes that the revised contingency measure plan elements for the applicable $PM_{2.5}$ NAAQS (SJV $PM_{2.5}$ Contingency Measure SIP) now includes contingency measures (Residential Wood Burning Contingency Measure, Rural Open Areas Contingency Measure, and the Smog Check Contingency Measure) that address all four triggering events for the $PM_{2.5}$ NAAQS under 40

[103] CARB, ''2022 State Strategy for the State Implementation Plan,'' adopted September 22, 2022, Chapter 5 (''State SIP Measures'').

[104] Executive Department, State of California, Executive Order N–79–20, September 23, 2020.

[105] SJV $PM_{2.5}$ Contingency Measure SIP, p. 74. As noted previously, the SJV $PM_{2.5}$ Contingency Measure SIP has been supplemented with two additional contingency measures (*i.e.,* the Rural Open Areas Contingency Measure and the Smog Check Contingency Measure).

CFR 51.1014, that have been structured to ensure emissions reductions, once triggered, and that are surplus to the RFP and attainment needs of the San Joaquin Valley for the 1997 annual $PM_{2.5}$ NAAQS.[106]

1. General Considerations

As stated previously, ''General Considerations,'' for the purposes of this proposed action, includes identification of the relevant pollutants, the use of contingency measures for more than one triggering event and for more than one NAAQS, and the magnitude of emissions reductions. We present our evaluation of the State's contingency measure feasibility analyses in a separate subsection.

a. $PM_{2.5}$ and $PM_{2.5}$ Plan Precursors

Under the CAA, states are required to regulate not only direct emissions of $PM_{2.5}$ in an attainment plan, but also all $PM_{2.5}$ precursors. Under the EPA's $PM_{2.5}$ SIP Requirements Rule, states must identify, adopt, and implement control measures, including control technologies, on sources of direct $PM_{2.5}$ emissions and sources of emissions of $PM_{2.5}$ plan precursors located in $PM_{2.5}$ nonattainment areas.[107] $PM_{2.5}$ plan precursors are those $PM_{2.5}$ precursors (which are sulfur dioxide (SO_2), NO_X, VOCs, and ammonia) that the state must regulate in the applicable attainment plan.[108] A state may elect to submit to the EPA precursor demonstrations for a specific nonattainment area in order to establish that regulation of one or more precursors is not necessary for attainment in the nonattainment area at issue.[109] If the EPA approves a comprehensive precursor demonstration that shows that emissions of a particular precursor does not contribute significantly to $PM_{2.5}$ levels that exceed the NAAQS in an area, then the state is not required to control emissions of the relevant precursor from existing sources in the current attainment plan.[110] Accordingly, the state would not need to address the precursor in order to meet attainment plan requirements, including RFP, in QMs and associated QM reports, or be required to adopt contingency measures to reduce the precursor at issue.[111]

For the San Joaquin Valley, as noted in section V.B.1 of this proposed rule, CARB and the District have concluded, based on CARB modeling, that SO_X, VOCs, and ammonia are not significant precursors for $PM_{2.5}$ formation in the San Joaquin Valley.[112] The EPA has considered, and approved, the State's precursor demonstrations with respect to the 1997 annual, 2006 24-hour, and the 2012 annual $PM_{2.5}$ NAAQS in taking action on the SIP submissions applicable to each NAAQS.[113] Therefore, we agree with CARB and the District that the contingency measure submissions for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS must address sources of direct $PM_{2.5}$ and NO_X emissions but do not need to address sources of SO_X, VOCs, or ammonia.

For the 2006 24-hour $PM_{2.5}$ NAAQS, the EPA approved the comprehensive precursor demonstration that established that SO_2, VOCs, and ammonia emissions do not contribute significantly to $PM_{2.5}$ levels that exceed the 2006 24-hour $PM_{2.5}$ NAAQS in the San Joaquin Valley.[114] In 2020, a petition for review before the Ninth Circuit Court of Appeals challenged the EPA's approval of the portions of the 2019 SIP submissions related to the 2006 24-hour $PM_{2.5}$ NAAQS. In 2021, the Court vacated the approval of aggregate commitments to the extent such commitments relied on inadequately funded incentive-based control measures and remanded to the EPA for further consideration of the aggregate commitments, and for further proceedings consistent with the decision, but denied the petition in all other respects.[115] The EPA's approval of the comprehensive precursor demonstration was not the subject of the court challenge. In light of the current circumstances surrounding these precursor demonstrations, the EPA agrees that direct $PM_{2.5}$ and NO_X are the appropriate pollutants for which contingency measures are required in the San Joaquin Valley for the 2006 24-hour $PM_{2.5}$ NAAQS.

b. Using Same Contingency Measures for More Than One Triggering Event, NAAQS

Under CAA section 172(c)(9), SIPs must provide for the implementation of specific contingency measures if the area fails to meet RFP or to attain the NAAQS by the applicable attainment date. For $PM_{2.5}$, there are four potential triggering events: failure to meet any RFP requirement, failure to submit a QM report, failure to meet a QM, and failure to attain the NAAQS by the applicable attainment date.[116]

To meet the contingency measure requirement, states may adopt different measures for different triggering events but are not required to do so. If the state adopts the same set of contingency measures for all the triggering events, however, then the contingency measures may all be implemented by earlier-occurring triggering events leaving no contingency measures for potential later-occuring events. In that case, if a state has no remaining approved contingency measures, then the EPA believes that states must adopt and submit additional contingency measures to be available for potential later-occuring triggering events. The potential for states to have used all approved contingency measures, and thus to lack contingency measures for potential later-triggering events is compounded by the reliance on the same set of contingency measures for more than one iteration of the $PM_{2.5}$ NAAQS. Accordingly, while the EPA might approve a SIP that relies on the same contingency measures for multiple potential triggering events, a SIP that does so may be subject to the need for future revision each time a triggering event occurs.

As noted previously, CARB and the District have submitted three contingency measures, each of which covers all three of the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS (*i.e.,* the same set of contingency measures has been submitted to address the contingency measure requirements for more than one $PM_{2.5}$ NAAQS). In addition, each of the contingency measures addresses each of the four potential triggering events: failure to meet any RFP requirement, failure to submit a QM report, failure to meet a QM, and failure to attain the NAAQS by the applicable attainment date.[117] As noted previously, states may adopt different measures for different triggering events and different NAAQS, but we do not believe that states are

[106] With respect to the contingency measures being surplus to the RFP and attainment needs of the San Joaquin Valley for the 1997 annual $PM_{2.5}$ NAAQS, we are relying on the recent approval of the RFP and attainment demonstrations in the State's 15 $\mu g/m^3$ SIP Revision.

[107] See generally 40 CFR 51.1009(a) and 40 CFR 51.1010(a).

[108] 40 CFR 51.1000.

[109] 40 CFR 51.1006(a).

[110] 40 CFR 51.1006(a)(1)(iii).

[111] 40 CFR 51.1009(a)(4)(i).

[112] See, *e.g.,* SJV $PM_{2.5}$ Contingency Measure SIP, Appendix G (Appendix C from the 2018 $PM_{2.5}$ Plan), p. C–12.

[113] EPA, ''Air Quality State Implementation Plans; Approvals and Promulgations: California; 1997 Annual Fine Particulate Matter Serious and Clean Air Act Section 189(d) Nonattainment Area Requirements; San Joaquin Valley, CA,'' Final rule, signed December 5, 2023; 85 FR 17382, 17390–17396, finalized at 85 FR 44192; 86 FR 49100, 49107–49112, finalized at 86 FR 67343.

[114] 85 FR 17382, 17390–17396, finalized at 85 FR 44192.

[115] *Medical Advocates for Healthy Air* v. *EPA,* No. 20–72780, Memorandum, Dkt. #58–1 (9th Cir. Apr. 13, 2022).

[116] 40 CFR 51.1014(a).

[117] 40 CFR 51.1014(a).

required to do so, and thus, we find that the State's reliance on the same set of contingency measures for more than one triggering event and more than one NAAQS to be acceptable.

In this instance, two of the three contingency measures—the Residential Wood Burning Contingency Measure and the Smog Check Contingency Measure—include provisions that would separately be implemented after a second triggering event.[118] Under section 5.7.3 of Rule 4901, upon a first triggering event, the No Burn (*i.e.,* curtailment) thresholds for the five non-hot spot counties (Kings, Merced, San Joaquin, Stanislaus, and Tulare) would be lowered to match the tighter No Burn thresholds for the three hot spot counties (Fresno, Madera, and Kern) (*i.e.,* to 35 μg/m^3 for registered devices and to 12 μg/m^3 for unregistered devices). Upon a subsequent triggering event (*i.e.,* in response to a separate, later determination by the EPA), the No Burn threshold for unregistered fireplaces and woodstoves for all eight counties would be lowered from 12 μg/m^3 to 11 μg/m^3.

Similarly, under the Smog Check Contingency Measure, upon a first triggering event, the Smog Check exemption would be lowered from eight or fewer model years old to seven or fewer model years old. Upon a subsequent triggering event (*i.e.,* in response to a separate, later determination by the EPA), the Smog Check exemption would be lowered from seven or fewer model years old to six or fewer model years old.

Therefore, after a first triggering event, the State would have two remaining SIP-approved contingency measures that are not yet triggered as it develops a SIP revision to meet the missed RFP requirement or to correct ongoing nonattainment. The EPA believes that the State would need to assess whether those two remaining contingency measures were sufficient to meet the contingency measure requirements in that future time and, if necessary, adopt and submit additional contingency measures to be available for potential later-occuring triggering events.

c. Magnitude of Emissions Reductions

As noted previously, neither the CAA nor the EPA's implementing regulations establish a specific level of emission reductions that implementation of contingency measures must achieve, but the EPA has recommended in existing guidance that contingency measures should provide for emission reductions equivalent to approximately one year of reductions needed for RFP in the nonattainment area.

Using the longstanding approach, contingency measures should provide for emissions reductions of approximately one year's worth of RFP for each of the relevant $PM_{2.5}$ NAAQS. Under the approach described in the EPA's Draft Revised Contingency Measure Guidance, the EPA has suggested that contingency measures provide for emissions reductions of approximately one year's worth of progress for each of the relevant $PM_{2.5}$ NAAQS rather than one year's worth of RFP.

We have reviewed the calculations in the SJV $PM_{2.5}$ Contingency Measure SIP, as summarized in section V.B.1 of this proposed rule, and find that the State properly calculated one year's worth of RFP (as an interim step in calculating one year's worth of progress) and one year's worth of progress for each of the relevant $PM_{2.5}$ NAAQS in the San Joaquin Valley.[119] We have also reviewed the calculations in the SJV $PM_{2.5}$ Contingency Measure SIP used to compare the emissions reductions from the Residential Wood Burning Contingency Measure with one year's worth of progress and generally find them to be acceptable with the exception that the calculation includes the emissions reductions from both triggering events in the evaluation. Only the emissions reductions from the first trigger should be used because there is no assurance that the additional emissions reductions from the second triggering event will provide emissions reductions in the year or two following the first triggering event.

We recognize that the calculations in the SJV $PM_{2.5}$ Contingency Measure SIP relied upon an interpollutant trading ratio of 6:1 (*i.e.,* 6 tpd NO_X for each excess 1 tpd direct $PM_{2.5}$) to convert ''excess'' $PM_{2.5}$ emissions reductions to equivalent NO_X emissions reductions. The technical basis of the interpollutant trading ratio of 6:1 was provided in the State's 2021 Progress Report to the EPA to support the State's Serious area attainment demonstration for the 2012 annual $PM_{2.5}$ NAAQS. Specifically, the State analyzed the relative effect of reducing 30% direct $PM_{2.5}$ (annual average) emissions versus 30% NO_X (annual average) emissions on ambient annual average $PM_{2.5}$ concentrations (as modeled for 2024) at each regulatory monitoring site in the San Joaquin Valley using data from the precursor sensitivity analyses in the 2018 $PM_{2.5}$ Plan.[120] While the 2021 Progress Report was nominally for only the 2012 annual $PM_{2.5}$ NAAQS and corresponded to the modeled 2025 attainment year in the State's Serious area plan for the 2012 annual $PM_{2.5}$ NAAQS (later withdrawn on October 27, 2022), we note that the control strategy in the 2018 $PM_{2.5}$ Plan was built upon annual average emissions inventories (*e.g.,* for demonstrating RFP) and applied in common to the 1997, 2006, and 2012 $PM_{2.5}$ NAAQS. Later, the 15 μg/m^3 SIP Revision for the 1997 annual $PM_{2.5}$ NAAQS retained the annual average emissions inventory basis for the control strategy to attain that NAAQS and continued to rely on the State's precursor sensitivity analyses. In other words, there is a common foundation on which CARB and the District selected the 6:1 ratio.

As previously discussed, CARB and the District examined several methods for calculating the ratio based on varying combinations of monitoring sites. They concluded that 6:1 was a conservative ratio as it was less than the average ratio for the two sites (in Fresno and Kern Counties) with the highest modeled (annual average) ambient $PM_{2.5}$ concentrations in 2025 (6.1:1), the average ratio of the six sites (in Fresno, Kern, Stanislaus, and Tulare Counties) with modeled 2025 concentrations over 11.00 μg/m^3 (6.4:1), and the average ratio of the six sites (in Fresno, Kern, Kings, and Tulare Counties) with a 2020 design value over 12 μg/m^3 (6.6:1).[121]

We have reviewed the State's technical basis for the 6:1 interpollutant trading ratio and find that it is a reasonable ratio for purposes of estimating the NO_X equivalent of excess direct $PM_{2.5}$ emission reductions for purposes of contingency measures in the San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS. First, the annual average emissions inventory and integrated

[118] We note that the contingency provisions in Rule 8051 would be fully implemented following a first triggering event.

[119] With respect to the 2012 $PM_{2.5}$ NAAQS, we agree with the calculation of one year's worth of progress in the SJV $PM_{2.5}$ Contingency Measure SIP that is based on the outermost RFP milestone year, rather than the attainment year, because, as an area for which an impracticability demonstration has been approved, the attainment year has not yet been established.

[120] See Appendix K (''Modeling Attainment Demonstration'') of the 2018 $PM_{2.5}$ Plan, including Table 14 (annual average modeled emissions inventory) and Table 49 (precursor sensitivity analysis for annual average ambient $PM_{2.5}$ concentration in 2024).

[121] 2021 Progress Report, Table 7 (''Base and Projected 2025 Annual Average Design Values Used to Select/Prioritize Sites for Calculating an Average Trading Ratio''). At the time, the modeled 2025 concentrations corresponded to the attainment year in the State's Serious area plan for the 2012 annual $PM_{2.5}$ NAAQS, which was later withdrawn on October 27, 2022.

nature of attainment planning for the three NAAQS provides a common emissions and control strategy basis for the ratios. Second, the ratios are based on whole emissions inventories (rather than, for example, only on-road emissions inventories that might be relevant to motor vehicle emission budgets) and modeling for a near-term year (2025), given that these contingency measures would be triggered no sooner than 2024.

Third, by examining several methods that involve averaging across two to six sites, including two methods that include both hot spot and non-hot spot counties, the State provides robustness in the ratio (*i.e.,* may better reflect the effect of emission reductions from the three contingency measures across sites in the San Joaquin Valley). The inclusion of non-hot spot counties in two of the averaging methods is important in that, upon a first triggering event, the Residential Wood Burning Contingency Measure—which is the contingency measure that would achieve emission reductions in excess of one year's worth of direct $PM_{2.5}$ emission reductions—would lower the No Burn (*i.e.,* curtailment) thresholds for the five non-hot spot counties (Kings, Merced, San Joaquin, Stanislaus, and Tulare) to match the tighter No Burn thresholds for the three hot spot counties (Fresno, Madera, and Kern). Fourth, we agree with CARB and the District that the selected 6:1 ratio is conservative relative to the slightly higher average ratios of 6.1:1, 6.4:1, and 6.6:1 from the methods that select sites with relatively high modeled concentrations, and relative to the ratio of 8.1:1 at the modeled 2025 high site of Bakersfield-Planz.[122]

The SJV $PM_{2.5}$ Contingency Measure SIP calculated the emissions reductions only from the Residential Wood Burning Contingency Measure because that was the only adopted contingency measure at the time, but the District and CARB have since supplemented the submission with two additional contingency measures—the Rural Open Areas Contingency Measure and the Smog Check Contingency Measure. As described in sections IV.A and IV.B of this proposed rule, the EPA proposes to approve the Residential Wood Burning Continency Measure and the Rural Open Areas Contingency Measure and, in a separate rulemaking action, we are proposing to approve the Smog Check Contingency Measure. Table 2 summarizes the estimated emissions reductions from these contingency measures, as evaluated by the EPA.

TABLE 2—ANNUAL AVERAGE EMISSIONS REDUCTIONS FROM DISTRICT AND CARB CONTINGENCY MEASURES, tpd

Contingency measure	1997 Annual $PM_{2.5}$ NAAQS		2006 24-hour $PM_{2.5}$ NAAQS		2012 Annual $PM_{2.5}$ NAAQS	
	Direct $PM_{2.5}$	NO_X	Direct $PM_{2.5}$	NO_X	Direct $PM_{2.5}$	NO_X
District: Residential Wood Burning (first triggering event)	0.5793	0.0817	0.5793	0.0817	0.5793	0.0817
District: Non-agricultural Rural Open Areas	0.008	.....	0.008	.....	0.008	.....
CARB: Smog Check (first triggering event)	.....	0.117	.....	0.120	.....	0.086
CARB: Effect of Moyer Program funding decrease in the San Joaquin Valley if Smog Check Contingency Measure triggered	.....	(0.004)	.....	(0.004)	.....	(0.003)
Total	0.5873	0.1947	0.5873	0.1977	0.5873	0.1647

Table 3 presents the estimated emissions reductions as percentages of one year's worth of RFP and one year's worth of progress both with and without trading between direct $PM_{2.5}$ and NO_X emissions. As noted previously in this proposed rule, one year's worth of RFP is the longstanding recommendation by the EPA to states regarding the magnitude of emissions reductions that contingency measures should be capable of achieving. One year's worth of progress is the new recommendation described in the EPA's Draft Revised Contingency Measure Guidance. In addition, we are proposing to approve the State's trading ratio of 6:1 (*i.e.,* 6 tpd NO_X for each excess 1 tpd direct $PM_{2.5}$) and to trade excess direct $PM_{2.5}$ emission reductions, as evaluated by the EPA, to substitute for a portion of the shortfall in NO_X emission reductions compared to one year's worth of RFP and one year's worth of progress.[123] We apply this trading ratio in our calculations for all three $PM_{2.5}$ NAAQS considered in this proposed rule.

TABLE 3—EPA EVALUATION OF DISTRICT AND CARB CONTINGENCY MEASURES AS PERCENTAGE OF ONE YEAR'S WORTH (OYW) OF RFP AND ONE YEAR'S WORTH OF PROGRESS

$PM_{2.5}$ NAAQS	Pollutant	One year's worth of RFP			One year's worth of progress		
		Reductions target	% OYW (no trading)	% OYW (with trading) [a]	Reductions target	% OYW (no trading)	% OYW (with trading) [a]
1997 Annual	Direct $PM_{2.5}$	0.44	132	100	0.41	142	100
	NO_X	16.7	1.2	6.3	7.9	2.5	15.7
2006 24-hour	Direct $PM_{2.5}$	0.58	101	100	0.52	112	100
	NO_X	18.4	1.1	1.3	6.7	3.0	8.8
2012 Annual	Direct $PM_{2.5}$	0.46	129	100	0.43	138	100

[122] We note that the interpollutant trading ratio of 6:1 compares favorably with the interpollutant trading ratios that the EPA used recently in the Agency's proposed San Joaquin Valley $PM_{2.5}$ contingency measure FIP. We provide our evaluation of the interpollutant trading ratio in the SJV $PM_{2.5}$ Contingency Measure SIP relative to the corresponding ratios in our proposed FIP in a Memorandum to File from Rory Mays and Scott Bohning, EPA Region IX, Subject: ''Comparison of California and EPA Interpollutant Trading Ratios for Trading Excess Direct $PM_{2.5}$ Emission Reductions to NO_X Equivalent Emission Reductions for $PM_{2.5}$ Contingency Measure Purposes in the San Joaquin Valley,'' December 2023.

[123] While this trading would not make up the entire shortfall in NO_X emission reductions, it gives a sense for the magnitude of the relative ambient effect of the excess direct $PM_{2.5}$ emission reductions towards meeting one year's worth of RFP or one year's worth of progress.

TABLE 3—EPA EVALUATION OF DISTRICT AND CARB CONTINGENCY MEASURES AS PERCENTAGE OF ONE YEAR'S WORTH (OYW) OF RFP AND ONE YEAR'S WORTH OF PROGRESS—Continued

$PM_{2.5}$ NAAQS	Pollutant	One year's worth of RFP			One year's worth of progress		
		Reductions target	% OYW (no trading)	% OYW (with trading) [a]	Reductions target	% OYW (no trading)	% OYW (with trading) [a]
	NO_X	15.3	1.1	6.3	8.7	1.9	13.1

[a] The EPA has calculated % OYW (With Trading) for NO_X based on the 6:1 ratio presented in the SJV $PM_{2.5}$ Contingency Measure SIP.

As shown in Table 2, the sum of the emissions reductions from the three contingency measures is approximately 0.5873 tpd direct $PM_{2.5}$ and ranges from 0.1647 tpd to 0.1977 tpd NO_X, depending on the particular $PM_{2.5}$ NAAQS. Without taking into account the substitution principle, these reductions would exceed one year's worth of RFP for direct $PM_{2.5}$ and provide a portion of one year's worth of RFP for NO_X for the 1997 annual $PM_{2.5}$ NAAQS, 2006 24-hour $PM_{2.5}$ NAAQS, and the 2012 annual $PM_{2.5}$ NAAQS, as shown in Table 3. With respect to one year's worth of progress, these reductions would similarly exceed one year's worth of progress for direct $PM_{2.5}$ and provide a portion of one year's worth of progress for NO_X for all three $PM_{2.5}$ NAAQS, as shown in Table 3.

Taking into account the substitution principle, under which, in this case, excess direct $PM_{2.5}$ emissions are substituted for a shortfall in NO_X emissions, the reductions would amount to 100% of one year's worth of RFP for direct $PM_{2.5}$ and the following amounts of one year's worth of RFP for NO_X for each NAAQS: 1997 annual $PM_{2.5}$ NAAQS (6.3%), 2006 24-hour $PM_{2.5}$ NAAQS (1.3%), and 2012 annual $PM_{2.5}$ NAAQS (6.3%). Similarly, the reductions would amount to 100% of one year's worth of progress for direct $PM_{2.5}$ and the following amounts of one year's worth of progress for NO_X for each NAAQS: 1997 annual $PM_{2.5}$ NAAQS (15.7%), 2006 24-hour $PM_{2.5}$ NAAQS (8.8%), and 2012 annual $PM_{2.5}$ NAAQS (13.1%).

While our estimates of the emissions from the contingency measures relative to one year's worth of RFP or progress differ in some respects from those contained in the SJV $PM_{2.5}$ Contingency Measure SIP, our conclusion is the same as the conclusion drawn by the District and CARB, namely, that the emissions reductions would provide for one year's worth of RFP or progress for direct $PM_{2.5}$ but would provide only a portion of one year's worth of RFP or progress for NO_X. Thus, we would expect the State to provide a ''reasoned justification'' to support approval of the contingency measures as meeting the requirements under CAA section 172(c)(9) and 40 CFR 51.1014 for the nonattainment area even though the contingency measures would not provide for the magnitude of emissions reductions recommended by the EPA to comply with the requirements. The District and CARB have included their reasoned justifications in the form of feasibility analyses included as chapters 4 and 5 of the SJV $PM_{2.5}$ Contingency Measure SIP, respectively. We provide our review of the feasibility analyses in the following section of this document.

2. Contingency Measure Feasibility Analyses

The EPA has reviewed the State's infeasibility demonstrations for not adopting contingency measures beyond the residential wood burning, rural open areas, and Smog Check contingency measures, including both the process used by the State and its assessment specific to a wide range of stationary, area, and mobile source categories.[124] Notably, in connection with the EPA's proposed contingency measure FIP for the San Joaquin Valley, the EPA recently prepared a detailed evaluation of source categories and measures that we considered as potential additional contingency measures but determined to be infeasible or otherwise unsuitable for contingency measures. See ''EPA Source Category and Control Measure Assessment and Reasoned Justification Technical Support Document, Proposed Contingency Measures Federal Implementation Plan for the Fine Particulate Matter Standards for San Joaquin Valley, California,'' July 2023 (''EPA's Reasoned Justification TSD''). We have relied heavily on that TSD given its breadth and depth, as well as the expertise of EPA Region IX staff, to review the State's infeasibility demonstration, understand where the State's and the EPA's analyses draw largely similar conclusions, and identify those source categories where the control measure analyses differ. As described in the following paragraphs, the EPA proposes to find that the State's infeasibility demonstrations adequately justify the contingency measures selected by the State to meet the contingency measure requirement under CAA section 172(c)(9) and 40 CFR 51.1014 for the San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS.

In terms of process, both CARB and the District identified and evaluated existing and potential control measures using components of the process recommended in the EPA's Draft Revised Contingency Measures Guidance,[125] even if not necessarily in the same sequence as those recommended by the EPA. As described in section V.B.2 of this proposed rule, for the wide range of stationary and area sources under its jurisdiction, the District described their ongoing stationary source regulatory efforts, identified potential control measures as candidate contingency measures, and analyzed the technological and/or economic feasibility of each candidate measure, including the feasibility of implementing such measures within 60 days and achieving the resulting emission reductions within one to two years.[126] The District also provided more in-depth analysis of potential control measures for five source categories, ultimately adopting measures for two source categories (wood burning fireplaces and wood burning heaters and rural open areas) and providing a reasoned justification for not adopting such measures for the other three source categories (commercial charbroiling, almond harvesting, and oil and gas production combustion equipment). We find that the District employed a reasonable process to identify and assess the feasibility and suitability of potential control measures as contingency measures for stationary and area sources in the San Joaquin Valley.

Similarly, as described in section V.B.2 of this proposed rule, CARB identified potential mobile source control measures, assessed whether

[124] Our summaries of the infeasibility demonstrations are found in section V.B.2 of this document.

[125] EPA's Draft Contingency Measure Guidance, section 4 (''Reasoned Justification for Less Than [One Year's Worth] of Progress'').

[126] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 9–11.

each candidate measure could be implemented within 60 days of a triggering event and emission reductions achieved within one to two years, and then analyzed their technological and/or economic feasibility.[127] Regarding timing of emission reductions from mobile sources, CARB concludes that new engine standards and fleet regulations are not appropriate for contingency measures given the time needed for manufacturers to design, develop, and deploy cleaner engines or equipment at scale, especially for zero-emission equipment.

As described in the EPA's Reasoned Justification TSD,[128] as a general matter, new mobile source engine or vehicle emission standards require significant lead time (more than two years) to allow manufacturers time to retool factories to produce compliant engines or vehicles. Retrofit or replacement requirements also require significant lead time to allow owners and operators to manage the process of retrofitting or replacing old engines or vehicles. Therefore, we agree with CARB that such mobile source control measures would not achieve emission reductions within one to two years of a contingency measure triggering event. Overall, we find that the CARB employed a reasonable process to identify and assess the feasibility and suitability of potential control measures as contingency measures for mobile sources in the San Joaquin Valley and in California more broadly.[129]

Beyond the analytical components employed by CARB and the District that mirror those recommended by the EPA, CARB and the District also evaluated whether they could develop, adopt, and secure EPA approval of SIP submissions, including additional contingency measures, meeting the contingency measure requirements, prior to the September 30, 2024 consent decree deadline for the EPA to promulgate a contingency measures FIP for San Joaquin Valley for the 1997 annual, 2006 24-hour and 2012 $PM_{2.5}$ NAAQS.[130] The EPA finds that such considerations, while important in the broader context of environmental regulation and sanctions in the San Joaquin Valley, are not appropriate for evaluating the feasibility or suitability of potential control measures as contingency measures. Even absent final guidance from the EPA, states are required to adopt and submit contingency measures within the timelines established by the CAA in response to EPA actions, including disapproval of prior contingency measure submissions, as was the case here, effective December 27, 2021.[131] In this instance, however, neither CARB nor the District relied upon the inability to adopt contingency measures and secure EPA approval by the consent decree deadline as the sole justification for not adopting additional contingency measures for any of the relevant source categories.

In addition, in certain instances, the District states that the robust public process necessary to develop and adopt control measures would take more than two years,[132] while CARB states that a state-wide regulatory measure typically needs five years to develop and adopt,[133] and therefore fall outside the one to two-year timeframe recommended in the EPA's Draft Revised Contingency Measures Guidance. While we certainly appreciate the importance of robust public process in developing control measures, inclusive of public process requirements in the CAA and the Administrative Procedures Act, the EPA finds that such timing considerations are not appropriate for assessing the feasibility of potential control measures as contingency measures. As previously noted, states are required to adopt and submit contingency measures within the timelines established by the CAA in response to EPA actions, including disapproval of prior contingency measure submissions.

For each of the stationary and area source categories examined, the EPA agrees with the District's determination that additional control measures cannot feasibly reduce emissions within one to two years. We first describe those source categories where we agree with the bases presented by the District. Then we discuss those source categories where the basis of the EPA's conclusion differs from that of the District, even while the conclusion itself is the same—that the additional control measure evaluated cannot feasibly reduce emissions within one to two years.

The District's analyses and conclusions were substantially the same as those of the EPA for the following source categories: open burning and prescribed/hazard burning (Rules 4103 and 4106), cotton gins (Rule 4204), fuel burning equipment (Rule 4301), flares (Rule 4311), lime kilns (Rule 4313; none operate in the San Joaquin Valley), solid fuel-fired boilers, steam generators, and process heaters (Rule 4352), glass melting furnaces (Rule 4354), asphalt paving and maintenance (Rule 4641; a VOC rule), internal combustion engines (Rule 4702), stationary gas turbines (Rule 4703), residential wood burning (Rule 4901, excluding the Residential Wood Burning Contingency Measure submitted as amendments to the rule), and fugitive dust (Regulation VIII, excluding the Rural Open Areas Contingency Measure submitted as amendments to Rule 8051).[134]

We note that the candidate control measures evaluated for certain sources, such as internal combustion engines, stationary gas turbines, boilers, steam generators, and process heaters, would require installation of costly and engineering-intensive devices (*e.g.,* oxy-fuel fired furnaces and natural gas furnaces equipped with selective catalytic reduction (SCR) for glass melting). As described in the EPA's Reasoned Justification TSD, while these technologies may be available and feasible in some contexts, we found that it would be technologically infeasible for these measures to be implemented and achieve meaningful emission reductions within one to two years.[135] Thus, we agree with the District's determinations that such measures would be technologically infeasible in the context of contingency measures at this time.

We note that the EPA's Reasoned Justification TSD does not present an evaluation of potential contingency measures specifically related to District Rules 4301, 4309, and 4352 and, thus,

[127] SJV $PM_{2.5}$ Contingency Measure SIP, section 5.3 (''Measure Analysis''); and Smog Check Contingency Measure, Appendix A (''Infeasibility Analysis'').

[128] EPA's Reasoned Justification TSD, pp. 143–144.

[129] We note that the EPA's Reasoned Justification TSD contains additional information that presents a comprehensive summary of the emissions inventories for direct $PM_{2.5}$ and NO_X in the San Joaquin Valley, as well as consideration of past recommendations of new control measures or improvements to existing control measures by the EPA and community and environmental groups (whether for purposes of RACM/RACT, BACM/BACT, MSM, attainment and RFP demonstrations, or contingency measures).

[130] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 12–25 and pp. 57–58.

[131] 86 FR 67329 and 86 FR 67343.

[132] SJV $PM_{2.5}$ Contingency Measure SIP, section 4.2 (''District Feasibility Analysis'').

[133] SJV $PM_{2.5}$ Contingency Measure SIP, 57.

[134] We note that, in responding to comments received during the public review of the SJV $PM_{2.5}$ Contingency Measure SIP and Residential Wood Burning Contingency Measure, the District states that, while there are limited opportunities for contingency measures, the District ''will consider additional wood burning curtailments as part of control measure analyses for upcoming [SIPs].'' SJV $PM_{2.5}$ Contingency Measure SIP, Appendix J (''Comments and Responses''), p. J–4. See also EPA's Reasoned Justification TSD, section G.1 (''Residential Fuel Combustion'').

[135] See, *e.g.,* EPA's Reasoned Justification TSD, pp. 9–22 (the EPA's evaluation of contingency measures for boilers, steam generators, and process heaters).

we provide our review and evaluation in this document. With respect to fuel burning equipment (Rule 4301), the SJV $PM_{2.5}$ Contingency Measure SIP notes that the District has adopted more stringent NO_X requirements for specific types of fuel burning equipment that supersede Rule 4301.[136] Potential contingency measures for emission sources related to Rule 4301 are covered in the EPA's evaluation of Rules 4306, 4307, 4308, 4309, 4320, and 4352. Our assessments of Rules 4309 and 4352 are contained in the following paragraphs.

With respect to dryers, dehydrators, and ovens (related to Rule 4309), the District considered controls such as low NO_X burners and determined that such technology could not feasibly be implemented within the two-year timeframe for contingency measures for this category, includes further discussion in appendices F and G of the SJV $PM_{2.5}$ Contingency Measure SIP (*i.e.,* copies of the stationary and area source control evaluations for the 2022 Ozone Plan [137] and the 2018 $PM_{2.5}$ Plan, respectively), and states that, in certain applications (*e.g.,* dehydrators for onions), may have an adverse effect on food product quality.[138] We have reviewed the District's infeasibility demonstration and agree that emissions reductions for this category could not feasibly be achieved within one to two years, and are therefore not suitable for contingency measures. As discussed in Appendix F of the SJV $PM_{2.5}$ Contingency Measure SIP, South Coast Air Quality Management District (AQMD) has recently revised and divided its rules for comparable sources, including amendments to NO_X limits, that are difficult to compare to Rule 4309 given their distinct applicability and provisions (*e.g.,* whether limits are differentiated by operating temperature). The EPA recommends that the District continue to evaluate dryers, dehydrators, and ovens for opportunities to further reduce NO_X emissions (and, as applicable, $PM_{2.5}$ emissions) in developing subsequent plans.

With respect to Rule 4352, the State's submittal notes that the District adopted amendments to Rule 4352 in December 2021, and District analysis associated with the 2021 amendments to Rule 4352 found that all control alternatives that would further reduce emissions require technology that had prohibitively high capital costs and were not cost effective,[139] and have not been widely implemented at facilities subject to Rule 4352. Given these reasons and given that the emission limits included in the 2021 amendments to Rule 4352 are lower than those of other districts' rules, we agree with the District's conclusion with respect to Rule 4352.

For several other source categories, the EPA finds that the contingency measure analyses by the District and the EPA differ in certain respects that warrant further discussion. Notwithstanding these differences, both the District's analyses and the EPA's analyses supporting our recent contingency measure FIP proposal support the conclusion that the measures evaluated cannot feasibly reduce emissions within one to two years. We discuss each of these cases in the paragraphs that follow.

With respect to residential water heaters (Rule 4902) and residential furnaces (Rule 4905), the District evaluated a contingency measure option to adopt electrification requirements (*i.e.,* requiring newly purchased furnaces and water heaters to be zero-emission units) earlier than a commitment by CARB to develop a state-wide building electrification measure that would achieve emission reductions starting in 2030.[140] The District deemed this contingency measure option infeasible, citing the lead time necessary for manufacturers to design and produce electric units, the need for collaboration with energy and building code regulators, consistency with State and local efforts, consideration of housing cost and affordability impacts, and equity considerations for low-income and environmental justice communities.[141] While we note that certain aspects of these factors do not necessarily align with the feasibility criteria outlined in the EPA's Draft Revised Contingency Measures Guidance,[142] the EPA determined that the building electrification contingency measure option would not be feasible because we expect that it would result in negligible emissions reductions within two years after trigger,[143] consistent with the District's suggestion that the attrition-based nature of implementation of this contingency measure option deem the measure infeasible. The EPA also recommended that the District consider developing control measures or programs that would incentivize the early replacement of existing gas space and water heaters with electric appliances, as such actions could significantly reduce emissions from this significant source category in the longer-term future.

With respect to commercial charbroiling (Rule 4692), the District noted that particulate matter control devices are required to be installed and operated on chain-driven commercial charbroilers under Rule 4692. The District evaluated a contingency measure option involving the requirement of particulate matter controls on underfired charbroilers. The District's evaluation includes a detailed cost analysis, concluding that underfired charbroiler contingency measure option is infeasible based on high costs of installation and maintenance, technological infeasibility considerations, lack of availability of specialized staff at restaurants, control equipment fire safety certification concerns, and the lack of demonstrated controls in areas that have adopted underfired charbroiling control measures.[144] The District also described ongoing and upcoming efforts to advance underfired charbroiler emissions control technology and demonstrate its performance in practice. The EPA's evaluation did not present cost information to conclude that an underfired charbroiling contingency measure would be economically infeasible, and we did not include the same considerations regarding lack of availability of specialized staff at restaurants and other technological feasibility concerns presented by the District. However, the EPA determined that an underfired charbroiling contingency measure would be infeasible based on fire safety certification concerns and lack of demonstrated implementation of controls.[145] In addition to recommending that the District and CARB collaborate with control technology manufacturers and industry to develop effective methods for reducing the commercial cooking industry's impact on public health, the EPA strongly encouraged the District to expand its Restaurant Charbroiler

[136] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 13–14.

[137] SJVUAPCD, ''2022 Plan for the 2015 8-hour Ozone Standard,'' adopted December 15, 2022.

[138] SJV $PM_{2.5}$ Contingency Measure SIP, p. 16.

[139] SJVUAPCD, ''Appendix C, Cost Effectiveness Analysis for Proposed Amendments to Rule 4352 (Solid Fuel Fired Boilers, Steam Generators, and Process Heaters,'' December 16, 2021.

[140] SJV $PM_{2.5}$ Contingency Measure SIP, 20–22.

[141] For further discussion of these factors, see CARB, ''2022 State Strategy for the State Implementation Plan,'' adopted September 22, 2022, pp. 101–103 (''Proposed Measures: Residential and Commercial Buildings'').

[142] EPA's Draft Revised Contingency Measures Guidance, pp. 35–38.

[143] EPA's Reasoned Justification TSD, pp. 43–51.

[144] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 32–41.

[145] EPA's Reasoned Justification TSD, pp. 131–136.

Technology Partnership program beyond hot spot counties.

With respect to conservation management practices (Rule 4550), the District describes its commitment in the 2018 $PM_{2.5}$ Plan to evaluate emission reduction opportunities for sources in this category (*e.g.,* emission reductions from fallowed lands and promotion of selection of conservation tillage as a conservation management practice [CMP]), explaining that rule development is ongoing and describing Rule 4550 as an ''on-the-way'' measure.[146] We acknowledge the ongoing efforts by the District to pursue emission reductions from these sources,[147] although we note that the District's use of the ''on-the-way'' term differs from its usage in the Draft Revised Contingency Measures Guidance, where the EPA defines ''on-the-way'' measures as ''the control measures in the nonattainment plan that will be implemented during the upcoming planning period'' (*i.e.,* adopted measures whose implementation is forthcoming in the near-term).[148] However, the EPA conducted its own evaluation of Rule 4550, finding that Rule 4550 contains conservation management practice options that are comparable with the rules identified in other jurisdictions and generally contain the same control measures required in other jurisdictions.[149]

The District also presented an evaluation of dust emissions from almond harvesting, concluding that a contingency measure requiring the replacement of conventional harvesting technology with low dust harvesting technology would be infeasible based on long lead times needed to meet significant increased demand generated by such a measure, prohibitively high cost of equipment, and the need to conduct additional research to better understand the changing landscape in harvesting techniques and associated emissions.[150] The EPA's evaluation determined that such a measure would be infeasible based only on the timing of emissions reductions; while the EPA presented cost effectiveness information for low dust almond harvesters,[151] the EPA did not determine that a low dust harvester replacement contingency measure would be economically infeasible, nor did we determine that any work needed to understand the emissions profile of low dust nut harvesters would disqualify a potential low dust harvester replacement contingency measure.[152]

With respect to oil and gas production combustion equipment (related to District Rules 4306 and 4320), the District evaluated numerous control options including direct control of $PM_{2.5}$ (*e.g.,* electrostatic precipitators or venturi scrubbers), electrification of oilfield steam generators, and solar powered oilfield steam generators.[153] For each of these options, the District provided technological and/or economic feasibility considerations deeming each option infeasible as a contingency measure. The District also evaluated lower emission limits for boilers and steam generators.[154] In this evaluation, the District explained that the EPA has determined that Rule 4306 meets MSM requirements and that Rule 4320 goes beyond MSM by establishing even lower emissions limits. The District noted that equipment operators are already in the process of investing in and installing technology to meet the recently amended Rule 4320 limits and suggests that the time needed to plan and prepare for installation of control equipment to meet lower limits would exceed the one- to two-year timeline for a contingency measure to achieve emissions reductions. The District also claims numerous technological feasibility considerations associated with lowering emission limits for this category. While the District describes a ''lack of EPA recognized SIP-creditable emissions reductions from Rule 4320'' due to the technology advancing nature of Rule 4320,[155] the EPA would recognize SIP-creditable emission reductions for this category if provided with the appropriate information such as records of the number of units complying with Rule 4320 NO_X emission limits and their associated emissions.[156]

The EPA's evaluation focused on lowering emission limits for boilers and steam generators, including identification of lower emission limits adopted by the South Coast AQMD for oilfield steam generators than those adopted in Rule 4306. While the EPA's evaluation does not claim that control requirements required to meet the lower limits would be technologically infeasible altogether (in light of the lower limits adopted by South Coast AQMD), we determined that it would be technologically infeasible to meet the lower limits within the two-year timeframe for contingency measures due to the likely requirement that affected units would need to install SCR to meet the lower limits.

The District also included evaluations for boilers, steam generators, and process heaters in general covered by District Rules 4307 and 4308.[157] The District's assessments for these rules focus on economic and technological feasibility, citing dollar per ton cost effectiveness values for numerous control options and adding technological feasibility concerns for SCONOx/EMx units. The EPA's evaluation for boilers in general does not provide cost effectiveness values to suggest that lower emission limits for boilers, steam generators, and process heaters are economically infeasible. However, as described in the EPA's evaluation, we expect that units required to meet lower limits than those already adopted in Rules 4307 and 4308 would require installation of SCR, which cannot be feasibly achieved within the two-year timeframe for contingency measures.[158]

Similar to our evaluation of the District's feasibility analysis, we have evaluated CARB's feasibility analysis, in part, by comparing the bases and conclusions of the State's analysis against those presented in the EPA's Reasoned Justification TSD.[159] Both CARB and the EPA note the importance of mobile source emissions in the San Joaquin Valley, particularly given that the large majority of NO_X emissions are from mobile sources, and describe the breadth of control measures considered by CARB to reduce direct $PM_{2.5}$ and NO_X emissions for broader CAA purposes in the San Joaquin Valley. These include new vehicle and engine emission standards, for both on-road and non-road applications, which generally apply to manufacturers and

[146] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 23–24.

[147] See, *e.g.,* SJVUAPCD, ''Public Workshop for Potential Amendments to District Rule 4550 (Conservation Management Practices),'' November 7, 2022 (workshop presentation).

[148] EPA's Draft Revised Contingency Measure Guidance, p. 32.

[149] EPA's Reasoned Justification TSD, pp. 86–90.

[150] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 41–43.

[151] EPA's Reasoned Justification TSD, chapter V.

[152] EPA's Reasoned Justification TSD, p. 95.

[153] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 44–47.

[154] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 47–49.

[155] SJV $PM_{2.5}$ Contingency Measure SIP, p. 49.

[156] See also, EPA Region IX, ''Technical Support Document for EPA's Notice of Proposed Rulemaking for the California State Implementation Plan, San Joaquin Valley Unified Air Pollution Control District's Rule 4320, Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr),'' August 19, 2010, p. 8.

[157] SJV $PM_{2.5}$ Contingency Measure SIP, pp. 14–16.

[158] EPA's Reasoned Justification TSD, pp. 9–22.

[159] EPA's Reasoned Justification TSD, section H (''Mobile Sources'').

achieve emission reductions through vehicle turnover; retrofit or replacement requirements for existing vehicles and fleets; and inspection and maintenance (I/M) program requirements, such as those implemented under California's Smog Check program for light-duty passenger cars and trucks, and those entering implementation under California's Heavy-Duty I/M program. We agree that the adopted measures and on-going development of mobile sources measures by CARB, including zero-emission standards, further constrain the opportunities for additional emission reductions via contingency measures.[160]

With respect to contingency measure requirements, CARB examined potential controls across the wide range of mobile source categories, including on-road light-duty passenger cars, trucks, and motorcycles; medium- and heavy-duty trucks and buses and transportation refrigeration units; commercial harbor craft, recreational boats, and ocean going vessels; off-road industrial, construction, and mining equipment; airport ground equipment, port and rail operations, and locomotives; lawn and garden equipment; and space and water heaters. The potential controls considered include pulling forward compliance dates and/or phase-in requirements; setting more stringent standards (often atop recently tightened standards) through mechanisms such as emission standards, emissions caps, thresholds for compliance, testing frequency, making optional standards required, or percentage of sales requirements; and removing exemptions and/or compliance options. In virtually all cases, CARB found that control measures beyond those already adopted or in development to fulfill commitments (*e.g.,* under the 2022 State SIP Strategy) were not technologically feasible.[161] In all cases (except the adopted Smog Check Contingency Measure), CARB found that the measures were not suitable for contingency measures due to lead time to develop, certify, adopt, and/or implement measures that could not be implemented within 60 days of a triggering event and achieve emission reductions within one year of the triggering event.

We have reviewed CARB's specific control measure analyses and agree that such potential control measures are not feasible within the timeframe necessary for contingency measures and, in many cases, are not technologically feasible to the extent that they build upon on-the-books and on-the-way measures that are technology- or market-forcing. Consistent with our evaluation presented in the EPA's Reasoned Justification TSD,[162] the EPA has not identified any engine or vehicle emission standards for consideration as contingency measures. Beyond the wide range of source types and control approaches examined by CARB, the EPA also examined a handful of potential additional controls and concluded that they too were not suitable as contingency measures, including expansion of Enhanced I/M requirements to areas currently subject to Basic I/M or Partial Enhanced I/M requirements in the San Joaquin Valley,[163] provisions to expand the applicability of and add requirements to District Rule 9510 (''Indirect Source Review''),[164] and additional transportation control measures.[165] Therefore, we propose to find that CARB's infeasibility demonstration adequately justifies the contingency measures selected by CARB for the San Joaquin Valley for the 1997 annual, 2006 24-hour and 2012 annual $PM_{2.5}$ NAAQS.

3. Conclusion

Based on our review and proposed approval of the three contingency measures submitted by the State that would achieve the full one year's worth of emission reductions for direct $PM_{2.5}$ and a portion of one year's worth of emission reductions for NO_X (whether using the longstanding RFP method or the new progress method) and our review of and proposed finding that the State's infeasibility demonstrations adequately justify the selection of the three contingency measures, we propose to approve the SJV $PM_{2.5}$ Contingency Measures SIP, the Residential Wood Burning Contingency Measure, the Rural Open Areas Contingency Measure, and the Smog Check Contingency Measure (as applied to the San Joaquin Valley) as meeting the contingency measure requirements of CAA section 172(c)(9) and 40 CFR 51.1014 for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS in the San Joaquin Valley.

VI. Environmental Justice Considerations

Executive Order 12898 (59 FR 7629, February 16, 1994) requires that federal agencies, to the greatest extent practicable and permitted by law, identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations.[166] To identify environmental burdens and susceptible populations in underserved communities in the San Joaquin Valley nonattainment area and to better understand the context of our proposed action on these communities, we conducted a screening-level analysis for $PM_{2.5}$ in the San Joaquin Valley using the EPA's environmental justice (EJ) screening and mapping tool (''EJSCREEN'').[167] The results of this analysis are being provided for informational and transparency purposes.

Our screening-level analysis indicates that all eight counties in the San Joaquin

[160] EPA's Reasoned Justification TSD, pp. 139–142. See also, SJV $PM_{2.5}$ Contingency Measure SIP, pp. 53–56; and Smog Check Contingency Measure, pp. 8–10.

[161] There were three measures that CARB indicated as technologically feasible. One is the Smog Check Contingency Measure that CARB has adopted and submitted to the EPA. A second was a different Smog Check measure that would add requirements for only high mileage vehicles; however, CARB found that the compliance burden would disproportionately fall on low-income populations and disadvantaged communities. SJV $PM_{2.5}$ Contingency Measures SIP, p. 59. The third was to increase the testing frequency under the Heavy-Duty I/M program; however, CARB found that the compliance burden would disproportionately fall on small businesses and low-income populations. SJV $PM_{2.5}$ Contingency Measure SIP, p. 62 and Appendix A, p. 49. In the latter two cases, CARB also found that, even if the measure were technologically feasible, the measures could not be effectuated within the timeframe necessary for contingency measures.

[162] EPA's Reasoned Justification TSD, pp. 138–144.

[163] EPA's Reasoned Justification TSD, section IV.E. In addition, CARB noted in its comment letter on the EPA's proposed contingency measure FIP that, under the I/M measure evaluated by the EPA, 50% of the vehicles that would be newly subject to Enhanced I/M would be in disadvantaged communities whereas only 35% of San Joaquin Valley population live in such disadvantaged communities. Letter dated September 22, 2023, from Steven S. Cliff, Ph.D., Executive Officer, CARB to Martha Guzman, Regional Administrator, EPA Region IX. In other words, the compliance burden would disproportionately fall on low-income populations and disadvantaged communities.

[164] EPA's Reasoned Justification TSD, section IV.B.

[165] EPA's Reasoned Justification TSD, pp. 144–146.

[166] 59 FR 7629 (February 16, 1994).

[167] EJSCREEN provides a nationally consistent dataset and approach for combining environmental and demographic indicators. EJSCREEN is available at *https://www.epa.gov/ejscreen/what-ejscreen.* The EPA used EJSCREEN to obtain environmental and demographic indicators representing each of the eight counties in the San Joaquin Valley. We note that the indicators for Kern County are for the entire county. While the indicators might have slightly different numbers for the San Joaquin Valley portion of the county, most of the county's population is in the San Joaquin Valley portion, and thus the differences would be small. These indicators are included in EJSCREEN reports that are available in the rulemaking docket for this action.

Valley score above the national average for the EJSCREEN ''Demographic Index'' (*i.e.,* ranging from 48% in Stanislaus County to 61% in Tulare County, compared to 36% nationally).[168] [169] The Demographic Index is the average of an area's percent minority and percent low income populations, *i.e.,* the two populations explicitly named in Executive Order 12898.[170] All eight counties also score above the national average for demographic indices of ''linguistically isolated population'' and ''population with less than high school education.''

With respect to pollution, all eight counties (Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare) score at or above the 97th percentile nationally for the $PM_{2.5}$ index and seven of the eight counties in the San Joaquin Valley score at or above the 90th percentile nationally for the $PM_{2.5}$ EJ index (*i.e.,* each county except Stanislaus County, which scores at the 87th percentile nationally), which is a combination of the Demographic Index and the $PM_{2.5}$ index.[171] Most counties also scored above the 80th percentile for each of 11 additional EJ indices included in the EPA's EJSCREEN analysis. In addition, several counties scored above the 90th percentile for certain EJ indices, including, for example, the Ozone EJ Index (Fresno, Kern, Madera, Merced, and Tulare Counties), the National Air Toxics Assessment (NATA) Respiratory Hazard EJ Index (Madera and Tulare Counties), and the Wastewater Discharge Indicator EJ Index (Merced, San Joaquin, Stanislaus, and Tulare Counties).[172]

We have considered the geographic scope of each of the contingency measures that the EPA proposes to approve herein on $PM_{2.5}$ concentrations in each county of the San Joaquin Valley, as well as other environmental considerations that pertain to applicable pollutant (*i.e.,* combustion $PM_{2.5}$, dust $PM_{2.5}$, or NO_X) and the applicable source category or categories.

For residential wood burning, upon a first triggering event, the Rule 4901 contingency measure would lower the No Burn (*i.e.,* curtailment) thresholds for the five non-hot spot counties (Kings, Merced, San Joaquin, Stanislaus, and Tulare) to match the tighter No Burn thresholds for the three hot spot counties (Fresno, Madera, and Kern). A prominent effect of this change would be to provide similar protections to people in the two southern-most non-hot spot counties that record among the highest year-to-year $PM_{2.5}$ design values in the San Joaquin Valley (*i.e.,* Kings County, including Corcoran and Hanford monitoring sites, and Tulare County, including Visalia monitoring site).[173] Were No Burn days to be called in Kings or Tulare County according to the more stringent thresholds, we also anticipate there would be smaller but still beneficial effect in the adjacent Fresno or Kern Counties, depending on the meteorology of the day. Upon a second triggering event, the Rule 4901 contingency measure would further lower the curtailment threshold for unregistered devices in all eight counties of the San Joaquin Valley. This would provide further protections to people throughout the area, including both hot-spot and non-hot spot counties, including those that record among the highest year-to-year $PM_{2.5}$ design values in the San Joaquin Valley.[174]

Where these direct $PM_{2.5}$ emission reductions from combustion occur, we also note that they do not require further chemical transformation in the atmosphere to form $PM_{2.5}$ (*i.e.,* the benefit is immediate) and, as they include fine particulate matter under one micron and toxic air chemicals, the reduction of such sub-micron particles would similarly reduce exposure of all residents in these areas, including minority and low-income populations to these environmental stressors. These reductions would also specifically reduce emissions on the winter days with the highest ambient $PM_{2.5}$ levels.

For open areas, the Rule 8051 contingency measure, if triggered, would lower the applicability threshold for the rural open area requirements of Rule 8051 (*i.e.,* for parcels having at least 1,000 square feet of disturbed soil) from 3.0 acres to 1.0 acre. Based on our analysis of land use to date, such rural open areas are found in all counties of the San Joaquin Valley, though with some variation from county to county consistent with overall land use types (*e.g.,* San Joaquin County has the smallest proportion of rural open areas, while Madera County has the highest proportion of rural open areas). Furthermore, there is variation in the number of rural open areas that would be newly subject to the rule, *i.e.,* those between 1.0 to 3.0 acres in size (*e.g.,* Kern County has the most total rural open area acreage from parcels between 1.0 to 3.0 acres in size, while Tulare County has the least). Given the overall land use and emission factors,[175] and assuming roughly equal levels of activity in each county (*i.e.,* soil disturbances over 1,000 square feet), we anticipate that the proposed contingency measure would provide air quality benefits in all counties of the San Joaquin Valley, with most air quality benefits occuring in Fresno, Kern, Kings, and Madera Counties.

Given that Rule 8051 for open areas was originally introduced as a PM_{10} control measure, we anticipate that the proposed measure would provide co-benefits to limiting PM_{10} levels in the San Joaquin Valley, with the same

[168] EPA Region IX, ''EJSCREEN Analysis for the Eight Counties of the San Joaquin Valley Nonattainment Area,'' August 2022.

[169] By comparison, the eight counties score above the State average for the EJSCREEN ''Demographic Index'' (*i.e.,* ranging from 52% in Stanislaus County to 71% in Tulare County, compared to 47% in California).

[170] EJSCREEN reports environmental indicators (*e.g.,* air toxics cancer risk, Pb paint exposure, and traffic proximity and volume) and demographic indicators (*e.g.,* people of color, low income, and linguistically isolated populations). The score for a particular indicator measures how the community of interest compares with the state, the EPA region, or the national average. For example, if a given location is at the 95th percentile nationwide, this means that only five percent of the U.S. population has a higher value than the average person in the location being analyzed. EJSCREEN also reports EJ indexes, which are combinations of a single environmental indicator with the EJSCREEN Demographic Index. For additional information about environmental and demographic indicators and EJ indexes reported by EJSCREEN, see EPA, ''EJSCREEN Environmental Justice Mapping and Screening Tool—EJSCREEN Technical Documentation,'' section 2 (September 2019).

[171] By comparison, two counties score at or above the 97th percentile in California for the $PM_{2.5}$ index and five counties score at or above the 80th percentile in California for the $PM_{2.5}$ EJ index (rather than seven of eight counties that score at or above the 90th percentile nationally).

[172] Notably, Tulare County scores above the 90th percentile on six of the 12 EJ indices in the EPA's EJSCREEN analysis, including the $PM_{2.5}$ EJ Index, which is the highest count among all San Joaquin Valley counties.

[173] For example, the certified 2020–2022 $PM_{2.5}$ design value for Visalia (AQS Site ID 061072003) is 18.4 μg/m^3 for the 2012 annual $PM_{2.5}$ NAAQS and 65 μg/m^3 for the 2006 24-hour $PM_{2.5}$ NAAQS. EPA design value workbook dated May 23, 2023, ''PM25_DesignValues_2020_2022_FINAL_05_23_23.xlsx,'' worksheets ''Table5a. Site Status Ann'' and ''Table5b.Site Status 24hr.'' The certified design value includes all available data; no data flagged for exceptional events have been excluded. The EPA's Air Quality System (AQS) contains ambient air pollution data collected by federal, state, local, and tribal air pollution control agencies from thousands of monitors. More information is available at *https://www.epa.gov/aqs.*

[174] For example, the certified 2020–2022 $PM_{2.5}$ design value for Bakersfield-Airport (Planz) (AQS Site ID 060290016) is 18.8 μg/m^3 for the 2012 annual $PM_{2.5}$ NAAQS and 61 μg/m^3 for the 2006 24-hour $PM_{2.5}$ NAAQS. EPA design value workbook dated May 23, 2023, ''PM25_DesignValues_2020_2022_FINAL_05_23_23.xlsx,'' worksheets ''Table5a. Site Status Ann'' and ''Table5b.Site Status 24hr.'' The certified design value includes all available data; no data flagged for exceptional events have been excluded.

[175] For further discussion of the land use and emission factors for open areas in the San Joaquin Valley, see EPA Region IX, ''Technical Support Document, Proposed Contingency Measures Federal Implementation Plan for the Fine Particulate Matter Standards for San Joaquin Valley, California,'' July 2023, section III.E.

geographical distribution as discussed herein for direct $PM_{2.5}$ emission reductions.[176]

Lastly, we anticipate that the Smog Check Contingency Measure (discussed in more detail in our separate proposed rule),[177] if triggered, would reduce NO_X and VOC emissions from light-duty vehicles throughout the San Joaquin Valley. Such emission reductions would provide air quality benefits in all counties of the San Joaquin Valley and especially along roadways with the highest vehicle miles traveled, including the major freeways (*e.g.,* California Highway 99) and urban areas (*e.g.,* Bakersfield, Fresno, Stockton, Visalia) that intersect minority populations and low-income populations throughout the San Joaquin Valley.

VII. Proposed Action and Request for Public Comment

For the reasons described in sections IV and V of this document, and under CAA section 110(k)(3), the EPA proposes to approve two SIP revisions submitted by CARB on June 8, 2023, and October 16, 2023, for the San Joaquin Valley to address the contingency measure SIP requirements for San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS. The SIP submissions include the contingency measure plan element for San Joaquin Valley for the relevant $PM_{2.5}$ NAAQS (referred to herein as the ''SJV $PM_{2.5}$ Contingency Measure SIP'') and two specific contingency measures, referred to herein as the Residential Wood Burning Contingency Measure and the Rural Open Areas Contingency Measure. We are proposing to approve the SJV $PM_{2.5}$ Contingency Measure SIP as meeting the applicable requirements of CAA section 172(c)(9) and 40 CFR 51.1014 for San Joaquin Valley for the applicable $PM_{2.5}$ NAAQS based on the infeasibility demonstrations that are provided in the submission and based on our proposed approval of the contingency measures. The Residential Wood Burning Contingency Measure and the Rural Open Areas Contingency Measure are included in amendments to SJVUAPCD Rule 4901 (''Wood Burning Fireplaces and Wood Burning Heaters'') and Rule 8051 (''Open Areas''), respectively. We are proposing to approve the two specific contingency measures because they meet the requirements under CAA section 172(c)(9) and 40 CFR 51.1014 for such measures. We will accept comments from the public on this proposal until January 19, 2024.

If we finalize this action as proposed, our action will resolve the disapproval of the contingency measure plan elements for San Joaquin Valley for the 1997 annual, 2006 24-hour, and 2012 annual $PM_{2.5}$ NAAQS, and our action will be codified through revisions to 40 CFR 52.220, ''Identification of plan—in part'' and 40 CFR 52.237, ''Part D Disapproval.'' In conjunction with our final approval into the SIP of the submitted amended versions of SJVUAPCD Rules 4901 and 8051, we would remove from the SIP the previously approved versions of SJVUAPCD Rules 4901 and 8051. Lastly, if we finalize our action as proposed, our FIP obligation arising from our December 6, 2018 finding of failure to submit will be terminated, and thus, we will no longer be obligated to finalize our August 8, 2023 proposed contingency measure FIP for San Joaquin Valley.

VIII. Incorporation by Reference

In this rulemaking, the EPA is proposing to include in a final EPA rule regulatory text that includes incorporation by reference. In accordance with requirements of 1 CFR 51.5, the EPA is proposing to incorporate by reference SJVUAPCD Rule 4901 (''Wood Burning Fireplaces and Wood Burning Heaters''), amended May 18, 2023, and Rule 8051 (''Open Areas''), amended September 21, 2023, identified and discussed in sections IV.A and IV.B of this preamble and that include revisions to meet the contingency measure requirements under part D of title I of the CAA. The EPA has made, and will continue to make, these materials available through *https://www.regulations.gov* and at the EPA Region IX Office (please contact the person identified in the **FOR FURTHER INFORMATION CONTACT** section of this preamble for more information).

IX. Statutory and Executive Order Reviews

Under the Clean Air Act, the Administrator is required to approve a SIP submission that complies with the provisions of the Act and applicable Federal regulations. 42 U.S.C. 7410(k); 40 CFR 52.02(a). Thus, in reviewing SIP submissions, the EPA's role is to approve state choices, provided that they meet the criteria of the Clean Air Act. Accordingly, this proposed action merely proposes to approve a state plan and related measures as meeting Federal requirements and does not impose additional requirements beyond those imposed by state law. For that reason, this proposed action:

- Is not a significant regulatory action subject to review by the Office of Management and Budget under Executive Orders 12866 (58 FR 51735, October 4, 1993) and 14094 (88 FR 21879, April 11, 2023);
- Does not impose an information collection burden under the provisions of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*);
- Is certified as not having a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*);
- Does not contain any unfunded mandate or significantly or uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4);
- Does not have federalism implications as specified in Executive Order 13132 (64 FR 43255, August 10, 1999);
- Is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997) because it proposes to approve a state program;
- Is not a significant regulatory action subject to Executive Order 13211 (66 FR 28355, May 22, 2001); and
- Is not subject to requirements of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) because application of those requirements would be inconsistent with the Clean Air Act.

In addition, the SIP is not approved to apply on any Indian reservation land or in any other area where the EPA or an Indian tribe has demonstrated that a tribe has jurisdiction. In those areas of Indian country, the rule does not have tribal implications and will not impose substantial direct costs on tribal governments or preempt tribal law as specified by Executive Order 13175 (65 FR 67249, November 9, 2000).

Executive Order 12898 (Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations, 59 FR 7629, Feb. 16, 1994) directs Federal agencies to identify and address ''disproportionately high and adverse human health or environmental effects'' of their actions on minority populations and low-income populations to the

[176] We also note that environmental and community groups have recommended that fugitive dust sources in the San Joaquin Valley be subject to specific requirements rather than having the option to select from a menu of control requirements in Rule 8011 (where the definition for open areas is found). Letter dated May 18, 2022, from Tom Frantz, Association of Irritated Residents, et al., to Michael S. Regan, EPA Administrator, Attachment B, 7. The proposed measure would not alter the existing structure but rather tighten the applicability threshold for rural open areas.

[177] EPA, ''Air Plan Revision; California; Motor Vehicle Inspection and Maintenance Program Contingency Measure,'' Proposed rule, published in this **Federal Register**.

greatest extent practicable and permitted by law. The EPA defines environmental justice (EJ) as ''the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.'' The EPA further defines the term fair treatment to mean that ''no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental, and commercial operations or programs and policies.''

The EPA performed an environmental justice analysis, as is described in section VI of this proposed rule, titled ''Environmental Justice Considerations.'' The analysis was done for the purpose of providing additional context and information about this rulemaking to the public, not as a basis of the action. Due to the nature of the action being taken here, this action is expected to have a neutral to positive impact on the air quality of the affected area. In addition, there is no information in the record upon which this decision is based inconsistent with the stated goal of E.O. 12898 of achieving environmental justice for people of color, low-income populations, and Indigenous peoples.

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Ammonia, Incorporation by reference, Intergovernmental relations, Nitrogen dioxide, Particulate matter, Reporting and recordkeeping requirements, Sulfur dioxide, Volatile organic compounds.

Authority: 42 U.S.C. 7401 *et seq.*

Dated: December 12, 2023.

Martha Guzman Aceves,

Regional Administrator, Region IX.

[FR Doc. 2023–27686 Filed 12–19–23; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R5–ES–2023–0179; FF09E21000 FXES1111090FEDR 245]

RIN 1018–BH06

Endangered and Threatened Wildlife and Plants; Endangered Species Status for West Virginia Spring Salamander and Designation of Critical Habitat

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to list the West Virginia spring salamander (*Gyrinophilus subterraneus*), an amphibian species from Greenbrier County, West Virginia, as an endangered species and to designate critical habitat under the Endangered Species Act of 1973, as amended (Act). This determination also serves as our 12-month finding on a petition to list the West Virginia spring salamander. After a review of the best available scientific and commercial information, we find that listing the species is warranted. We also propose to designate critical habitat for the West Virginia spring salamander under the Act. In total, approximately 3.5 kilometers (2.2 miles) in Greenbrier County, West Virginia, fall within the boundaries of the proposed critical habitat designation. We announce the availability of a draft economic analysis of the proposed designation of critical habitat for the West Virginia spring salamander. If we finalize this rule as proposed, it would extend the Act's protections to the species and its designated critical habitat.

DATES: We will accept comments received or postmarked on or before February 20, 2024. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES,** below) must be received by 11:59 p.m. eastern time on the closing date. We must receive requests for a public hearing, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by February 5, 2024.

ADDRESSES: You may submit comments by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal: *https://www.regulations.gov.* In the Search box, enter FWS–R5–ES–2023–0179, which is the docket number for this rulemaking. Then, click on the Search button. On the resulting page, in the panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on ''Comment.''

(2) *By hard copy:* Submit by U.S. mail to: Public Comments Processing, Attn: FWS–R5–ES–2023–0179, U.S. Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We request that you send comments only by the methods described above. We will post all comments on *https://www.regulations.gov.* This generally means that we will post any personal information you provide us (see Information Requested, below, for more information).

Availability of supporting materials: Supporting materials, such as the species status assessment report, are available on the Service's website at *https://www.fws.gov/office/west-virginia-ecological-services,* at *https://www.regulations.gov* at Docket No. FWS–R5–ES–2023–0179, or both. For the proposed critical habitat designation, the coordinates or plot points or both from which the maps are generated are included in the decision file for this critical habitat designation and are available at *https://www.regulations.gov* at Docket No. FWS–R5–ES–2023–0179 and on the Service's website at *https://www.fws.gov/office/west-virginia-ecological-services.*

FOR FURTHER INFORMATION CONTACT: Jennifer Norris, Field Supervisor, U.S. Fish and Wildlife Service, West Virginia Ecological Services Field Office, 6263 Appalachian Highway, Davis, WV 26260; telephone 304–866–3858. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States. Please see Docket No. FWS–R5–ES–2023–0179 on *https://www.regulations.gov* for a document that summarizes this proposed rule.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act (16 U.S.C. 1531 *et seq.*), a species warrants listing if it meets the definition of an endangered species (in danger of extinction throughout all or a significant portion of its range) or a threatened species (likely to become an

Symptoms | Prevention Tips | Resources | Community Toolkit | History

Message from the Director

Valley Fever affects thousands of residents in Kern County every year, and its impact can be devastating. As someone who has personally faced the challenges of this illness, I can speak to the gravity of its effects. In May of 2024, I was diagnosed with a rare and severe form of Valley Fever called cocci meningitis. Cocci meningitis is a permanent Valley Fever infection in the brain and spine. This experience has given me an intimate understanding of the long-term consequences Valley Fever can have on our health, as well as the challenges—both positive and negative—that accompany antifungal treatment.

While it is easy to become complacent or desensitized to the warnings about Valley Fever, it is crucial that we remain vigilant. The symptoms of Valley Fever can often be mistaken for other illnesses, but the earlier it is diagnosed, the better our chances of preventing severe complications. I encourage everyone to familiarize themselves with the symptoms of Valley Fever and take them seriously. If you are experiencing symptoms, ask your doctor for a Valley Fever test.

Early diagnosis and treatment can make a significant difference in your health outcome. Let's all work together to raise awareness, promote early detection, and reduce the impact that Valley Fever has on our community. Thank you for visiting our website, and for taking the time to learn more about Valley Fever. Your health matters, and by staying informed, you can protect yourself and your loved ones in our community.

— Brynn Carrigan, Director of Public Health Services

Valley Fever, also called coccidioidomycosis or "cocci," is a disease caused by a fungus that grows in soil and dirt in parts of California and the southwestern U.S. When the soil is disturbed by wind or activity, tiny fungal spores can become airborne and be breathed in, potentially making people and animals sick. The infection usually affects the lungs, causing symptoms like cough, fever, chest pain, and fatigue. While some may experience mild or no symptoms, others can develop severe illness. Early detection is key—if you've had a lingering cough, fever, or painful breathing for more than two weeks, ask your doctor about Valley Fever. It's in the air. Be aware!

Quon Louey

Executive Director, Telehealthdocs

Learn More

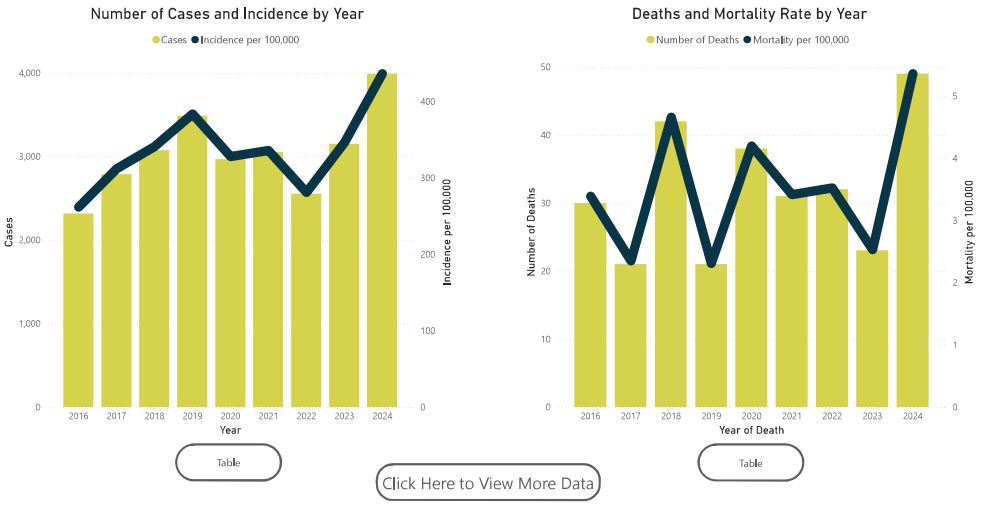
Valley Fever: Many Faces, Many Stories

Valley Fever doesn't discriminate—it can affect anyone. The tiny fungal spores that cause it are carried in the air, stirred up by wind or dust, and breathed in without anyone realizing it. Some people may only experience mild symptoms, like a lingering cough or fatigue, while others face severe illness that can last for months or even years. No two experiences are the same.

Behind every case of Valley Fever is a real person with a story to tell—a mother, a teacher, a director, a neighbor. Each journey is different. Their voices bring awareness. Their stories bring hope. These are the faces of Valley Fever.

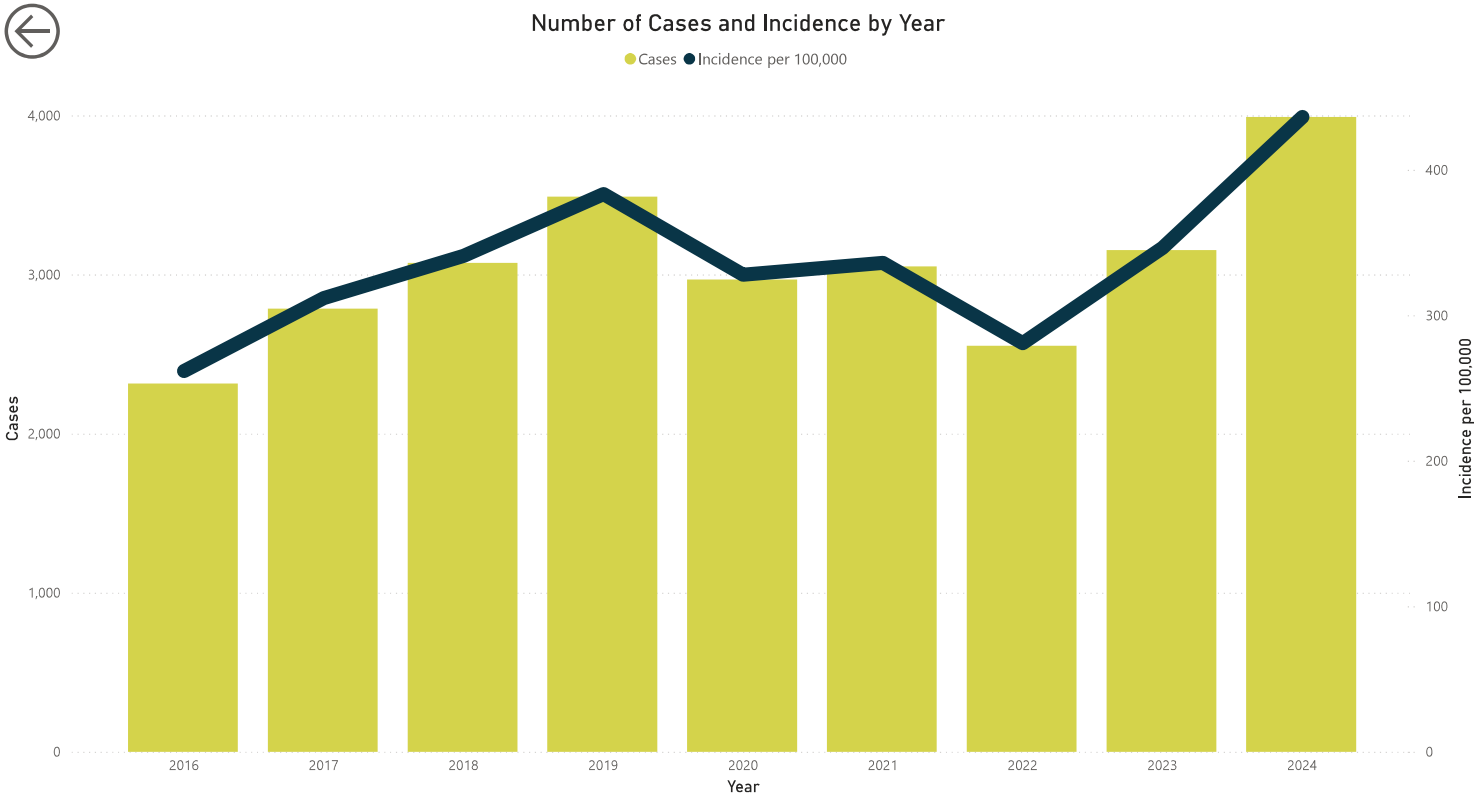
Have a story you'd like to share?

Email Us



Do you have a question about Valley Fever? Email: valdovinosli@kerncounty.com

Return to Previous Screen



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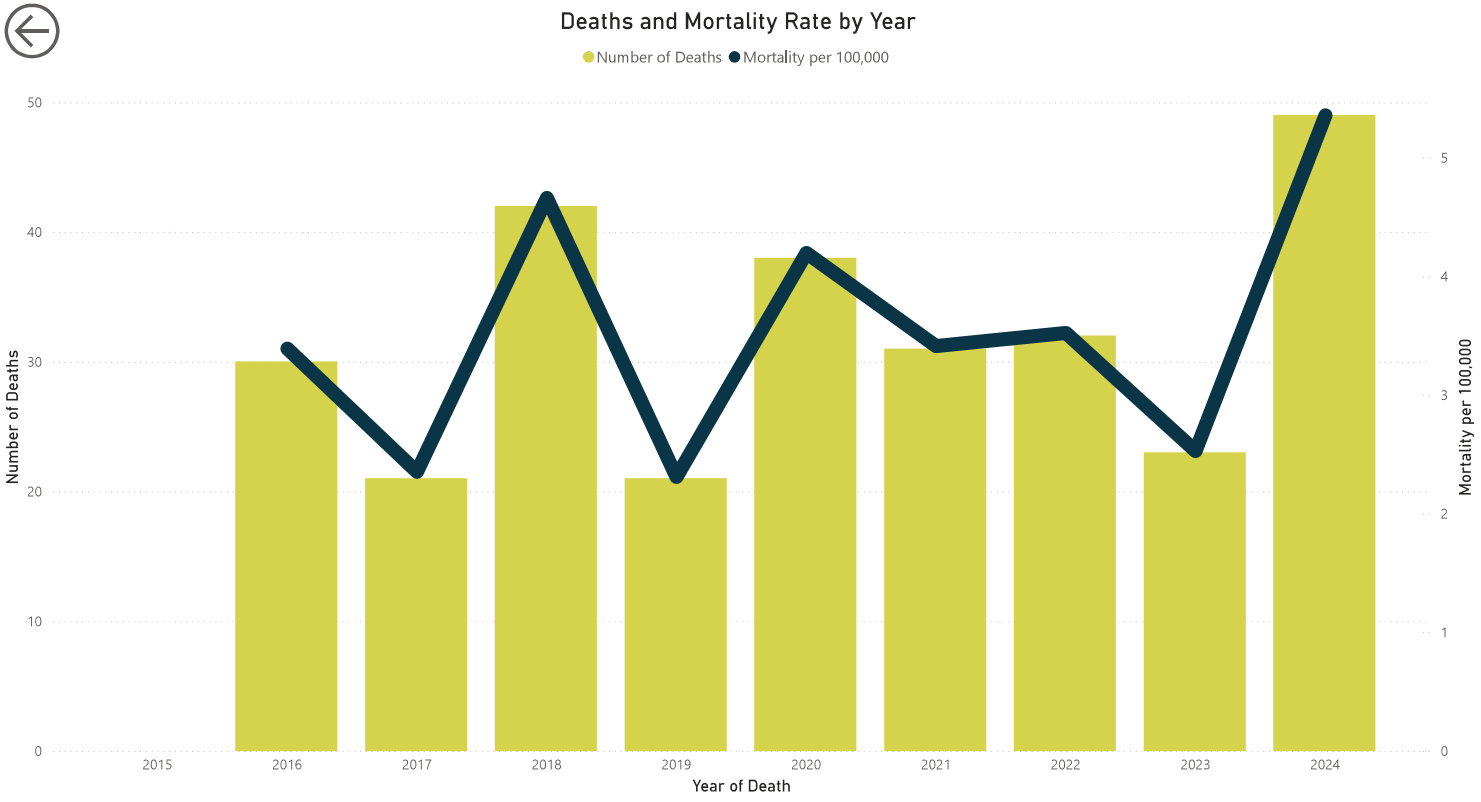


Valley Fever cases reach record-high in 2024, Kern County Public Health data shows

bakersfieldnow.com/news/local/valley-fever-cases-reach-record-high-in-2024-kern-county-public-health-data-shows-public-health-california

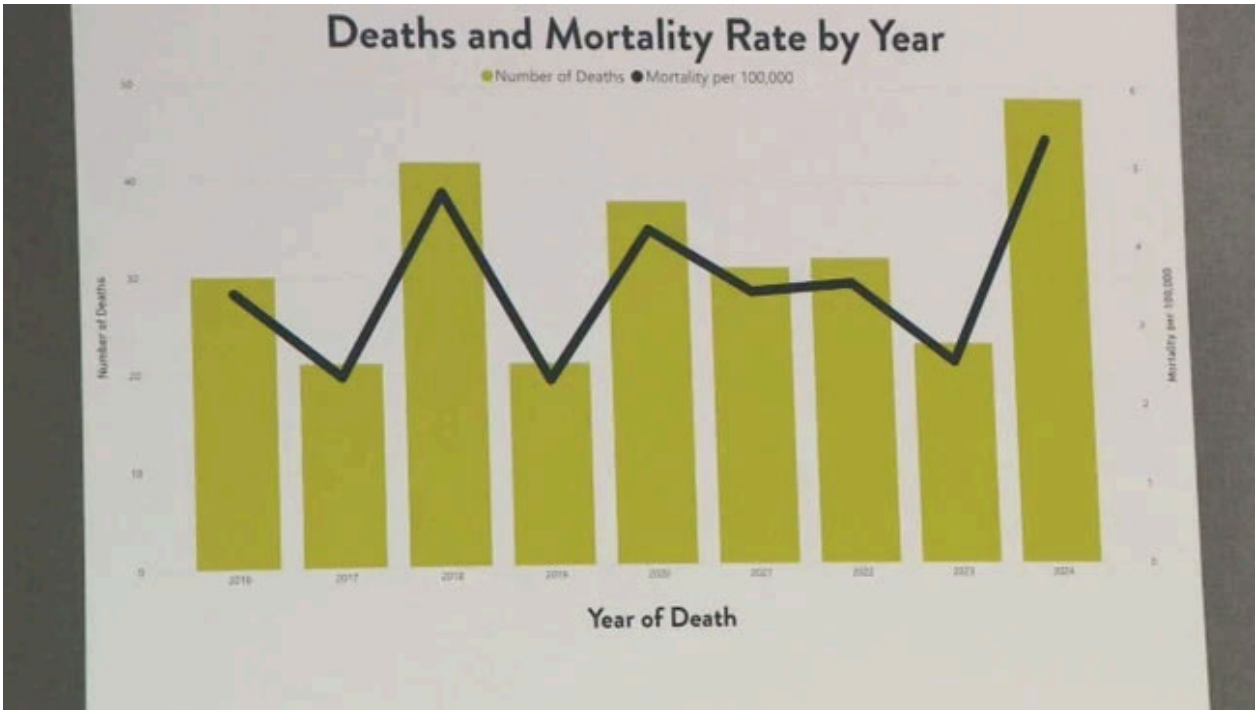
Please ensure Javascript is enabled for purposes of website accessibility

Valley Fever cases and deaths reach record-high in 2024, Kern Co. Public Health data shows

by Michael Patterson, Eyewitness News

Fri, April 4th 2025 at 5:12 PM
Updated Fri, April 4th 2025 at 5:17 PM

A bar chart showing the number of Valley Fever cases in Kern County since 2016. A record number of cases were confirmed in Kern County residents in 2024.



5

VIEW ALL PHOTOS

A bar chart showing the number of Valley Fever cases in Kern County since 2016. A record number of cases were confirmed in Kern County residents in 2024.

BAKERSFIELD, Calif. (KBAK/KBFX) — Cases and deaths from Valley Fever reached the highest in recorded history in 2024, according to new data released Thursday by Kern County Public Health.

The data shows that 3,990 cases of Valley Fever were identified in Kern County residents last year and 49 people died because of it. It's a shocking rise compared to 2023, which saw just 3,152 cases and 23 deaths.

While public health officials stress that about 60% of people who become infected with Valley Fever exhibit no symptoms, some will develop severe symptoms like cocci meningitis that is a life-long infection in the brain and spine.

The numbers were released during a press conference by public health officials to kick off Valley Fever Month, aiming to raise awareness of the disease locally.

Kern County Public Health Director Brynn Carrigan did not mince words when talking about the most recent data.

"Sadly we announce 2024 as the year Valley Fever has had the most devastating impact on the residents of Kern County," Carrigan said.

Valley Fever is caused by a fungus that grows in soil and dirt in parts of California and other southwestern states like Arizona. While it is prevalent in other regions, the Central Valley is hit particularly hard.

Public health officials believe it could potentially get worse due to climate change and prolonged drought cycles that plagued the region in recent years.

"Data shows that in the two years following a drought, cases of Valley Fever rise. With the second year being the highest," said Paul Rzucidlo, Assistant Division Director of Kern County Health Services. "After the drought beginning in 2020, heavy rains in 2022 were followed by rising case counts in 2023 and 2024."

To view the latest data on the spread of Valley Fever in Kern County, you can view the Valley Fever Dashboard.

Recirculated
Draft Environmental Impact Report

SCH# 2009051005

Volume 1

Chapters 1 through 10

99 HOUGHTON INDUSTRIAL PARK PROJECT
By McIntosh & Associates

General Plan Amendment 1, 143-07;
Zone Change Case 2, Map 143-07;
Conditional Use Permit 5, Map 143-07;
Ag Preserve No. 13 – Excl.

Kern County
Planning and Natural Resources Department
Bakersfield, California

October 2019

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Lorelei H. Oviatt, AICP, Director
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Bakersfield, CA 93301-2323
Phone: (661) 862-8600
Fax: (661) 862-8601 TTY Relay 1-800-735-2929
Email: planning@co.kern.ca.us
Web Address: http://pcd.kerndsa.com/

PLANNING AND NATURAL RESOURCES DEPARTMENT

Planning
Community Development
Administrative Operations

November 1, 2019

File: GPA 1, ZCC 2, Map 143-07;
CUP 5, Map 143-07;
Ag Preserve No. 13 – Excl.

ADDRESSEE LIST (See Distribution List)

Re: Recirculated Draft Environmental Impact Report for the 99 Houghton Industrial Park Project by McIntosh & Associates (PP16132)

Dear Interested Party:

The 99 Houghton Industrial Park Project Environmental Impact Report was originally circulated for public comment from February 13, 2018, with a comment closing date of April 2, 2018, by the Kern County Planning Department acting as the lead agency. On March 13, 2018, prior to the end of the original comment period, the project was formally withdrawn from circulation. The County has received and considered written comments that were received after the close of the public comment period. County staff has determined that changes should be made in the Draft EIR that was originally circulated for public comment. In some cases changes have been made to the project and in some cases new or revised information or analysis has been included in the Recirculated Draft EIR.

The Guidelines adopted by the Governor's Office of Planning and Research for the California Environmental Quality Act (Guidelines) provide that a lead agency is required to recirculate an environmental impact report when *significant new information* is added to an EIR after public review of the Draft EIR has begun. New information can include changes in the project description, changes in the environmental setting, as well as other additional data or information. This information may relate to new environmental impacts, severity of such impacts, alternatives or mitigation. Recirculation of an EIR is covered by CEQA Guidelines Section 15088.5.

As mandated by State law, the minimum public review period for this document is 45 days. CEQA Guidelines Section 15088.5 (f) (1) provides that when an Environmental Impact Report (EIR) is substantially revised and the entire EIR is circulated, Kern County, as lead agency, may require that reviewers submit new comments, and the lead agency need not respond to those comments received during the earlier circulation period. Kern County will therefore respond in the Final Recirculated EIR only to new comments received regarding this Recirculated Draft EIR received during this comment period

The Recirculated Draft Environmental Impact Report (RDEIR) was prepared for the above-noted land use applications to allow for the development of an industrial park on approximately 314 acres in unincorporated Kern County. The proposed project requires a General Plan Amendment (GPA) to the Land Use Element; a Zone Change (ZCC); a Conditional Use Permit (CUP); and a petition for Exclusion from the County's Agricultural Preserve No. 13. The project site is generally bounded by South Union Avenue on the east, State Route 99 on the west, DiGiorgio Road to the north, and Houghton Road to the south.

The Kern County Planning and Natural Resources Department, as Lead Agency, has determined that preparation of an Environmental Impact Report would be appropriate for the referenced project. Enclosed is a copy of the Recirculated Draft EIR.

If we have not received a reply from you by **December 16, 2019, at 5:00 P.M.**, we will assume that you have no comments regarding this Draft EIR.

Should you have any questions regarding this project, please do not hesitate to contact me at (661) 862-5015 or via email at CRojas@kerncounty.com

Sincerely,

Carlos E. Rojas, Planner III
Advanced Planning Division

GPA # 1 Map # 143-07
ZCC # 2 Map # 143-07
CUP # 5 & 6 Map # 143-07
es (10/10/2019)
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AGENCIES

City of Arvin
P.O. Box 548
Arvin, CA 93203

Bakersfield City Planning Dept
1715 Chester Avenue
Bakersfield, CA 93301

Bakersfield City Public Works Dept
1501 Truxtun Avenue
Bakersfield, CA 93301

California City Planning Dept
21000 Hacienda Blvd.
California City, CA 93515

Delano City Planning Dept
P.O. Box 3010
Delano, CA 93216

City of Maricopa
P.O. Box 548
Maricopa, CA 93252

City of McFarland
401 West Kern Avenue
McFarland, CA 93250

City of Ridgecrest
100 West California Avenue
Ridgecrest, CA 93555

City of Shafter
336 Pacific Avenue
Shafter, CA 93263

City of Taft
Planning & Building
209 East Kern Street
Taft, CA 93268

City of Tehachapi
Attn: John Schlosser
115 South Robinson Street
Tehachapi, CA 93561-1722

City of Wasco
764 E Street
Wasco, CA 93280

Inyo County Planning Dept
P.O. Drawer "L"
Independence, CA 93526

Kings County Planning Agency
1400 West Lacey Blvd, Bldg 6
Hanford, CA 93230

Los Angeles Co Reg Planning Dept
320 West Temple Street
Los Angeles, CA 90012

San Bernardino Co Planning Dept
385 North Arrowhead Avenue, 1st Floor
San Bernardino, CA 92415-0182

San Luis Obispo Co Planning Dept
Planning and Building
976 Osos Street
San Luis Obispo, CA 93408

Santa Barbara Co Resource Mgt Dept
123 East Anapamu Street
Santa Barbara, CA 93101

Tulare County Planning & Dev Dept
5961 South Mooney Boulevard
Visalia, CA 93291

Ventura County RMA Planning Div
800 South Victoria Avenue, L1740
Ventura, CA 93009-1740

U.S. Bureau of Land Management
Caliente/Bakersfield
3801 Pegasus Drive
Bakersfield, CA 93308-6837

U. S. Fish & Wildlife Service
Division of Ecological Services
2800 Cottage Way #W-2605
Sacramento, CA 95825-1846

Environmental Protection Agency
Region IX Office
75 Hawthorn Street
San Francisco, CA 94105

U.S. Dept of Agriculture/NRCS
5080 California Avenue, Ste 150
Bakersfield, CA 93309-0711

State Air Resources Board
Stationary Resource Division
P.O. Box 2815
Sacramento, CA 95812

So. San Joaquin Valley Arch Info Ctr
California State University of Bkfd
9001 Stockdale Highway
Bakersfield, CA 93311

Caltrans/Dist 6
Planning/Land Bank Bldg.
P.O. Box 12616
Fresno, CA 93778

State Clearinghouse
Office of Planning and Research
1400 - 10th Street, Room 222
Sacramento, CA 95814

State Dept of Conservation
Director's Office
801 "K" Street, MS 24-01
Sacramento, CA 95814-3528

State Dept of Conservation
Division of Oil & Gas
4800 Stockdale Highway, Ste 108
Bakersfield, CA 93309

State Dept of Conservation
Division of Oil & Gas
801 "K" Street, MS 20-20
Sacramento, CA 95814-3530

State Dept of Conservation
Office of Land Conservation
801 "K" Street, MS 18-01
Sacramento, CA 95814

California State University
Bakersfield - Library
9001 Stockdale Highway
Bakersfield, CA 93309

California Fish & Wildlife
1234 East Shaw Avenue
Fresno, CA 93710

State Dept of Food & Agriculture
1220 "N" Street
Sacramento, CA 95814

California Highway Patrol
Planning & Analysis Division
P.O. Box 942898
Sacramento, CA 94298-0001

Integrated Waste Management
P.O. Box 4025, MS #15
Sacramento, CA 95812-4025

California Regional Water Quality
Control Board/Central Valley
Region
1685 E Street
Fresno, CA 93706-2020

CalRecycle
Dept of Resources, Recycling, and
Recovery
1001 "I" Street
Sacramento, CA 95812

Kern County
Agriculture Department

Kern County Administrative Officer

Kern County Public Works
Department/
Building &
Development/Floodplain

Kern County Public Works
Department/
Building & Development/Survey

Kern County
Env Health Services Department

Kern County Fire Dept
David Witt, Interim Fire Chief

Kern County Fire Dept
Cary Wright, Fire Marshall

Kern County Library/Beale
Local History Room

Kern County Library/Beale
Andie Sullivan

Kern County Parks & Recreation

Kern County Sheriff's Dept
Administration

Kern County Public Works
Department/
Building &
Development/Development Review

Kern County Public Works
Department/Operations &
Maintenance/Regulatory
Monitoring & Reporting

Gulf Oil Expl & Prod Co
P.O. Box 1392
Bakersfield, CA 93302

Kern High School Dist
5801 Sundale Avenue
Bakersfield, CA 93309

General Shafter School Dist
1825 Shafter Road
Bakersfield, CA 93313

Panama-Buena Vista School Dist
4200 Ashe Road
Bakersfield, CA 93313

Kern County Superintendent of
Schools
Attention Mary Baker
1300 17th Street
Bakersfield, CA 93301

KernCOG
1401 19th Street - Suite 300
Bakersfield, CA 93301

Local Agency Formation
Comm/LAFCO
5300 Lennox Avenue, Suite 303
Bakersfield, CA 93309

San Joaquin Valley
Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, CA 93726

AT&T California
OSP Engineering/Right-of-Way
4540 California Avenue, 4th Floor
Bakersfield, CA 93309

Boron Chamber of Commerce
27217 Carmichael Street
Boron, CA 93516

Defenders of Wildlife/
Kim Delfino, California Dir
980 - 9th Street, Suite 1730
Sacramento, CA 95814

Sierra Club/Kern Kaweah Chapter
P.O. Box 3357
Bakersfield, CA 93385

Southern California Gas Co
Transportation Dept
9400 Oakdale Avenue
Chatsworth, CA 91313-6511

David Laughing Horse Robinson
P.O. Box 20849
Bakersfield, CA 93390

Santa Rosa Rancheria
Ruben Barrios, Chairperson
P.O. Box 8
Lemoore, CA 93245

Tubatulabals of Kern County
Attn: Robert Gomez, Chairperson
P.O. Box 226
Lake Isabella, CA 93240

Kern Delta Water Dist
501 Taft Highway
Bakersfield, CA 93307

Kern Mosquito Abatement Dist
4705 Allen Road
Bakersfield, CA 93314

Kern Audubon Society
Attn: Harry Love, President
13500 Powder River Avenue
Bakersfield, CA 93314

Center on Race, Poverty
& the Environment
Attn: Marissa Alexander
1999 Harrison Street – Suite 650
San Francisco, CA 94612

California Farm Bureau
2300 River Plaza Drive, NRED
Sacramento, CA 95833

Southern California Edison
2244 Walnut Grove, Ave, GO-1
Quad 2C
Rosemead, CA 91770

Verizon California, Inc.
Attention Engineering Department
520 South China Lake Boulevard
Ridgecrest, CA 93555

Kern Valley Indian Council
Attn: Robert Robinson,
Chairperson
P.O. Box 401
Weldon, CA 93283

Tejon Indian Tribe
Kathy Morgan, Chairperson
1731 Hasti-acres Drive, Suite 108
Bakersfield, CA 93309

Tule River Indian Tribe
Neal Peyron, Chairperson
P.O. Box 589
Porterville, CA 93258

Kern County Water Agency
P.O. Box 58
Bakersfield, CA 93302-0058

Adams, Broadwell, Joseph &
Cardozo
Attention: Janet M. Laurain
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

Los Angeles Audubon
926 Citrus Avenue
Los Angeles, CA 90036-4929

Center on Race, Poverty
& the Environmental/
CA Rural Legal Assistance
Foundation
1012 Jefferson Street

Pacific Gas & Electric Co
Matt Coleman, Land Mgt
1918 "H" Street
Bakersfield, CA 93301-4319

Southern California Gas Co
1510 North Chester Avenue
Bakersfield, CA 93308

Chumash Council of Bakersfield
2421 "O" Street
Bakersfield, CA 93301-2441

Kern Valley Indian Council
Historic Preservation Office
P.O. Box 401
Weldon, CA 93283

Kitanemuk & Yowlumne Tejon
Indians
Chairperson
115 Radio Street
Bakersfield, CA 93305

San Fernando Band of Mission
Indians
Attn: John Valenzuela, Chairperson
P.O. Box 221838
Newhall, CA 91322

Carol Bender
13340 Smoke Creek Avenue
Bakersfield, CA 93314-9025

Janice Armstrong
24121 Rand Court
Tehachapi, CA 93561

Joyce LoBasso
P.O. Box 6003
Bakersfield, CA 93386

LIUNA
Attn: Danny Zaragoza
2201 "H" Street
Bakersfield, CA 93301

Nature Conservancy West Reg Office
201 Mission Street, 4th Floor
San Francisco, CA 94105

A E Corporation
Planning Department
901 Via Piemonte, 5th Floor
Ontario, CA 91764

Vestas
1417 NW Everett Street
Portland, OR 97209

Smart Growth – Tehachapi Valleys
P.O. Box 1894
Tehachapi, CA 93581

Lozeau Drury LLP
1939 Harrison Street, Suite 150
Oakland, CA 94612

Kern River Groundwater Sustainability Agency
1600 Truxtun Avenue
Bakersfield, CA 93301

California Department of Public Health
Drinking Water Field Operations
P.O. Box 100

Southern California Edison
P.O. Box 410
Long Beach, CA 90801

RECIRCULATED
DRAFT ENVIRONMENTAL IMPACT REPORT
NOTICE OF AVAILABILITY FOR PUBLIC REVIEW

This is to advise that the Kern County Planning and Natural Resources Department has prepared an Environmental Impact Report (EIR) for the project identified below. As mandated by State law, the minimum public review period for this document is 45 days. CEQA Guidelines Section 15088.5 (f) (1) provides that when an Environmental Impact Report (EIR) is substantially revised and the entire EIR is circulated, Kern County, as lead agency, may require that reviewers submit new comments, and the lead agency need not respond to those comments received during the earlier circulation period. Kern County will therefore respond in the Final Recirculated EIR only to new comments received regarding this Recirculated Draft EIR received during this comment period. The document and documents referenced in the Recirculated Draft EIR are available for review at the Planning and Natural Resources Department, 2700 "M" Street, Suite 100, Bakersfield, CA 93301 or on the Departmental website **(https://kernplanning.com/planning/environmental-documents/).**

A public hearing has been scheduled with the Kern County Planning Commission to receive comments on the document on: **February 27, 2020** at 7:00 p.m. or soon thereafter, Chambers of the Board of Supervisors, First Floor, Kern County Administrative Center, 1115 Truxtun Avenue, Bakersfield, California.

The comment period for this document closes on **December 16, 2019**. Testimony at future public hearings may be limited to those issues raised during the public review period either orally or submitted in writing by 5:00 p.m. the day the comment period closes.

Project Title: 99 Houghton Industrial Park Project; General Plan Amendment No. 1, Map 143-07; Zone Change Case No. 2, Map 143-07; Conditional Use Permit No. 5, Map 143-07; Ag Preserve No. 13 – Excl.

Project Location: Bounded by South Union Avenue on the east, State Route 99 on the west, DiGiorgio Road to the north, and Houghton Road to the south.

Project Description: The project proponent is requesting: (a) one (1) General Plan Amendment from map code designation R-IA (Resource – Intensive Agriculture) to LI (Light Industrial) on 108 acres, SI (Service Industrial) on 159 acres, HC (Highway Commercial) on 9.01 acres, GC (General Commercial) on 22 acres of the proposed site; (b) one (1) change in zone classification from the existing A (Exclusive Agriculture) to M-1 PD (Light Industrial Precise Development Combining) on 108 acres, M-2 PD (Medium Industrial) on 159 acres, CH PD (Highway Commercial) on 25 acres and C-2 PD (General Commercial) on 22 acres of the proposed site; (c) One Conditional Use Permit for the construction of a Sewage Treatment Plant (19.38.030.H) in an M-2 (Medium Industrial) District; (d) an exclusion of 257.57 acres from the boundaries of Agricultural Preserve No. 13. The propose project would allow the development of an industrial park with a maximum of 4,613,004 square feet of net building area.

Anticipated Significant Impacts on Environment: Agricultural Resources, Air Quality, Greenhouse Gases, Noise and Transportation

Document can be viewed online at: https://kernplanning.com/planning/environmental-documents/

For further information, please contact: Carlos E. Rojas, Planner 3 ((661) 862-5015) or email CRojas@kerncounty.com

LORELEI OVIATT, AICP, Director
Planning and Natural Resources Department

To be published once only on next available date and as soon as possible

BAKERSFIELD CALIFORNIAN

CER:sc (02/01/18)

County Clerk (2) (with fee)
Environmental Status Board
Sierra Club/Kern Kaweah
Chapter LiUNA/Arthur Izzo
Supervisorial District No. 4
California Native Plant Society/Kern Chapter
Kern County Archaeological Society
Native American Heritage Pres. Council/Kern
County Center on Race, Poverty and Environment (2)

GPA # 1 Map # 143-07
ZCC # 2 Map # 143-07
CUP # 5 & 6 Map # 143-07
es (10/10/2019)
I:\Planning\WORKGRPS\WP\LABELS\147-07gpa1zcc2cup5cup6_Property Owners.docx

PROPERTY OWNERS

18538107007
AYON ALFREDO
14201 COSTAJO RD
BAKERSFIELD CA 933139500

18516005000
BALL FAMILYS TRUST
12825 S UNION AV
BAKERSFIELD CA 933079025

18518016008 **DUP**
BALL FAMILYS TRUST
12825 S UNION AV
BAKERSFIELD CA 933079025

18415070008
BUGNI JIMMY R FAMILY TRUST
3053 CURNOW RD
BAKERSFIELD CA 93313

18519002000
CABRERA MARIO & ROSA
12043 S UNION AV
BAKERSFIELD CA 933079023

18415046009
CALDERON CHRISTY SHAFFER
2843 LANGHORN DR
FREMONT CA 94555

18518027000
CALI ESTATES LLC
117 MUGSY AV
BAKERSFIELD CA 933078710

18519005009
CANTU GLORIA
8502 BALLINA ST
BAKERSFIELD CA 933134247

18538112001
DEVIN SKYLER D & DANNON A
13080 THOROUGHBRED ST
BAKERSFIELD CA 933139604

18538105001
HARARI ENTERPRISES LLC
9024 W OLYMPIC BL
BEVERLY HILLS CA 902113564

18538111008
HAYCOCK DUSTIN N & STEPHANIE
13031 THOROUGHBRED ST
BAKERSFIELD CA 933139604

18518031001
HOOLEY REBECCA
11509 MARAZZON HILL CT
BAKERSFIELD CA 93311

18538124006
HYLTON JEANNE C
13162 THOROUGHBRED ST
BAKERSFIELD CA 933139604

18518010000
LAMB DAN E & SUSAN A LAMB TRUST
12336 S UNION AV
BAKERSFIELD CA 933079023

18518022005
LAMB DAN E & SUSAN A LAMB TRUST
409 LAMB AV
BAKERSFIELD CA 933078812

18518038002 **DUP**
LAMB DAN E & SUSAN A REVOCABLE TRUST
409 LAMB AV
BAKERSFIELD CA 933078812

18518021002
LAMB LEWIS KEITH & MICKEY SUE TRUST
315 LAMB AV
BAKERSFIELD CA 933078812

18515004004
MADRUGA FAMILY TRUST
9037 EL ORO PLAZA DR
ELK GROVE CA 956242647

18502005009
MAVEN GRAPES LLC
PO BOX 9389
AVON CO 816209303

18502023001 **DUP**
MAVEN GRAPES LLC
PO BOX 9389
AVON CO 816209303

18514008003 **SITE**
MITCHELL PROPERTY MANAGEMENT LP
16420 JOHNSON RD
BAKERSFIELD CA 93314

18516008009 **DUP**
MITCHELL PROPERTY MANAGEMENT LP
16420 JOHNSON RD
BAKERSFIELD CA 93314

18518029006
MOLINA SANTANA & NORMA
PO BOX 1322
LEBEC CA 932431322

18519001007
MURPHY LUCILA
12063 S UNION AV
BAKERSFIELD CA 93307

18516003004
PACIFIC GAS & ELECTRIC CO
1 MARKET PZ STE 400
SAN FRANCISCO CA 941051004

18515001005
PACIFIC TEL & TEL CO
140 NEW MONTGOMERY ST # 818
SAN FRANCISCO CA 941053705

18538101009
PANAMA M U LLC
1470 W HERNDON # 100
FRESNO CA 93711

18514005004
PINHEIRO FAMILY L P
5021 E BEAR MOUNTAIN BL
BAKERSFIELD CA 933079760

18538108000 **DUP**
PINHEIRO FAMILY L P
5021 E BEAR MOUNTAIN BL
BAKERSFIELD CA 933079760

18539029007
SAMORA HELEN ORDONEZ TR
13041 S UNION AV
BAKERSFIELD CA 93307

18517019004
UNION AVE GRAPE VINEYARDS LLC
4200 TRUXTUN AV STE 101
BAKERSFIELD CA 933090668

18517018001
WANG LIAN XIANG & SUN GUANG JI
9916 DUTCHMAN PEAK LN
BAKERSFIELD CA 933118770

18518032004
PRICE DISPOSAL INC
8665 S UNION AV
BAKERSFIELD CA 93307

18519003003
SANCHEZ JUAN A S & SANTIAGO FRANCISCA IRENE
12051 S UNION AV
BAKERSFIELD CA 933079023

18518036006 **DUP**
UNION AVE GRAPE VINEYARDS LLC
4200 TRUXTUN AV # 101
BAKERSFIELD CA 933090668

18539005007
ANGONE RODOLF A & BARBARA S FAMILY TRUST 201
3112 FORTUNE ST
BAKERSFIELD CA 933133710

18516004007
ROBINSON CALF RANCH
P O BOX 78350
BAKERSFIELD CA 93383

18518011003
THOMAS BILLY RAY & ELIZABETH ANN
12724 S UNION AV
BAKERSFIELD CA 93307

18518040007 **DUP**
UNION AVE GRAPE VINEYARDS LLC
4200 TRUXTUN AV # 101
BAKERSFIELD CA 933090668

18538110005
AULD JERRY & COLLINS JACKIE
4021 S FAIRFAX RD
BAKERSFIELD CA 933078912

Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P. O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH # 2009051005

Project Title: 99 Houghton Industrial Park Project by McIntosh & Associates

Lead Agency: Kern County Planning Department | Contact Person: Carlos E. Rojas

Mailing Address: 2700 "M" Street Suite 100 | Phone: (661) 862-5015

City: Bakersfield | Zip: 93301-2323 | County: Kern

Project Location: County: Kern | City/Nearest Community: City of Bakersfield

Cross Streets: South Union and DiGiorgio | Zip Code: 93307

Lat. / Long.: 35° 14′ 39″ N / 119° 0’ 44″ W | Total Acres: 314.31

Assessor's Parcel No.: 185-140-08 | Section: 7 | Twp.: 31S | Range: 28E | Base: MDB&M

Within 2 Miles: State Hwy #: 99 | Waterways: N/A

Airports: N/A | Railways: N/A | Schools: General Shafter Elem

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Document Type:

CEQA: ☐ NOP ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec ☒ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ☐ Other Recirculated

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI

Other: ☐ Joint Document ☐ Final Document ☐ Other

Local Action Type:

☐ General Plan Update ☒ General Plan Amendment ☐ General Plan Element ☐ Community Plan

☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan

☒ Rezone ☐ Prezone ☒ Use Permit ☐ Land Division (Subdivision, etc.)

☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Ag Preserve No. Excl.

Development Type:

☐ Residential: Units _____ Acres _____

☐ Office: Sq.ft. _____ Acres _____ Employees _____

☐ Commercial: Sq.ft. _____ Acres _____ Employees _____

☒ Industrial: Sq.ft. 4,613,004 Acres 314 Employees _____

☐ Educational

☐ Recreational

☐ Water Facilities: Type _____ MGD _____

☐ Transportation: Type _____

☐ Mining: Mineral _____

☐ Power: Type _____ MW _____

☐ Waste Treatment: Type _____ MGD _____

☐ Hazardous Waste: Type _____

☐ Other: _____

Project Issues Discussed in Document:

☒ Aesthetic/Visual ☒ Agricultural Land ☒ Air Quality ☒ Archeological/Historical ☒ Biological Resources ☐ Coastal Zone ☒ Drainage/Absorption ☒ Economic/Jobs ☐ Other

☒ Fiscal ☒ Flood Plain/Flooding ☒ Forest Land/Fire Hazard ☒ Geologic/Seismic ☒ Minerals ☒ Noise ☒ Population/Housing Balance ☒ Public Services/Facilities

☒ Recreation/Parks ☒ Schools/Universities ☒ Septic Systems ☒ Sewer Capacity ☒ Soil Erosion/Compaction/Grading ☒ Solid Waste ☒ Toxic/Hazardous ☒ Traffic/Circulation

☒ Vegetation ☒ Water Quality ☒ Water Supply/Groundwater ☐ Wetland/Riparian ☒ Wildlife ☒ Growth Inducing ☒ Land Use ☒ Cumulative Effects

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Present Land Use/Zoning/General Plan Designation:

Agriculture**.** *Zoning:* A (Exclusive Agriculture); *Kern County General Plan:* R-IA (Resource-Intensive Agriculture) and HC (Highway Commercial) 4.3

Project Description: *(please use a separate page if necessary)* The project proponent is requesting: (a) One General Plan Amendment from map code designation R-IA (Resource – Intensive Agriculture) to LI (Light Industrial) on 108 acres, SI (Service Industrial) on 159 acres, HC (Highway Commercial) on 9.01 acres, GC (General Commercial) on 22 acres of the proposed site; (b) one change in zone classification from the existing A (Exclusive Agriculture) to M-1 PD (Light Industrial Precise Development Combining) on 108 acres, M-2 PD (Medium Industrial) on 159 acres, CH PD (Highway Commercial) on 25 acres and C-2 PD (General Commercial) on 22 acres of the proposed site; (c) One Conditional Use Permit for the construction of a Sewage Treatment Plant (19.38.030.H) in an M-2 (Medium Industrial) District; (d) an exclusion of 257.57 acres from the boundaries of Agricultural Preserve No. 13. The propose project would allow the development of an industrial park with a maximum of 4,613,004 square feet of net building area.

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "**X**".
If you have already sent your document to the agency please denote that with an "**S**".

_____	Air Resources Board	_____	Office of Emergency Services
_____	Boating & Waterways, Department of	_____	Office of Historic Preservation
__S__	California Highway Patrol	_____	Office of Public School Construction
_____	CalFire	_____	Parks & Recreation
__S__	Caltrans District # 6 & 9	_____	Pesticide Regulation, Department of
_____	Caltrans Division of Aeronautics	_____	Public Utilities Commission
_____	Caltrans Planning (Headquarters)	__S__	Regional WQCB # _____
_____	Central Valley Flood Protection Board	_____	Resources Agency
_____	Coachella Valley Mountains Conservancy	_____	S.F. Bay Conservation & Development Commission
_____	Coastal Commission	_____	San Gabriel & Lower L.A. Rivers and Mtns Conservancy
_____	Colorado River Board	_____	San Joaquin River Conservancy
_____	Conservation, Department of	_____	Santa Monica Mountains Conservancy
_____	Corrections, Department of	_____	State Lands Commission
_____	Delta Protection Commission	_____	SWRCB: Clean Water Grants
_____	Education, Department of	_____	SWRCB: Water Quality
_____	Energy Commission	_____	SWRCB: Water Rights
__S__	Fish & Game Region # Fresno	_____	Tahoe Regional Planning Agency
_____	Food & Agriculture, Department of	_____	Toxic Substances Control, Department of
_____	General Services, Department of	_____	Water Resources, Department of
_____	Health Services, Department of		
_____	Housing & Community Development	_____	Other _____
_____	Integrated Waste Management Board	_____	Other _____
__S__	Native American Heritage Commission		

Local Public Review Period (to be filled in by lead agency)

Starting Date November 1, 2019 Ending Date December 16, 2019

Lead Agency (Complete if applicable):

Consulting Firm: _____
Address: _____
City/State/Zip: _____
Contact: _____
Phone: _____

Applicant: _____
Address: _____
City/State/Zip: _____
Phone: _____

Signature of Lead Agency Representative: _____/S/_____ **Date:** 11/1/19

Authority cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code.

Recirculated
Draft Environmental Impact Report

SCH# 2009051005

Volume 1

99 HOUGHTON INDUSTRIAL PARK PROJECT
By McIntosh & Associates

General Plan Amendment 1, 143-07;
Zone Change Case 2, Map 143-07;
Conditional Use Permit 5, Map 143-07;
Ag Preserve No. 13 – Excl.

Kern County Planning and Natural Resources Department
2700 M Street, Suite 100
Bakersfield, CA 93301-2370
(661) 862-8600

Technical Assistance by:

Kimley-Horn and Associated
555 Capitol Mall, Suite 300
Sacramento, CA 95814
(916) 858-5800

October 2019

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NOTE TO REVIEWER OF ELECTRONIC FILES:

To assist you in reviewing this electronic document, "bookmarks" and/or "links" have been provided for easier navigation between sections. When available, bookmarks are located in the panel to the left. Links are highlighted in BLUE in the Table of Contents. Clicking on either the bookmarks or links will take you to the selected item. This document may consist of multiple linked PDF files. If saving this document to your computer, you must save all corresponding files to a directory on your hard drive to maintain the manner in which these PDF documents are linked.

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Appendices

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Chapter 1
Executive Summary

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Chapter 1
Executive Summary

1.1 Introduction

This Recirculated Draft Environmental Impact Report (RDEIR) has been prepared to identify and evaluate the potential environmental impacts associated with the implementation of the 99 Houghton Industrial Park Project (proposed Project), an industrial development of 314.30 acres of land within the unincorporated area of Kern County, California County (Figure 1-1, *Regional Vicinity*). The proposed Project encompasses approximately 314 acres, and is located north of Houghton Road, east of State Route 99 (SR-99), west of South Union Avenue, and south of DiGiorgio Road, in Kern County (Figure 1-2, *Project Vicinity*) The proposed Project would allow for development of a light to medium industrial park containing approximately 4,613,004 square feet (net building area) of warehousing, distribution, and retail showroom uses. A private package sewer treatment plant is proposed to provide sewer services for the Project site.

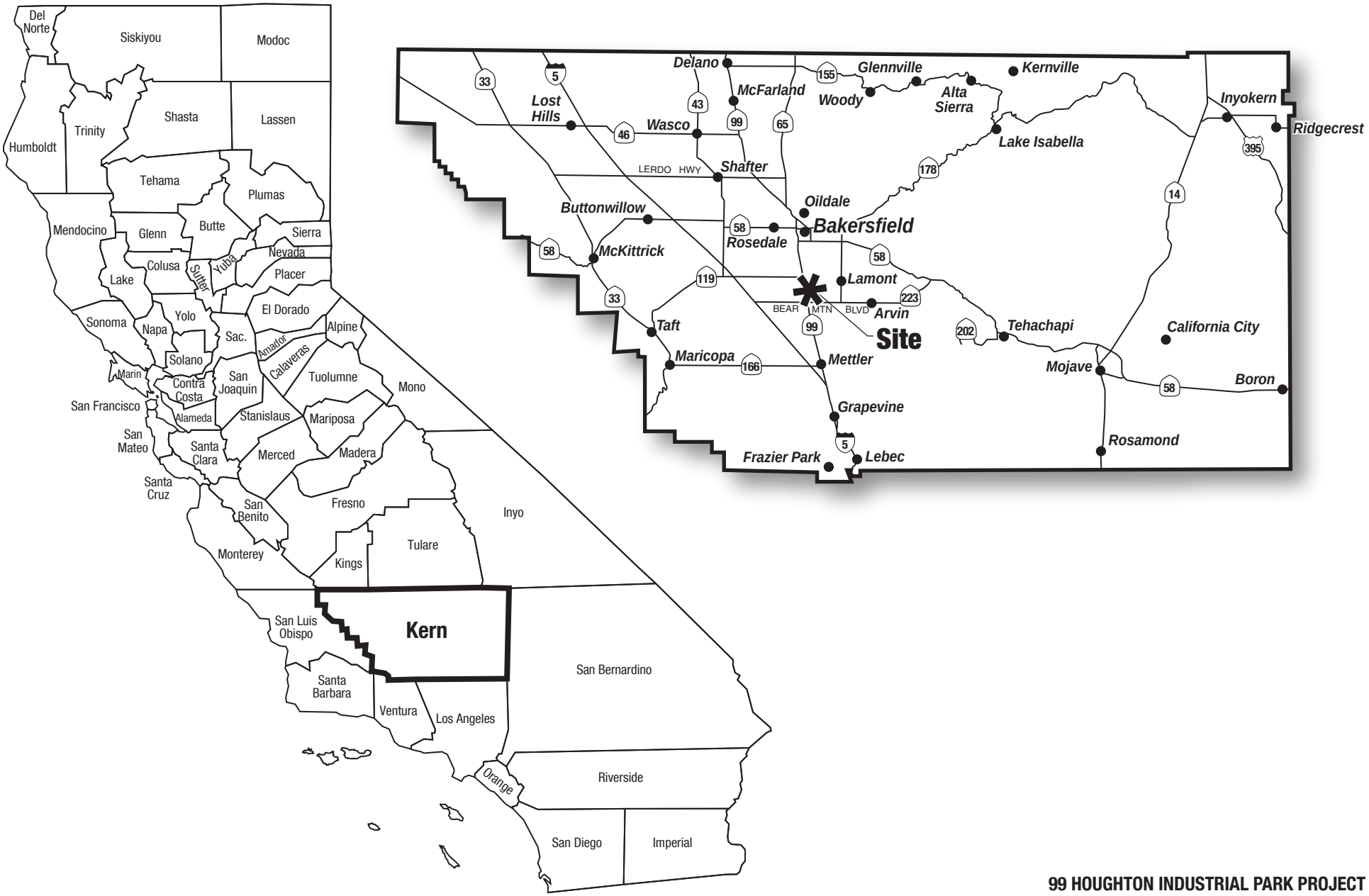
This Recirculated Draft Environmental Impact Report (RDEIR) has been prepared by Kern County as the Lead Agency under the California Environmental Quality Act (CEQA). The RDEIR provides information about the environmental setting and impacts of the project and alternatives. It informs the public about the project and its impacts and provides information to meet the needs of local, State, and federal permitting agencies that are required to consider the project. The RDEIR will be used by Kern County to determine whether to approve the general plan amendment (GPA), zone change (ZCC), conditional use permit (CUP), and Agricultural Preserve Exclusion for the project.

This Executive Summary summarizes the requirements of the CEQA Statutes and Guidelines, provides an overview of the project and alternatives, identifies the purpose of the RDEIR, outlines the potential impacts of the project and the recommended mitigation measures, and discloses areas of controversy and issues to be resolved.

Project Summary

The proposed Project consists of medium to light industrial development of 314.30 acres of land within the unincorporated area of Kern County, California. The proposed Project includes a GPA to modify the existing Metropolitan Bakersfield General Plan land use designations, a change in zone classification and the Exclusion from Agricultural Preserve No. 13. The RDEIR, once certified, will be used to satisfy the CEQA requirements for the following discretionary and ministerial approvals by the County:

1. Consideration and certification of a final Environmental Impact Report (FEIR) with appropriate State CEQA Guidelines Sections 15091 Findings, 15093 Statement of Overriding Considerations, and the mitigation measures monitoring reporting program by the Kern County Planning Commission and Kern County Board of Supervisors;



not to scale

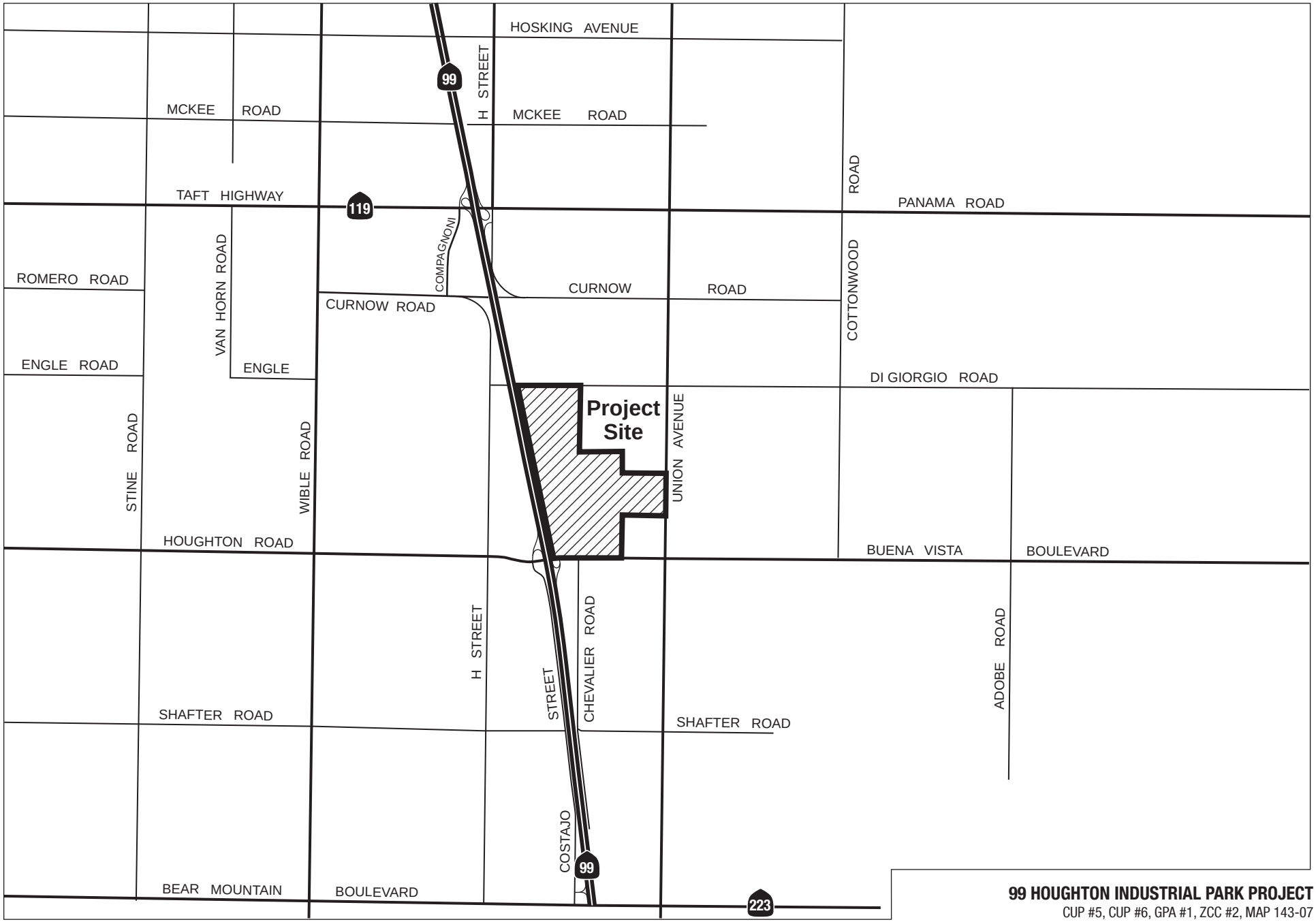
99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07

AGRICULTURAL PRESERVE #13 EXCLUSION

Regional Vicinity

Figure 1-1



99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07

AGRICULTURAL PRESERVE #13 EXCLUSION

Project Vicinity

Figure 1-2

2. Approval by the Kern County Board of Supervisors for a general plan amendment for the proposed Project site, to amend the existing land use designation from R-IA (Resource – Intensive Agriculture) to LI (Light Industrial), SI (Service Industrial), HC (Highway Commercial), and GC (General Commercial);

3. Approval by the Kern County Board of Supervisors for a zone change (ZCC) for the Project site, to remove the existing A (Exclusive Agriculture) zoning classification and rezone the Project site M-1PD (Light Industrial, Precise Development Combining), M-2 PD (Medium Industrial, Precise Development Combining), CH PD (Highway Commercial Precise Development Combining), and C-2 PD (General Commercial Precise Development Combining);

4. Approval by the Kern County Board of Supervisors for a conditional use permit (CUP) for a Sewer Treatment Plant;

~~5. Approval by the Kern County Board of Supervisors for a conditional use permit (CUP) for a Water Treatment Plant;~~

5. Exclusion of the Project site from Agricultural Preserve No. 13;

~~6. Approval by the Kern County Board of Supervisors and processing of a parcel map(s);~~

~~7. Kern County Public Works Department – construction, grading, and building permits;~~

~~8. Kern County Environmental Health Services Division – Water well permits, if applicable;~~

~~9. Kern County Fire Department – Fire Safety Plan; and~~

~~10. Kern County Permit for Occupancy.~~

1.3 Purpose and Use of the Recirculated Draft EIR

This document is the Recirculated DEIR for the 99 Houghton Industrial Park. The 99 Houghton Industrial Park Project Environmental Impact Report was originally circulated for public comment from February 13, 2018, with a comment closing date of April 2, 2018, by the Kern County Planning Department acting as the lead agency. On March 13, 2018, prior to the end of the original comment period, the project was formally withdrawn from circulation. The County has received and considered written comments that were received after the close of the public comment period.

County staff has determined that changes should be made in the Draft EIR that was originally circulated for public comment. In some cases changes have been made to the project and in some cases new or revised information or analysis has been included in the Recirculated Draft EIR.

The Guidelines adopted by the Governor's Office of Planning and Research for the California Environmental Quality Act (Guidelines) provide that a lead agency is required to recirculate an environmental impact report when *significant new information* is added to an EIR after public

review of the Draft EIR has begun. New information can include changes in the project description, changes in the environmental setting, as well as other additional data or information. This information may relate to new environmental impacts, severity of such impacts, alternatives or mitigation. Recirculation of an EIR is covered by CEQA Guidelines Section 15088.5.

As mandated by State law, the minimum public review period for this document is 45 days. CEQA Guidelines Section 15088.5 (f) (1) provides that when an Environmental Impact Report (EIR) is substantially revised and the entire EIR is circulated, Kern County, as lead agency, may require that reviewers submit new comments, and the lead agency need not respond to those comments received during the earlier circulation period. Kern County will therefore respond in the Final Recirculated EIR only to new comments received regarding this Recirculated Draft EIR received during this comment period

~~This Draft EIR was prepared to evaluate the potential environmental impacts associated with the proposed Project. This report also identifies mitigation measures and alternatives to the proposed Project that may reduce or eliminate impacts. This Draft EIR has been prepared pursuant to CEQA.~~

1.4 Project Overview

Local and Regional Setting

The proposed Project is situated in the southern San Joaquin Valley in Kern County, California. Kern County is California's third-largest county in land area encompassing approximately 8,202 square miles. The geography of the county is diverse, containing mountainous areas, agricultural lands, and desert areas. The dominant land uses within the county are related to agricultural and resource extraction, although over the last few decades, urban development has occurred in and around the County's 11 incorporated cities. Bakersfield is the county's largest city, with an estimated population of 389,211 [California Department of Finance (CDOF) 2019].

The Project site is located within the sphere of influence to the City, in southeast Metropolitan Bakersfield, governed by the Metropolitan Bakersfield General Plan. The proposed Project is generally located north of Houghton Road, east of State Route 99 (SR-99), west of South Union Avenue, and south of DiGiorgio Road. South Union Avenue, Houghton Road, and the DiGiorgio Road alignment provide the primary access to and from the proposed Project. The proposed Project is located within a portion of Section 7, Township 31 South, Range 28 East, Mount Diablo Base and Meridian (MDBM). In general, the Project site is surrounded by vacant land, actively cultivated and fallow agricultural land, and limited residential uses.

Surrounding Land Uses

The general area of the proposed Project site is surrounded by cultivated and fallow agricultural land and limited residential, commercial and industrial land uses.

Project Objectives

The CEQA Guidelines (Section 15124[b]) require that the project description contain a statement of objectives that includes the underlying purpose of the project. The applicant's objectives for the proposed Project are as follows:

- Facilitate quality development that is consistent with and implements the goals of the Kern County General Plan and Metropolitan Bakersfield General Plan.
- To develop the site consistent with the provisions of the Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards.
- Assure adequate planning for all community facilities including circulation improvements, drainage facilities, water, and wastewater facilities.
- Ensure that the project, in and of itself, does not contribute to the conversion of adjacent agricultural areas.
- Cluster commercial retail uses that provide goods and services near an interchange with SR-99 to accommodate interstate freight and reduce traffic congestion and air emissions.
- Accommodate new development that channels land uses in a phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.
- Address community circulation, both vehicular and pedestrian, utilizing available capacity with the existing circulation system, and provide fair-share system improvements to deficient intersections or road segments.
- Facilitate a planned development and related in-line tenants consistent with the market objectives of the applicant and its tenants.
- Accommodate growth within the proposed project while balancing environmental considerations.
- Provide an industrial center at the Houghton Road and SR-99 interchange in the southern metropolitan area adjacent to the City that would provide a broad range of goods and services that serve the regional market area.
- Allow for the development of a variety of commercial and industrial centers which are differentiated by their function, intended users and level of intensity.
- Provide new industrial development that captures the economic demands generated by the marketplace.
- Provide new development that will assist the County of Kern in obtaining fiscal balance in the years and decades ahead.

Proposed Project Characteristics

The Project site would be developed with approximately 4,613,004 square feet (net building area) of warehousing, distribution, and retail showroom uses. A private package sewer treatment plant is proposed to provide sewer services for the Project site.

Proposed General Plan Amendment

The Project proposes to amend the MBGP land use designations from R-IA (Resource-Intensive Agriculture) and HC (Highway Commercial), to LI (Light Industrial), SI (Service Industrial), HC (Highway Commercial), and GC (General Commercial) (refer to Figure 1-3, *Existing General Plan Land Use Designations* and Figure 1-4, *Proposed General Plan Land Use Designations*). Approximately 108 acres would be amended to LI, approximately 159 acres would be amended to SI, approximately 9.01 acres would be amended to HC (Highway Commercial), and approximately 22 acres would be amended to GC (General Commercial). The Project site contains 15.99 acres of HC (Highway Commercial) that would remain unchanged. The LI designation is characterized by unobtrusive industrial activities that can be located in close proximity to residential and commercial uses with a minimum of environmental conflicts. The SI designation is characterized by industrial activities which involve outdoor storage or use of heavy equipment (MBGP 2007).

Proposed Zone Change

The Project proposes a Zone Change from A (Exclusive Agriculture) to M-1 PD (Light Industrial, Precise Development Combining), M-2 PD (Medium Industrial, Precise Development Combining), CH PD (Highway Commercial, Precise Development Combining), and C-2 PD (General Commercial, Precise Development Combining). Approximately 108 acres would be amended to M-1 PD, approximately 159 acres would be amended to M-2 PD, approximately 22 acres would be amended to C-2 PD, and approximately 25 acres would be amended to CH PD; refer to Figure 1-5, *Existing Zoning*, and Figure 1-6, *Proposed Zoning*, for a graphical representation of the proposed Project zone changes. As discussed in further detail below, all zones would be amended to contain the PD (Precise Development) Combining District overlay. The C-2 zoning classification is typically characterized by regional shopping centers and heavy commercial uses while CH zoning classification is typically characterized by gas stations, restaurants, and motels. The purpose of the M-1 zoning classification is to designate areas for wholesale commercial, storage, trucking, assembly-type manufacturing, and other similar industrial uses. The M-2 zoning designation is typically characterized by general manufacturing, processing, and assembly activities. The purpose of the PD Combining District is to designate areas with unique site characteristics or environmental conditions or areas surrounded by sensitive land uses to ensure that development in such areas is compatible with such constraints.

Precise Development Plans

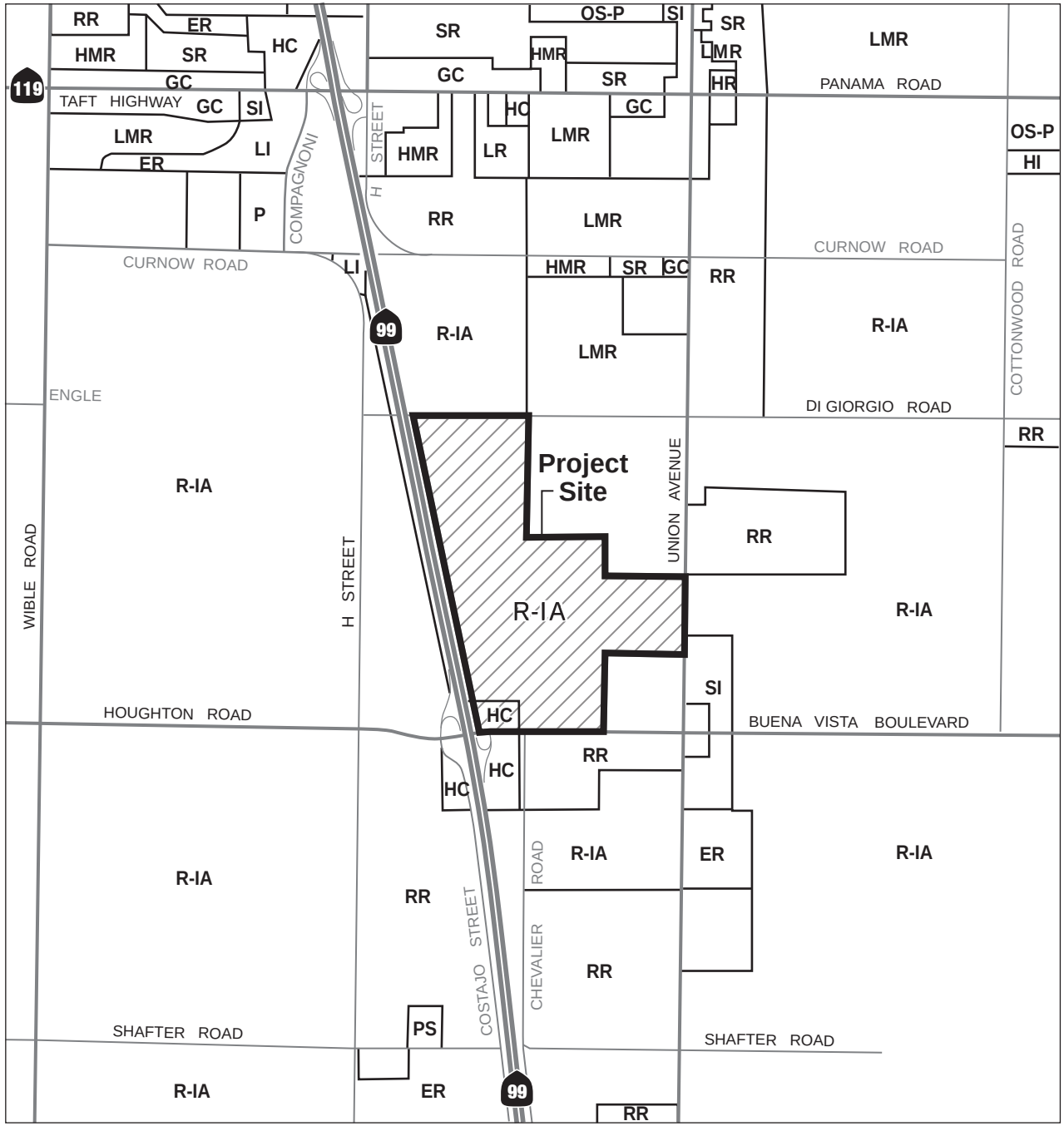
Included with the proposed zone change to C-2, CH, M-1, and M-2 is the Precise Development (PD) Combining District. The purpose of the Precise Development (PD) Combining District is to designate areas with unique site characteristics or environmental conditions or areas surrounded by sensitive land uses to ensure that development in such areas is compatible with such constraints.

All development in the PD Combining District shall be subject as a minimum to Special Development Standards as specified in Chapter 19.80 of the Kern County Zoning Ordinance; however, a Special Development Standard Plan Review shall not be required. The regulations established by the PD District shall be in addition to the regulations of the base district with which the PD District is combined.

Given the uncertainty regarding the specific use to be developed on site at this time, the PD Combining District is being included in the proposed zone change request. Implementation of the PD Combining District will ensure that as development of the site moves forward, the Kern County Planning and Natural Resources Department and the community at large will have the opportunity to publicly review site specific proposals to ensure compliance with the environmental impact report, the specific development standards and overall compatibility with the surrounding uses. Implementation of the site is expected to be processed under a Master Precise Development Plan.

Agricultural Preserve – Exclusion

An agricultural preserve defines the boundary of an area within the County that meets the criteria for property owners to enter into Williamson Act Land Use Contracts and Farmland Security Zone Contracts. Only land within an agricultural preserve is eligible for such contracts. The Kern County Board of Supervisor policy has established the criteria for inclusion into a preserve as land having a General Plan resource designation (RI–A) and having a zoning designation of A (Exclusive Agriculture). If approved, the requested MBGP designations of LI and SI would require the exclusion of approximately 257.57 acres from Agricultural Preserve No. 13 (refer to Figure 1-7, *Agricultural Preserve No. 13 Map*).



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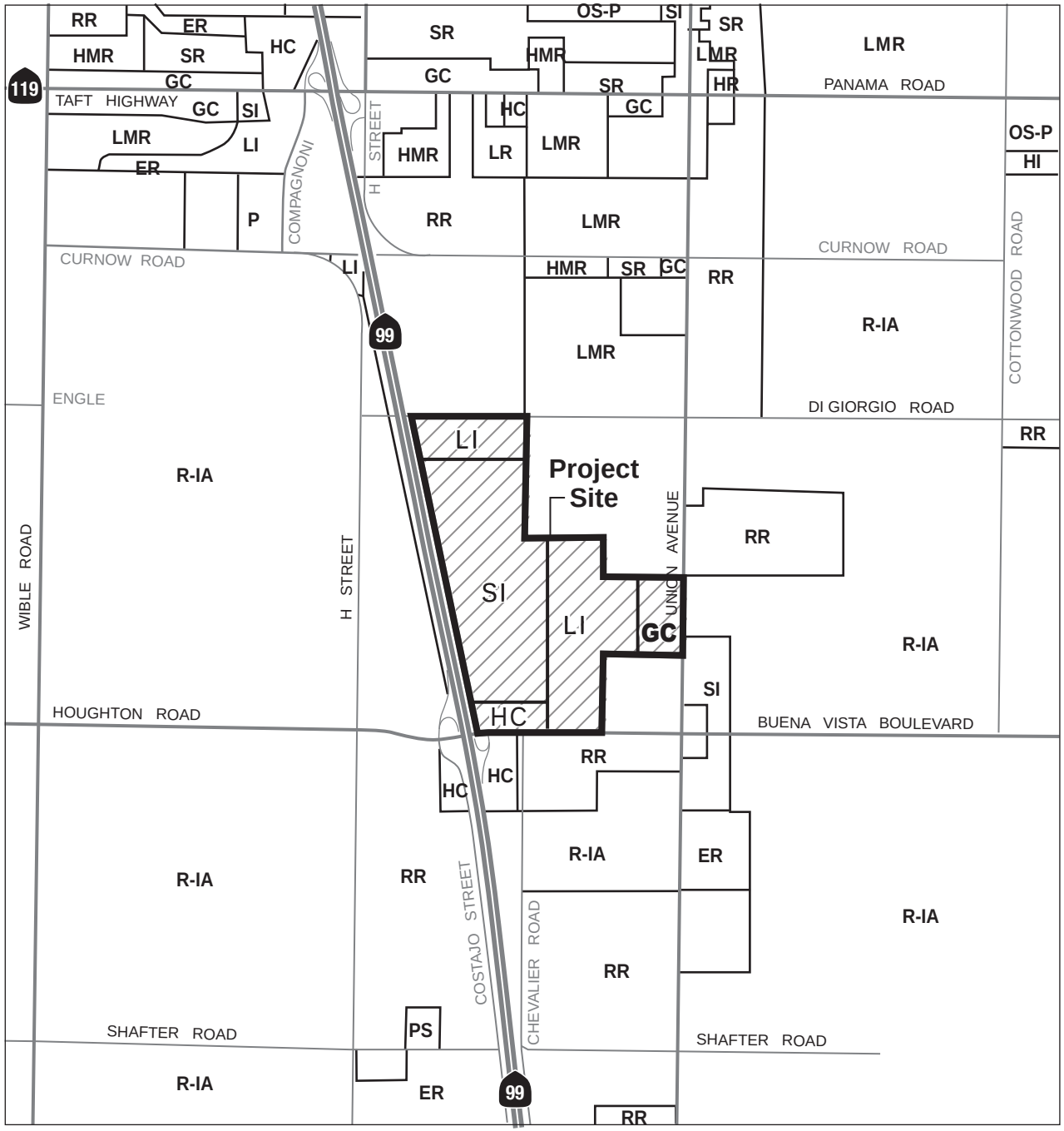
Land Use Designations

R-IA	Resource - Intensive Agriculture
LMR	Low Medium Residential
HMR	High Medium Residential
RR	Rural Residential
ER	Estate Residential
SR	Suburban Residential
GC	General Commercial
HC	Highway Commercial
LI	Light Industrial
SI	Service Industrial
HI	Heavy Industrial
OS-P	Parks and Recreation Facilities
PS	Public and Private Schools
P	Publicly Owned Facilities

99 HOUGHTON INDUSTRIAL PARK PROJECT
CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07
AGRICULTURAL PRESERVE #13 EXCLUSION

Existing General Plan Land Use Designations

Figure 1-3



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Land Use Designations

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LMR	Low Medium Residential
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RR	Rural Residential
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HC	Highway Commercial
LI	Light Industrial
SI	Service Industrial
HI	Heavy Industrial
OS-P	Parks and Recreation Facilities
PS	Public and Private Schools
P	Publicly Owned Facilities

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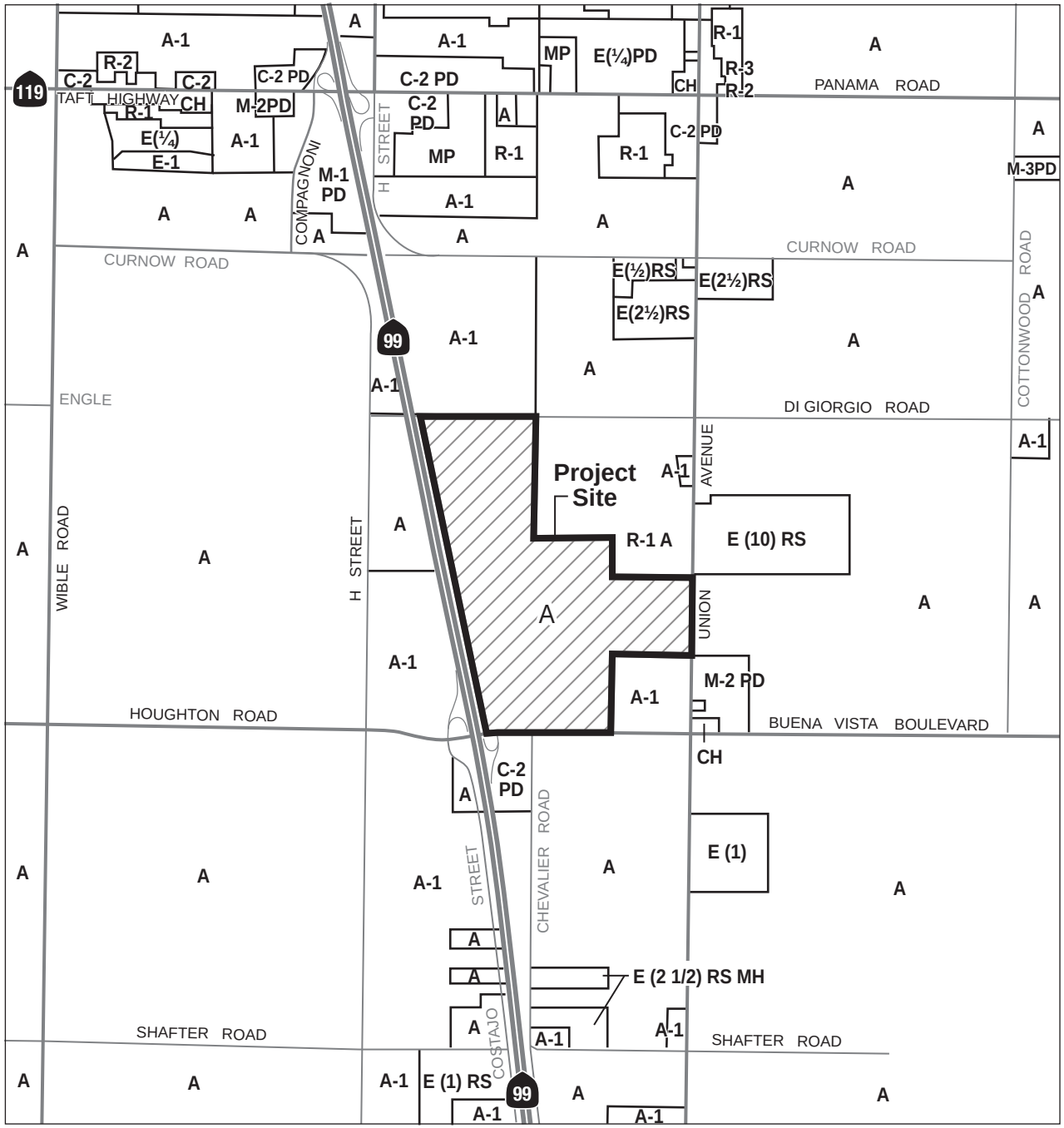
CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07
AGRICULTURAL PRESERVE #13 EXCLUSION

Proposed General Plan Land Use Designations

Figure 1-4



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Zoning Districts

A	Exclusive Agriculture
A-1	Limited Agriculture
C-2 PD	General Commercial, Precise Development Combining
C-2	General Commercial
CH	Highway Commercial
E (1/4)	Estate .25 Acres
E (1/2) RS	Estate .5 Acres, Residential Suburban Combining
E (1)	Estate 1 Acre
E (10) RS	Estate 10 Acres, Residential Suburban Combining
E (2 1/2) RS	Estate 2.5 Acre, Residential Suburban Combining
M-2 PD	Medium Industrial, Precise Development Combining
M-3 PD	Heavy Industrial, Precise Development Combining
MP	Mobile Home Park
R-1	Low Density Residential

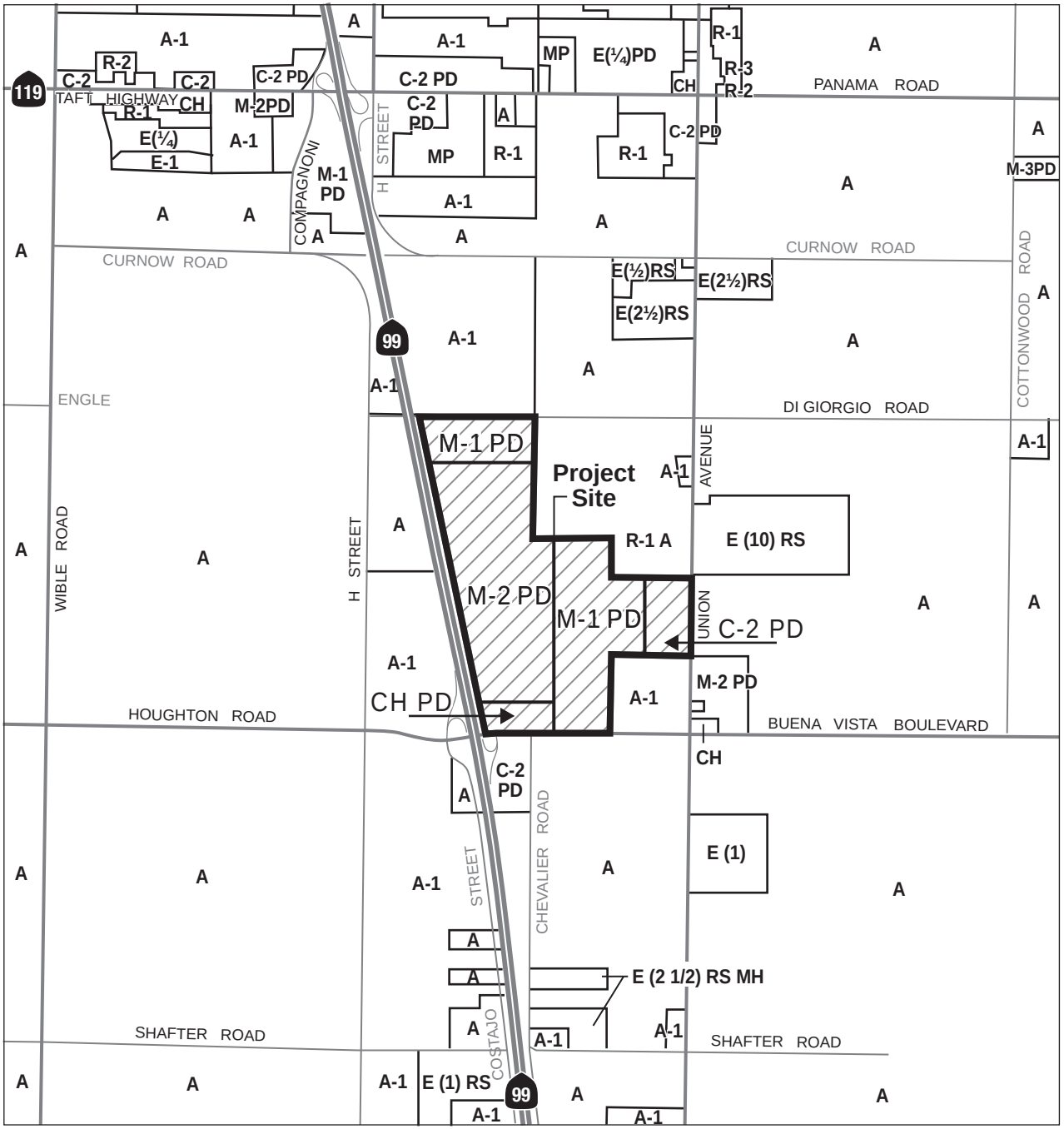
99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07

AGRICULTURAL PRESERVE #13 EXCLUSION

Existing Zoning

Figure 1-5



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Zoning Districts

A	Exclusive Agriculture
A-1	Limited Agriculture
C-2 PD	General Commercial, Precise Development Combining
C-2	General Commercial
C-2 PD	General Commercial Precise Development Combining
CH	Highway Commercial
CH PD	Highway Commercial Precise Development Combining
E (1/4)	Estate .25 Acres
E (1/2) RS	Estate .5 Acres, Residential Suburban Combining
E (1)	Estate 1 Acre
E (10) RS	Estate 10 Acres, Residential Suburban Combining
E (2 1/2) RS	Estate 2.5 Acre, Residential Suburban Combining
M-1	Light Industrial
M-1 PD	Light Industrial, Precise Development Combining
M-2	Medium Industrial
M-2 PD	Medium Industrial, Precise Development Combining
M-3 PD	Heavy Industrial, Precise Development Combining
MP	Mobile Home Park
R-1	Low Density Residential

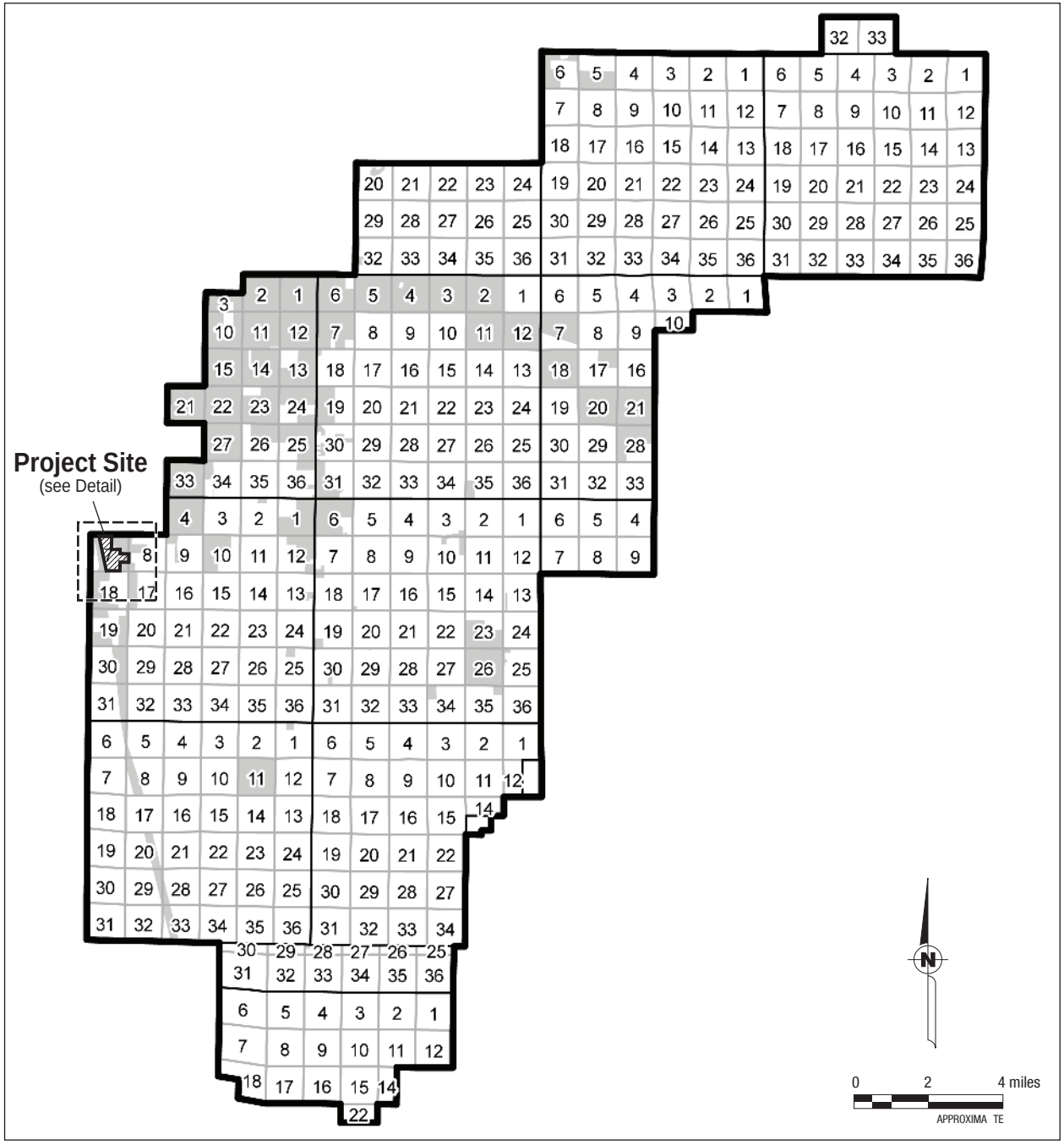
99 HOUGHTON INDUSTRIAL PARK PROJECT

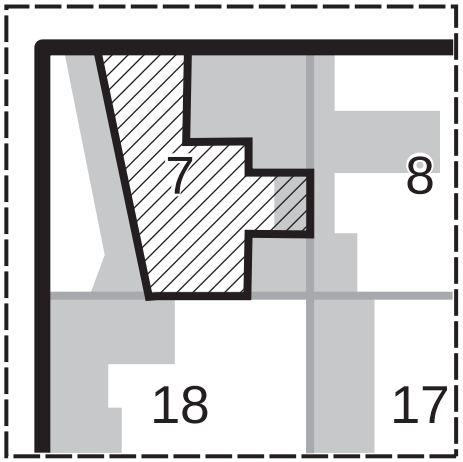
CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07

AGRICULTURAL PRESERVE #13 EXCLUSION

Proposed Zoning

Figure 1-6





Project Site Detail

LEGEND

- 99 Houghton Project Site
- Agricultural Preserve 13
- Townships
- PLSS Sections
- Portion Excluded From Agricultural Preserve

99 HOUGHTON INDUSTRIAL PARK PROJECT
CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07
AGRICULTURAL PRESERVE #13 EXCLUSION

Agricultural Preserve No. 13 Map

Figure 1-7

Proposed Discretionary Action and Required Approvals

This Recirculated Draft EIR, once certified, will be used to satisfy the CEQA requirements for the following discretionary and ministerial approvals:

Kern County:

- Consideration and Certification of a Final Environmental Impact Report (FEIR) with appropriate findings State CEQA Guidelines Section 15091 Findings, 15093 Statement of Overriding Considerations, and the mitigation measures monitoring reporting program by the Kern County Planning Commission and Kern County Board of Supervisors
- Approval by the Kern County Board of Supervisors for a GPA for the proposed Project site, to amend the existing land use designation from R-IA (Resource – Intensive Agriculture) to LI (Light Industrial), SI (Service Industrial), HC (Highway Commercial), and GC (General Commercial)
- Approval by the Kern County Board of Supervisors for a ZCC for the Project site, to remove the existing A (Exclusive Agriculture) zoning classification and rezone the Project site M-1 PD (Light Industrial, Precise Development Combining), M-2 PD (Medium Industrial, Precise Development Combining), CH PD (Highway Commercial, Precise Development Combining), and C-2 PD (General Commercial, Precise Development Combining)
- Approval by the Kern County Board of Supervisors for a CUP for a Sewer Treatment Plant
- ~~Approval by the Kern County Board of Supervisors for a CUP for a Water Treatment Plant~~
- Exclusion of the Project site from Agricultural Preserve No. 13

1.5 Environmental Impacts

Section 15128 of the State CEQA Guidelines requires that an EIR contain a statement briefly indicating the reasons that various, possible new significant effects of a project were determined not to be significant and were therefore not discussed in detail in the RDEIR. The County has engaged the public and sought community participation in the scoping process for the environmental document. Comments received during scoping have been considered in the process of identifying issue areas that should receive attention in the EIR. The contents of this Recirculated Draft EIR were established based on the Notice of Preparation/Initial Study (NOP/IS) prepared in accordance with the State CEQA Guidelines, as well as public and agency input received during the scoping process.

Impacts Not Further Considered

Those specific issues that are found to have no impact or less-than-significant impacts during preparation of the NOP/IS do not need to be addressed further in this RDEIR. The findings of the NOP/IS and the results of scoping were the basis of the determination that this Recirculated Draft EIR would contain a comprehensive analysis of all environmental issues identified in the Kern

County CEQA Implementation Document. No issues have been eliminated from discussion in this Recirculated Draft EIR.

Impacts of the Proposed Project

Sections 4.1 through 4.16 provide a detailed discussion of the environmental setting, impacts associated with the proposed Project, and mitigation measures designed to reduce significant impacts to less-than-significant levels, when feasible. The impacts, mitigation measures, and residual impacts for the proposed Project are summarized in Table 1-2 at the end of this chapter and are discussed further below.

Less Than Significant Impacts (Including Significant Impacts That Can Be Mitigated, Avoided, or Substantially Lessened).

The analysis of the impacts of the proposed Project documents that the impacts would be less than significant or less than significant after mitigation is implemented on the following resources:

- Aesthetics,
- Biological Resources,
- Cultural Resources,
- Energy
- Geologic and Seismic Hazards,
- Hazards and Hazardous Materials,
- Hydrology and Water Quality,
- Land Use and Planning,
- Mineral Resources,
- Population and Housing,
- Public Services,
- Utilities, and
- Wildfire

Significant and Unavoidable Impacts

Section 15126.2(b) of the CEQA Guidelines requires that the EIR describe any significant impacts, including those that can be mitigated but not reduced to less-than-significant levels. Potential environmental effects of the proposed Project and proposed mitigation measures are discussed in detail in Chapter 4 of this RDEIR. The following environmental impacts were determined to be significant and unavoidable impacts (refer to Table 1-1, *Summary of Significant Impacts of the Proposed Project*).

Table 1-1. Summary of Significant Impacts of the Proposed Project

Resources	Project Impacts	Cumulative Impacts
Agricultural Resources	The conversion of approximately 314.30 acres of agricultural farmland is considered **significant and unavoidable.**	Although the Metropolitan Bakersfield General Plan has various Land Use policies that direct development to encourage site compatibility with surrounding uses, the cumulative loss of agricultural land results in a significant and unavoidable impact. Notwithstanding this conclusion, Project implementation, when combined with the potential loss of other agricultural lands within the Planning area, over time, would remain a **significant and unavoidable** cumulative impact.
Air Quality	Surrounding sensitive receptors could potentially be exposed to substantial ROG pollutant concentrations from the proposed Project. In addition, operational impacts would result in **significant and unavoidable** impacts of ROG, NO_x, CO, and PM_{10} emissions.	While all feasible and reasonable mitigation has been included, however, the proposed mitigation measures do not result in a reduction of ROG, NO_x, CO, and PM_{10}, below the thresholds. Therefore, the remaining unmitigated emissions and related health effects are considered **cumulatively significant and unavoidable.**
Greenhouse Gases	Project-related greenhouse gases impacts would be reduced to **less than significant** levels with incorporation of mitigation measures.	The cumulative impacts of the proposed Project on global climate change are not known with certainty; therefore, cumulative impacts on global climate change and associated health effects are considered **significant and unavoidable.**
Noise	Given a specific Project use is not currently proposed, and the fact that permitted uses within the M-1 PD and M-2 PD Zone Districts allow for operations to be conducted outside of a fully enclosed building, the proposed Project may result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies. Impacts are considered **significant and unavoidable.**	While all feasible and reasonable mitigation has been included, noise levels at 14 roadway segments a result of the proposed Project and at 15 roadway segments considering the project with past, present and reasonable, would be significant. In addition, noise levels at one residence in proximity to the proposed Project would exceed thresholds. Therefore, even with the implementation of all feasible mitigation, impacts would be both **significant and unavoidable and cumulatively significant and unavoidable**
Transportation and Traffic	Project-related transportation and traffic impacts would be reduced to **less than significant** levels with incorporation of mitigation measures.	Given the uncertainty of the timing and/or ultimate implementation of the recommended improvements which require pro-rata, fair share funding from various sources, along with those improvements necessary within Metropolitan Bakersfield, the proposed Project's contribution would result in **significant and unavoidable impacts.**

Significant Cumulative Impacts

According to Section 15355 of the CEQA Guidelines, the term cumulative impacts "...refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Individual effects that may contribute to a cumulative impact may be from a single project or a number of separate projects. Individually, the impacts of a project may be relatively minor, but when considered along with impacts of other closely related

or nearby projects, including newly proposed projects, the effects could be cumulatively considerable. This RDEIR has considered the potential cumulative effects of the proposed project along with other current and reasonably foreseeable projects. Impacts for the following have been found to be cumulatively considerable:

- Agriculture,
- Air Quality,
- Greenhouse Gases,
- Noise, and
- Transportation and Traffic

Growth Inducement

The Metropolitan Bakersfield General Plan recognizes that certain forms of growth are beneficial, both economically and socially. CEQA associates development of new utilities and other infrastructure and public services with growth inducement. These facilities will be provided as an accommodation to proposed growth, and growth is expected to occur in the region. A project could induce population growth in an area either directly or indirectly. More specifically, the development of new homes or businesses could induce population growth directly, whereas the extension of roads or other infrastructure could induce population growth indirectly.

This Project would not directly increase population or the housing stock. The Project proposes to amend the Metropolitan Bakersfield General Plan to allow for service industrial and light industrial uses. This allows for additional employment opportunities, which can lead to the relocation of people to jobs and ultimately an increase in population. However, the size of the labor force within Kern County and the current unemployment rates are considered to be sufficient for the current County population to accommodate jobs generated by the proposed Project. Additionally, the proposed Project site is in the vicinity of a Metropolitan Bakersfield General Plan designation for "intensified activity center," and anticipates development of the southern activity center and surrounding areas. Therefore, the introduction of industrial uses on the Project site would not create a growth-inducing impact.

Irreversible Impacts

Section 15126.2(c) of the CEQA Guidelines defines the nature of an irreversible impact as an impact that uses nonrenewable resources during the initial and continued phases of the project. Irreversible impacts can also result from damage caused by environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to ensure that such consumption is justified. Buildout of the proposed Project would commit nonrenewable resources during construction and ongoing utility services. During the operations of the proposed Project, oil, gas, and other nonrenewable resources would be consumed. Therefore, an irreversible commitment of nonrenewable resources would occur as a result of long-term operation under the proposed Project. However, assuming that those commitments occur in accordance with the adopted goals, policies, and implementation measures of the Metropolitan Bakersfield General Plan, as a matter of public policy, those commitments have been determined to be acceptable. The Metropolitan Bakersfield General Plan ensures that any irreversible environmental changes associated with those commitments will be minimized.

1.6 Alternatives to the Proposed Project

CEQA states that an EIR must address "a range of reasonable alternatives to the project, or to the location of the project, which are ostensibly feasible and could attain the basic objectives of the project and evaluate the comparative merits of the alternatives." Please refer to Chapter 6, *Alternatives*, for a more detailed analysis and discussion.

Alternatives Considered in this RDEIR

In accordance with State CEQA Guidelines Section 15126.6, Section 6.0, *Alternatives*, describes a range of reasonable alternatives to the proposed Project that could feasibly attain the basic objectives of the proposed Project and evaluates the comparative merits of each Alternative. The analysis focuses on Alternatives capable of eliminating significant adverse environmental effects or reducing them to less than significant levels, even if these Alternatives would impede, to some degree, the attainment of the Project objectives. Potential environmental impacts are compared to impacts from the proposed Project. The following is a description of each of the Alternatives evaluated in Section 6.0.

Alternative A – "No Project/No Development"

The "No Project/No Development" Alternative assumes that the proposed GPA, ZCC and subsequent development would not be implemented. Under this scenario, the General Plan Land Use Designation on the Project site would remain R-IA (Resource-Intensive Agriculture) and HC (Highway Commercial); the zoning would remain A (Exclusive Agriculture). Additionally, this Alternative assumes that existing land uses on the Project site would remain unchanged, and, as such, would remain under agricultural production. Because the Project site would remain unchanged, few or no environmental impacts would occur. This Alternative serves as the baseline against which to evaluate the effects of the proposed Project and other Project Alternatives presented below.

This Alternative would reduce impacts compared to the proposed Project in all categories. However, this Alternative was rejected because it does not fulfill 9 of the 13 objectives of the proposed Project described in Section 6.2, *Applicant Project Objectives*.

Alternative B – "Buildout Existing General Plan Designation"

Under Alternative B, the "Buildout Existing General Plan Designation" Alternative, the Project site would be developed to the maximum intensity allowed under the existing General Plan land use designation. Implementation of this Alternative would consist of development on the 314.30-acre Project site under the current land use designation of R-IA (Resource – Intensive Agriculture) and HC (Highway Commercial). The R-IA designation allows the development of dwelling units at a density of one unit per 20 acres. The HC designation allows the development of 7.6 acres for commercial uses. Therefore, this Alternative would yield 15 single-family dwelling units and approximately 132,422 square feet of highway commercial facilities. This number is based on the allowable Floor Area Ratio (FAR) of 0.4; therefore, 7.6 acres = 331,056 square feet. The maximum allowable building square footage would be 132,422 square feet (331,056 x 0.4 = 132,422).

This Alternative would reduce impacts compared to the proposed Project in the categories of aesthetics, agriculture, air quality, biological resources, energy, greenhouse gases, land use and relevant planning, noise, public services, utilities and traffic and circulation; and would have equivalent impacts in the categories of cultural resources, geologic and seismic hazards, hazards/hazardous materials, hydrology and water quality mineral resources, and wildfire. However, there would still have significant and unavoidable impacts on cumulative air quality. This Alternative would only partially satisfy the Project objectives, as no industrial land uses would be developed.

Alternative C – "Reduced Density" Alternative

Under Alternative C, the "Reduced Density" Alternative, the Project site would be developed under the LI (Light Industrial) and SI (Service Industrial) land use designation; however, the industrial facilities would be reduced in area. This Alternative would develop the entire 314.30-acre Project site; however, the square footage of industrial facilities would be reduced by approximately 25 percent. This results in the development of approximately 3,459,753 square feet of light and medium industrial facilities. The Project site would continue to require a GPA, ZCC, annexation, and exclusion from Agricultural Preserve Number 13.

This Alternative would reduce impacts compared to the proposed Project in the categories of air quality, energy, and noise ~~and traffic and circulation~~; and would have equivalent impacts in the categories of aesthetics, agriculture, biological resources cultural resources, geologic and seismic hazards, greenhouse gases, hazards/hazardous materials, hydrology and water quality, land use and relevant planning, mineral resources, population and housing, public services and utilities, traffic and circulation, and wildfire. This Alternative would satisfy the Project objectives.

Alternative D – "Reduced Project Size" Alternative

Under Alternative D, the "Reduced Project Size" Alternative, the Project site size would be reduced by 50 percent and the square footage size would be reduced accordingly. Therefore, Alternative D would develop the 159-acre portion of the Project site designated to be SI (Service Industrial) with 2,306,502 square feet of medium industrial facilities, as identified in the proposed Project. The approximately 22-acre parcel on the east, the 9.01-acre Highway Commercial parcel, and the approximately 107.72-acres on the east and north of the Project site to be designated LI (Light Industrial) would not be developed. Additionally, this Alternative would not provide access to any public road. Therefore, this Alternative assumes that existing land uses on the northern and eastern portions of the site would remain unchanged and would remain under their current state as fallow and cultivated land. This Alternative would continue to require the GPA, ZCC, annexation, and Agricultural Preserve Exclusion.

This Alternative would reduce the impacts compared to the proposed Project in the categories of air quality, noise, energy, and traffic and circulation; and would have equivalent impacts in the categories of aesthetics, agriculture, biological resources, cultural resources, geologic and seismic hazards, greenhouse gases, hazards/hazardous materials, hydrology and water quality, land use and relevant planning, mineral resources, noise, population and housing, public services and utilities, traffic and circulation, and wildfire. This Alternative would satisfy the Project objectives.

Environmentally Superior Alternative

An EIR must identify the environmentally superior alternative to the proposed Project. Alternative A, the "No Project/No Development Alternative would be environmentally superior to the proposed Project on the basis of the minimization or avoidance of physical environmental impacts. CEQA Section 15126(d)(2) indicates that, if the "No Project/No Development" Alternative is the "Environmentally Superior" Alternative, then the EIR shall also identify an Environmentally Superior Alternative among the other Alternatives. Among those alternatives that propose development, Alternative D, the "Reduced Project Size" Alternative, is the environmentally superior Alternative because it significantly reduces the amount of agricultural land impacted, while reducing other Project specific impacts.

1.7 Areas of Controversy

Written agency and public comments received during the public review period for the NOP/IS are provided in Appendix A. Also see Appendix A for further details on areas of controversy. In summary, the following key issues were identified during scoping as being controversial due to their potentially significant impacts or the need for mitigation to avoid significant impact.

- The EIR should address the following issues: incompatibility with the Metropolitan Bakersfield General Plan, need for the proposed Project, farmland conversion, air quality, biological resources, global warming, water supplies, energy and solar photovoltaics, traffic, aesthetics and light pollution, alternatives, and cumulative impacts.
- The EIR should address issues involving compatibility with industrial uses and the scope of impact upon the surrounding agricultural properties.
- When the traffic impact study for the proposed Project is submitted to the County, the Roads Department would like a copy for review and comment.
- The proposed Project is located outside the administrative boundaries of any oil or gas field, and there is one plugged and abandoned oil well within the Project boundaries. The abandoned well will need to be addressed if structures, roads, or parking lots are planned in proximity to it.
- The proposed Project is located in an area that Tejon Indian Tribe ancestors used in the past; however, the Tribe has no information or concerns at this time.
- The NAHC, as the state trustee agency, recommended various actions in order to adequately assess the proposed Project-related impacts on historical resources.
- A traffic impact study is needed for the proposed Project. An encroachment permit may be needed for the proposed Project, for any work in the State right-of-way.
- The EIR should include a quantitative emissions analysis, a discussion of greenhouse gas emissions generated by the proposed Project and the effect they will have (if any) on global climate change, a discussion of potential odors/sensitive receptors, potential health impact of Toxic Air Contaminants (if any), existing District regulations, feasible mitigation measures that will reduce air quality impacts.

- The Kern County Superintendent of Schools office represents the Greenfield Union and Kern High School Districts with regard to the imposition of developer fees. The collection of statutory fees shall be collected at the time that building permits are issued. Currently, these fees are set at $0.56 per square foot, an amount subject to adjustment ever two years.

1.8 Issues to Be Resolved

Section 15123(b)(3) of the State CEQA Guidelines requires that an EIR contain issues to be resolved, which includes the choices among alternatives and whether or how to mitigate significant impacts. The major issues to be resolved regarding the proposed Project include decisions by the lead agency as to whether or not:

- the Recirculated Draft EIR adequately describes the environmental impacts of the proposed Project,
- the recommended mitigation measures should be adopted or modified, or
- additional mitigation measures need to be applied.

1.9 Summary of Environmental Impacts and Mitigation

The following is a summary of the environmental impacts of the proposed Project, mitigation measures, and unavoidable significant impacts identified and analyzed in Chapter 4.0 of this RDEIR. Refer to the appropriate RDEIR section for additional information.

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Table 1-2. Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation			
Impact	**Level of Significance Before Mitigation**	**Mitigation Measures**	**Level of Significance After Mitigation**
4.1 AESTHETICS			
4.1-1: The Project Would Have a Substantial Adverse Effect on a Scenic Vista.	Less than significant	No mitigation measures are required.	Less than significant
4.1-2: The Project Would Substantially Alter or Damage Scenic Resources, Including but not Limited to, Trees, Rock outcroppings, and Historic Buildings Within a State Scenic Highway.	Less than significant	No mitigation measures are required.	Less than significant
4.1-3: The Project Would Substantially Degrade the Existing Visual Character or Quality of the Proposed Project Site and Its Surroundings.	Potentially ~~Less than~~ significant	**MM 4.1-1:** Prior to the issuance of building permits, the project operator shall demonstrate compliance with ~~one of~~ the following: a. The project proponent shall present a plan to color treat the proposed warehouse and office buildings to blend in with the colors found in the surrounding natural landscape while not producing reflection, as approved by the Kern County Planning and Natural Resources Department; **MM 4.1-2:** The following aesthetic features shall be required in site plans and building permits for commercial buildings located within 1,000 feet of the State Route 99 corridor: a. Rooftop screening features shall be installed to create a visual screen for rooftop mechanical equipment, such as a parapet or screening material. b. Reflective metal exteriors shall not be used as exterior architectural elements in buildings immediately adjacent to State Route 99. **MM 4.1-3:** Prior to the issuance of building permits for any facilities on the project site, the project applicant shall submit to the Kern County Planning and Natural Resources Department for approval, a landscape plan that will effectively buffer foreground views of the proposed project site from State Route 99. This landscape plan shall include, but is not limited to, landscape structural elements (such as fencing), and planting materials consistent with current Kern County landscape requirements and shall be cleared of trash and debris at least monthly during the year. The plan shall also include:	Less than significant

Table 1-2. Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation			
Impact	**Level of Significance Before Mitigation**	**Mitigation Measures**	**Level of Significance After Mitigation**
		a. Preparation by a licensed Landscape Architect and approval by the Kern County Planning and Natural Resources Department Director prior to buffer planting; b. The plan shall include California native, drought-tolerant plants. c. The plan shall provide for an irrigation plan as required under the Kern County Zoning Ordinance 19.86.070. d. Should perimeter fencing be proposed, fencing materials shall be constructed of any materials commonly used in the construction of fences and walls such as wood, stone, rock, tubular steel, wrought iron, or brick, or other durable materials. Masonry block walls shall be decorative and not bare masonry blocks. Decorative materials can include a façade, colored masonry blocks, or other materials. Fencing proposed around sumps may be chain-link with view obscuring slats. Barbed wire is not permitted. e. A 20-foot wide perimeter buffer along any visible boundary from the State Route 99 frontage and shall be included as part of the landscape plan. This buffer shall consist of live ground cover, shrubs, or grass, and: 1) One (1) tree having a minimum planting height of six (6) feet for every 50 lineal feet of buffer; 2) Shrubs which reach a minimum height of four (4) to six (6) feet. 3) Live ground cover consisting of low-height plants, or shrubs, or grass shall be planted in the portion of the landscaped area not occupied by trees or evergreen shrubs. 4) Bare gravel, rock, bark or other similar materials may be used, but are not a substitute for ground cover plantings, and shall be limited to no more than 25 percent of the required landscape area. 5) Landscaping shall be installed prior to final occupancy.	
4.1-4: The Project Would Create a New Source of Substantial Light and Glare That Would Adversely Affect Daytime or Nighttime Views of the Area.	Potentially significant	**MM 4.1-4:** The project shall continuously comply with the following: project facility lighting shall comply with the applicable provisions of the Dark Skies Ordinance (Chapter 19.81 of the Kern County Zoning Ordinance), and shall be designed to provide the minimum illumination needed to achieve safety and security objectives. All lighting shall be directed downward and shielded to focus illumination on the desired areas only	Less than significant

Table 1-2. Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation			
Impact	**Level of Significance Before Mitigation**	**Mitigation Measures**	**Level of Significance After Mitigation**
		and avoid light trespass into adjacent areas. Lenses and bulbs shall not extend below the shields. **MM 4.1-5:** Prior to the issuance of building permits for any facilities on the project site, the project applicant shall submit, and the Kern County Planning and Natural Resources Department shall have approved, plans verifying all outdoor lighting is designed so that all direct lighting is confined to the project site property lines and that adjacent properties and roadways are protected from spillover light and glare.	
Cumulative Impact	Potentially significant	Implement Mitigation Measures MM 4.1-1 through MM 4.1-5, above.	Less than significant
4.2 AGRICULTURAL RESOURCES			
4.2-1: The Project Would Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as Shown on the Maps Prepared Pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to Nonagricultural Use.	Significant and unavoidable	**MM 4.2-1:** Prior to issuance of a grading or building permit, whichever occurs first, the project proponent shall provide written evidence of completion of one or more of the following measures to mitigate the loss 314.30 acres of agricultural land before conversion, at a one-to-one ratio. Funding and/or purchase of agricultural conservation easements (will be managed and maintained by an appropriate entity); Purchase of credits from an established agricultural farmland mitigation bank; Contribution of agricultural land or equivalent funding to an organization that provides for the preservation of farmland in California; or Participation in any agricultural land mitigation programs adopted by Kern County that provides equal or more effective mitigation than the measures listed above. Mitigation land shall meet the definition of prime farmland or farmland of statewide importance established by the State Department of Conservation. Completion of the selected measure(s), or with the Planning Director's approval, a combination of the selected mitigation measures, can be on qualifying agricultural land within the San Joaquin Valley (San Joaquin, Stanislaus, Merced, Fresno, Madera, Kings, Tulare, Kern Counties) or outside the San Joaquin Valley with written evidence that the same or equivalent crops can be produced on the mitigation land.	Significant and unavoidable

Table 1-2. Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation			
Impact	**Level of Significance Before Mitigation**	**Mitigation Measures**	**Level of Significance After Mitigation**
4.2-2: The Project Would Conflict with Existing Zoning for Agricultural Use, or a Williamson Act Contract.	Less than significant	No mitigation measures are required.	Less than significant
4.2-3: The Project Would Conflict with Existing Zoning for, or Cause Rezoning of, Forest Land (as Defined in Public Resources Code Section 12220(g)) or Timberland (as Defined in Public Resources Code Section 4526).	No Impact	No mitigation measures are required.	No impact
4.2-4: The Project Would Result in the Loss of Forest Land or Conversion of Forest Land to Non-Forest Use.	No Impact	No mitigation measures are required.	No impact
4.2-5: The Project Would Involve Other Changes in the Existing Environment Which, Due to Their Location or Nature, Could Result in Conversion of Farmland, to Non-Agricultural Use or Conversion of Forest Land to Non-Forest Use.	Significant and unavoidable	Implement MM 4.2-1.	Significant and unavoidable
4.2-6: The Project Would Result in the Cancellation of an Open Space Contract Made Pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Contract for Any Parcel of 100 or More Acres (Section 1526(b)(3) Public Resources Code.	Potentially significant	Implement MM 4.2-1.	Less than significant
Cumulative Impacts	Significant and unavoidable	Implement MM 4.2-1.	Significant and unavoidable

4.3 AIR QUALITY			
4.3-1: The Project Would Not Be Consistent with the Air Quality Attainment Plan.	Less than significant	No mitigation measures are required.	Less than significant
4.3-2: The Project Would Violate Any Air Quality Standard as Adopted or Established by EPA or Air District or Contribute Substantially to an Existing or Projected Air Quality Violation.	Less than significant	**MM 4.3-1:** Air Quality. To minimize personnel and public exposure to potential Valley Fever–containing dust both on- and off-site, the following additional control measures shall be included in the DCP to be prepared for this project: Equipment, vehicles, and other items shall be thoroughly cleaned of dust before they are moved off-site to other work locations. Wherever possible, grading and trenching work shall be phased so that earth-moving equipment is working well ahead or down-wind of workers on the ground. The area immediately behind grading or trenching equipment shall be sprayed with water before ground workers move into the area. In the event that a water truck runs out of water before dust is sufficiently dampened, ground workers being exposed to dust are to leave the area until a full truck resumes water spraying. All heavy-duty earth-moving vehicles shall be closed-cab and equipped with a HEPA-filtered air system. **MM 4.3-2:** Valley Fever Training. On-site personnel shall be trained on the proper use of personal protective equipment, including respiratory equipment. National Institute for Occupational Safety and Health (NIOSH)-approved respirators shall be provided to on-site personal, upon request. Evidence of training shall be provided to the Kern County Planning and Natural Resources Department within 24 hours of the training session. Valley Fever informational handout shall be provided to all on-site construction personnel. The handout shall, at a minimum, provide information regarding the symptoms, health effects, preventative measures, and treatment. Additional information and handouts can be obtained by contacting the Kern County Public Health Services Department. **MM 4.3-3:** Valley Fever Education Fees. One-time payment of $3,200.00 shall be made to the Kern County Public Health Services Department for the specific purposes of continued Valley Fever education and outreach.	Less than significant for construction related impacts and operational SOx PM10, and PM2.5. Significant and Unavoidable Impact of ROG, NOx, and CO operational emissions.

		MM 4.3-4: All required landscaping along major and arterial roadways will be designed with native drought-resistant species (plants, trees, and bushes) to reduce demand for gas-powered landscape maintenance equipment. **MM 4.3-5:** Prior to issuance of building permit, the applicant shall submit evidence, verified by the Air District, that the development has total Project construction and operations emissions mitigated baseline below 2 tons per year for NOx (total Project construction and operations) and mitigated baseline below 2 tons per year for PM10 emissions (total Project constructions and operations). Required reductions can be achieved from any combination of Project design, compliance with the Indirect Source Review (ISR) and/or a Development Mitigation Contract. If a Development Mitigation Contract is utilized, a copy of the executed agreement and implementing reports will be provided to the Planning Department to substantiate compliance. As there still would be unmitigated emissions of ROG participation in any air mitigation program adopted by Kern County that provides equal or more effective mitigation than this mitigation measure can be utilized as a replacement for the requirements of this mitigation measure.	
4.3-3: The Project Would Violate Standards for CO Concentrations.	Less than significant	No mitigation measures are required.	Less than significant
4.3-4: The Project Would Result in A Cumulatively Considerable Net Increase of Any Criteria Pollutant For Which The Project Region Is Nonattainment Under an Applicable Federal Or State Ambient Air Quality Standard.	Potentially significant	Implement Mitigation Measures MM 4.3-1 through MM 4.3-5.	Significant and Unavoidable
4.3-5: The Project Would Expose Sensitive Receptors To Substantial Pollutant Concentrations.	Significant and unavoidable	Implement mitigation measures MM 4.3-1 through MM 4.3-5.	Significant and Unavoidable impact of ROG, NOx, and CO operation emissions. Less than significant after mitigation for Project contribution of all other emissions. Less than significant for

			construction emissions.
4.3-6: The Project Would Create Odor Impacts.	Less than significant	No mitigation measures are required.	Less than significant
Cumulative Impacts			
Total Cumulative Project Emissions	Significant and unavoidable	**Implement Mitigation Measures MM 4.3-1 through MM 4.3-5.**	Significant and unavoidable
Hazardous Air Pollutants.	Less than significant	No mitigation measures are required.	Less than significant
4.4 BIOLOGICAL RESOURCES			
4.4-1: The Project Will Have a Substantial Adverse Effect, Either Directly or Through Habitat Modifications, on Any Species Identified as a Candidate, Sensitive or Special Status Species in Local or Regional Plans, Policies or Regulations, or by the CDFG or USFWS.	Potentially Significant	**MM 4.4-1: Biological Monitoring.** Prior to initiation of any site preparation and/or construction activities, the project proponent shall retain a Lead Biologist who shall be approved prior to conducting pre-construction surveys by the Kern County Planning and Natural Resources Department with a submitted resume. The Lead Biologist will have oversight over implementation of all necessary avoidance and minimization efforts and will have the authority to stop construction activities, if any of the requirements associated with these measures are not being fulfilled. If the biologist has requested work activities stop due to take of any listed species, the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife will be notified within 1 day via email and telephone. In addition to the Lead Biologist, all other qualified biologists or monitors working on site, conducting evaluations, etc., shall submit resumes for approval to the Kern County Planning and Natural Resources Department. **MM 4.4-2: Environmental Awareness Training and Education Program.** Prior to the issuance of grading or building permits and for the duration of construction activities, all new construction workers at the project site shall attend an Environmental Awareness Training and Education Program, developed and presented by the Lead Biologist. Any employee responsible for the operations and maintenance or decommissioning of the project facilities shall also attend the Environmental Awareness Training and Education Program. The Training Program shall include, but not be limited to, information on the life history of species including the blunt-nosed leopard lizard, San Joaquin whipsnake, coast horned lizard, burrowing owl, Swainson's hawk, prairie falcon, Le Conte's thresher, Nelson's antelope squirrel, giant kangaroo rat, short-nosed kangaroo rat, Tipton kangaroo rat, Tulare grasshopper mouse, San Joaquin pocket mouse, American badger, nesting birds, and San Joaquin kit fox, as well as other wildlife and plant	Less than significant

		species that may be encountered during construction activities, their legal protections, the definition of "take" under the Endangered Species Act, measures to protect the species, reporting requirements, specific measures that each worker shall employ to avoid take of wildlife species, and penalties for violation of the Act. To ensure employees and contractors understand their roles and responsibilities, training may be conducted in languages other than English. An acknowledgement form signed by each worker indicating that Environmental Awareness Training and Education Program has been completed would be kept on record; A sticker shall be placed on hard hats indicating that the worker has completed the Environmental Awareness Training and Education Program. Construction workers shall not be permitted to operate equipment within the construction areas unless they have attended the Environmental Awareness Training and Education Program and are wearing hard hats with the required sticker; A copy of the training transcript and/or training video, as well as a list of the names of all personnel who attended the Environmental Awareness Training and Education Program and copies of the signed acknowledgement forms shall be submitted to the Kern County Planning and Natural Resources Department; and, The construction crews and contractor(s) shall be responsible for unauthorized impacts from construction activities to sensitive biological resources that are outside the areas defined as subject to impacts by project permits. An Operation and Maintenance-phase version of the WEAP will be maintained within the on-site O&M facility for review as may be necessary during the life of the project. All vehicles will be directed to exercise caution when commuting within the project area. A 15-mile per hour speed limit will be enforced on unpaved roads. Project employees will be provided with written guidance governing vehicle use, speed limits on unpaved roads, fire prevention, and other hazards. A litter control program shall be instituted at the project site. All workers shall ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash from the project area are deposited in covered or closed trash containers. The trash containers shall be removed from the project area at the end of each working day. No canine or feline pets or firearms (except for federal, state, or local law enforcement officers and security personnel) shall be permitted on construction sites to avoid harassment, killing, or injuring of listed species.	

		Maintenance and construction excavations greater than 2 feet deep shall be covered, filled in at the end of each working day, or have earthen escape ramps no greater than 200 feet apart provided to prevent entrapment of listed species. All construction activities shall be confined within the project construction area, which may include temporary access roads, haul roads, and staging areas specifically designated and marked for these purposes. At no time shall equipment or personnel be allowed to adversely affect areas outside the project site. Because dusk and dawn are often the times when listed species are most actively foraging, all construction activities will cease 0.5 hour before sunset and will not begin prior to 0.5 hour before sunrise. Except when necessary for driver or pedestrian safety, lighting of the project site by artificial lighting during nighttime hours is prohibited. Tightly woven fiber netting or similar material shall be used for erosion control or other purposes at the project site to ensure that special-status species do not get trapped. This limitation will be communicated to the contractor through use of Special Provisions included in the bid solicitation package. Use of rodenticides and herbicides at the project site shall be avoided to the maximum extent feasible. If use is unavoidable, rodenticides and/or herbicides shall be utilized in such a manner to prevent primary or secondary poisoning of special-status species and depletion of prey populations on which they depend. All uses of such compounds shall observe labels and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Pesticide Regulation, and other appropriate state and federal regulations as well as additional project-related restrictions deemed necessary by the U.S. Fish and Wildlife Service or California Department of Fish and Wildlife. **MM 4.4-3: Preconstruction Surveys.** A pre-construction survey by a qualified biologist or monitor shall be conducted no more than 30 days and no less than 14 days prior to the commencement of any site preparation, ground disturbance, and/or construction activities in previously undisturbed areas of the project site. If any evidence of occupation of that portion of the project site by listed or other special-status plant or animal species is observed, a buffer shall be established by a qualified biologist that results in sufficient avoidance to comply with applicable regulations. If sufficient avoidance cannot be established, the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife shall be contacted for further guidance and consultation on additional measures. The project proponent or operator shall obtain any required permits from the appropriate wildlife agency. Copies of the pre-construction survey and results, as well as all permits and evidence of compliance with applicable regulations, shall be submitted to the Kern County Planning and Natural Resources Department.	

		The following buffer distances shall be established prior to commencement of any site preparation and/or construction activities, if any listed or other special status plant or animal species is observed: a. San Joaquin kit fox or American badger potential den: 50 feet; b. San Joaquin kit fox or American badger known den: 100 feet; c. San Joaquin kit fox or American badger pupping den: contact the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife; d. Burrowing owl burrow outside of breeding season: as recommended by the California Department of Fish and Wildlife Staff Report 2012; e. Burrowing owl burrow during breeding season: as recommended by the California Department of Fish and Wildlife Staff Report 2012; f. Swainson's hawk nest during breeding season: 0.5 mile; g. Other protected raptor nests during the breeding season: as recommended by a qualified biologist; h. Other protected nesting migratory bird nests during the breeding season: as recommended by a qualified biologist; and i. Coast horned lizard, San Joaquin whipsnake, and other special-status wildlife species: as recommended by a qualified biologist. **MM 4.4-4**: If construction activities are conducted during the typical nesting bird season (February 15 through September 15), pre-construction surveys shall be conducted by a qualified biologist prior to any site preparation and/or construction activity to identify potential nesting bird activity. The survey area shall include a 500-foot buffer surrounding the property. If no active nests are found within the survey area, no further mitigation is required. If nesting activity is identified during the pre-construction survey process, the following measures will be implemented: a. If active nest sites of bird species protected under the Migratory Bird Treaty Act and/or California Fish and Game Code are observed within the project site, then the project will be modified and/or delayed as necessary to avoid direct take of the identified nests, eggs, and/or young; b. If active nest sites of raptors and/or bird species of special concern are observed within the vicinity of the project site, then the appropriate buffer around the nest site (typically 250 feet for passerines and 500 feet for raptors) will be established.	

		Construction activities in the buffer zone will be prohibited until the young have fledged the nest and achieved independence; and, c. Active nests shall be documented by a qualified biologist, and a letter report shall be submitted to the Kern County Planning and Natural Resources Department documenting project compliance with the Migratory Bird Treaty Act and California Fish and Game Code. **MM 4.4-5:** Within 6 months prior to commencement of site preparation and/or construction activities, the project proponent shall ensure that a U.S. Fish and Wildlife Service-approved biologist conducts a protocol survey for blunt-nosed leopard lizard in accordance with the guidelines published by the California Department of Fish and Wildlife, Region 4, Fresno Office (CDFW 2004). If blunt-nosed leopard lizards are located within the action area, the U.S. Fish and Wildlife Service will be contacted to discuss methods for proceeding with the project in a manner which will avoid take. **MM 4.4-6: Burrowing Owl.** The project proponent shall implement the following measures, based on the recently updated California Department of Fish and Game (now California Department of Fish and Wildlife) 2012 Staff Report on Burrowing Owl Mitigation, to ensure potential impacts to burrowing owl resulting from project implementation will be avoided and minimized to less-than-significant levels: A qualified wildlife biologist (i.e., a wildlife biologist with previous burrowing owl survey experience) shall conduct pre-construction surveys of the permanent and temporary impacts areas, plus an ISO-meter (approximately 492-foot) buffer, to locate active breeding or wintering burrowing owl burrows no less than 14 days prior to construction. The survey methodology will be consistent with the methods outlined in the Staff Report and will consist of walking parallel transects 7 to 20 meters apart, adjusting for vegetation height and density as needed, and noting any potential burrows with fresh burrowing owl sign or presence of burrowing. As each burrow is investigated, biologists will also look for signs of American badger and kit fox. Copies of the survey results shall be submitted to the California Department of Fish and Wildlife and Kern County Planning and Natural Resources Department. If burrowing owls are detected, no ground-disturbing activities, such as road construction or ancillary facilities, shall be permitted within the distances listed below in the table titled “Burrowing Owl Burrow Buffers,” unless otherwise authorized by California Department of Fish and Wildlife. Burrowing owls shall not be moved or excluded from burrows during the breeding season. If avoidance of active burrows is infeasible, the owls can be passively displaced from their burrows according to recommendations made in the 2012 Staff Report on	

		Burrowing Owl Mitigation. Burrowing owls should not be excluded from burrows unless or until: Occupied burrows shall not be disturbed during the nesting season unless a qualified biologist meeting the Biologist Qualifications set forth in the May 2012 California Department of Fish and Wildlife Staff Report, verifies through noninvasive methods that either: (1) the owls have not begun egg-laying and incubation; or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival. Burrowing owls will not be moved or excluded from burrows during the breeding season. A Burrowing Owl Exclusion Plan is developed and approved by the applicable local California Department of Fish and Wildlife office and submitted to the Kern County Planning and Natural Resources Department. The plan shall include, at a minimum: Confirm by site surveillance that the burrow(s) is empty of burrowing owls and other species preceding burrow scoping; Type of scope and appropriate timing of scoping to avoid impacts; Occupancy factors to look for and what will guide determination of vacancy and excavation timing (one-way doors should be left in place 48 hours to ensure burrowing owls have left the burrow before excavation, visited twice daily, and monitored for evidence that owls are inside and can't escape, i.e., look for sign immediately inside the door); How the burrow(s) will be excavated. Excavation using hand tools with refilling to prevent reoccupation is preferable whenever possible (may include using piping to stabilize the burrow to prevent collapsing until the entire burrow has been excavated and it can be determined that owls reside the burrow); Removal of other potential owl burrow surrogates or refugia on-site; Photographing the excavation and closure of the burrow to demonstrate success and sufficiency; Monitoring of the site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use to avoid take; How the impacted site will continually be made inhospitable to burrowing owls and fossorial mammals (e.g., by allowing vegetation to grow tall, heavy disking, or immediate and continuous grading) until development is complete. Permanent loss of occupied burrow(s) and habitat is mitigated in accordance with the measures described below.	

		Temporary exclusion is mitigated in accordance with the measures described below. Site monitoring is conducted prior to, during, and after exclusion of burrowing owls from their burrows sufficient to ensure take is avoided. Conduct daily monitoring for 1 week to confirm young of the year have fledged if the exclusion will occur immediately after the end of the breeding season. Excluded burrowing owls are documented using artificial or natural burrows on an adjoining mitigation site (if able to confirm by band re-sight). In accordance with the Burrowing Owl Exclusion Plan, a qualified wildlife biologist shall excavate burrows using hand tools. Sections of flexible plastic pipe or burlap bag shall be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow. One-way doors shall be installed at the entrance to the active burrow and other potentially active burrows within 160 feet of the active burrow. The one-way doors can be removed 48 hours after installation, and ground-disturbing activities can proceed. Alternatively, burrows can be filled to prevent reoccupation. During construction activities, monthly and final compliance reports shall be provided to the California Department of Fish and Wildlife, Kern County Planning and Natural Resources Department, and other applicable resources agencies documenting the effectiveness of mitigation measures and the level of burrowing owl take associated with the proposed project. Should burrowing owls be found on-site, compensatory mitigation for lost breeding and/or wintering habitat shall be implemented on-site or off-site in accordance with Burrowing Owl Staff Report guidance and in consultation with the California Department of Fish and Wildlife. At a minimum, the following recommendations shall be implemented: Temporarily disturbed habitat shall be restored, if feasible, to pre-project conditions, including decompacting soil and revegetating. If restoration is not feasible, then the project proponent shall implement (2) below. Permanent impacts to nesting, occupied, and satellite burrows and/or burrowing owl habitat will be mitigated such that the habitat acreage, number of burrows, and burrowing owls impacted are replaced based on a site-specific analysis and shall include: Permanent conservation of similar vegetation communities (grassland, scrublands, desert, urban, and agriculture) to provide for burrowing owl nesting, foraging, wintering, and dispersal (i.e., during breeding and non-breeding seasons) comparable to or better than that of the impact area, and with sufficiently large acreage, and presence of	

		fossorial mammals. Conversation shall occur in areas that support burrowing owl habitat and can be enhanced to support more burrowing owls. Permanently protect mitigation land through a conservation easement deeded to a nonprofit conservation organization or public agency with a conservation mission. If the project is located within the service area of a California Department of Fish and Wildlife-approved burrowing owl conservation bank, the project operator may purchase available burrowing owl conservation bank credits. Develop and implement a mitigation land management plan in accordance with Burrowing Owl Staff Report guidelines to address long-term ecological sustainability and maintenance of the site for burrowing owls. Fund the maintenance and management of mitigation land through the establishment of a long-term funding mechanism such as an endowment. Habitat shall not be altered or destroyed, and burrowing owls shall not be excluded from burrows, until mitigation lands have been legally secured, are managed for the benefit of burrowing owls according to California Department of Fish and Wildlife-approved management, monitoring and reporting plans, and the endowment or other long-term funding mechanism is in place or security is provided until these measures are completed. Mitigation lands should be on, adjacent to, or in proximity to the impact site, where feasible, and where habitat is sufficient to support burrowing owls. Consult with the California Department of Fish and Wildlife when determining off-site mitigation acreages. **MM 4.4-7: Burrowing Owl Buffers.** The project proponent shall continuously comply with the following: If any burrowing owl burrows are observed during the pre-construction survey, avoidance measures shall be consistent with those included in the California Department of Fish and Wildlife staff report on burrowing owl mitigation (CDFG, 2012). If occupied burrowing owl burrows are observed outside of the breeding season, a passive relocation effort may be instituted in accordance with the guidelines established by the California Burrowing Owl Consortium (1993) and the California Department of Fish and Wildlife (CDFG, 2012) (Table 1). During the breeding season, a buffer zone, as noted in Table 1, shall be maintained unless a qualified biologist verifies through noninvasive methods that either the birds have not begun egg laying and incubation or that juveniles from the occupied burrows are foraging independently and are capable of independent survival. Buffer zones may be reduced in size through consultation with	

appropriate agencies and the project biologist to determine if avoidance would still be achieved. The Kern County Planning and Natural Resources Department shall be kept apprised of meetings and correspondence for any consultation.

Table 1: Burrowing Owl Burrow Buffers (CDFG Staff Report, 2012)

Location	Time of Year	Level of Disturbance		
		Low	Medium	High
Nesting Sites	April 1-Aug 15	656 ft	1,640 ft	1,640 ft
Nesting Sites	Aug 16-Oct 15	656 ft	656 ft	1,640 ft
Any Occupied Burrow	Oct 16-Mar 31	164 ft	328 ft	1,640 ft

MM 4.4-8: Trash Abatement. Prior to issuance of grading or building permits, a long-term trash abatement program shall be established for construction, operations and maintenance. Trash and food items shall be contained in closed containers and removed daily.

MM 4.4-9: Trash Abatement and Trench Monitoring Requirements. Prior to and during construction activities, the project proponent shall ensure the project complies with the following:

a. Any pipe, culvert, or similar structure with a diameter of 4 inches or greater, stored on-site for one or more nights shall be inspected to ensure kit foxes or other wildlife have not become entrapped or buried in the pipes. If the pipes, culverts, or similar structures with a diameter of 4 inches or greater are not capped or otherwise covered, they shall be inspected twice daily, in the morning and evening, and prior to burial or closure, to ensure no kit foxes or other wildlife become entrapped or buried in the pipes.

b. All food, garbage, and plastic shall be disposed of in closed containers and regularly removed from the site to minimize attracting ranging kit fox, or other wildlife to the site where they may be harmed. All trash shall be removed and disposed of regularly in accordance with state and local laws and regulations.

		MM 4.4-10: San Joaquin kit fox. Prior to and during construction activities: a. If any San Joaquin kit fox dens are found during pre-construction surveys, the status of the dens shall be evaluated no more than 14 days prior to project ground disturbance. Provided that no evidence of kit fox occupation is observed, potential dens shall be marked and a 50-foot avoidance buffer delineated using stakes and flagging or other similar material to prevent inadvertent damage to the potential den. If a potential den cannot be avoided, it may be hand-excavated following United States Fish and Wildlife Service standardized recommendations for protection of the San Joaquin kit fox prior to or during ground disturbance by the lead biologist. If kit fox activity is observed at a den, the den status shall change to "known" per United States Fish and Wildlife Service guidelines (1999), and the buffer distance shall be increased to 100 feet. Absolutely no excavation of San Joaquin kit fox known or pupping dens shall occur without prior authorization from the United States Fish and Wildlife Service and California Department of Fish and Wildlife. b. To enable kit foxes and other wildlife (e.g., American badger) to pass through the project site during construction, the perimeter security fence shall leave a 5-inch opening between the fence mesh and the ground or the fence shall be raised 5 inches above the ground. The bottom of the fence fabric shall be knuckled (wrapped back to form a smooth edge) to protect wildlife that passes under the fence. c. All pipes, culverts, or similar structures with a diameter of four inches or more that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the United States Fish and Wildlife Service has been consulted. If necessary, under the direct supervision of the biologist, the pipe may be moved once to remove it from the path of construction activity until the fox has escaped. d. To prevent inadvertent entrapment of San Joaquin kit foxes, badgers, or other animals during construction, all excavated, steep-walled holes or trenches more than two feet deep shall be covered with plywood or similar materials at the close of each working day, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals. If trapped animals are observed, escape ramps or structures shall be installed immediately to allow escape. If listed species	

		are trapped, the United States Fish and Wildlife Service and California Department of Fish and Wildlife shall be contacted. e. All vertical tubes used in project construction, such as chain link fencing poles shall be temporarily or permanently capped at the time they are installed to avoid the entrapment and death of special-status birds. **MM 4.4-11: Nesting Birds.** A pre-construction protocol-level surveys by a qualified biologist for nesting birds shall be required if construction activities are scheduled to occur during the breeding season for raptors and other migratory birds (February 1–August 31), to reduce potential impacts to nesting birds and raptors. The survey shall be conducted within 30 days of ground disturbance activities. a. If any nesting birds/raptors are observed, a qualified biologist shall determine buffer distances and/or the timing of project activities so that the proposed project does not cause nest abandonment or destruction of eggs or young. This measure shall be implemented so that the proposed project remains in compliance with the Migratory Bird Treaty Act and applicable State regulations. **MM 4.4-12:** Prior to any vegetation removal during site preparation, the areas required for construction shall be surveyed for actively nesting birds. If any wildlife is encountered during the course of construction, the wildlife shall be allowed to leave the construction area unharmed. Should any active bird nests be identified, the vegetation shall not be removed in areas that contain actively nesting birds. A biological monitor shall survey the areas of vegetation slated for removal, a report shall be submitted to the Kern County Planning and Natural Resources Department for review prior to site preparation. **MM 4.4-13:** The measures below shall be implemented throughout construction and operation of the project: a. Project-related vehicles shall observe a 15 mile-per-hour speed limit in all project areas, except on county roads and State and federal highways. Construction after sundown shall be prohibited. Off-road traffic outside of designated project areas shall be prohibited. b. No pets shall be allowed in project areas, except for trained canine animals related to security and operation of the facility. c. All uses of such herbicidal and rodenticide compounds shall observe label and other restrictions mandated by the United States Environmental Protection Agency, California Department of Food and Agriculture, and federal and State legislation as well as additional project-related restrictions deemed necessary by	

		the California Department of Fish and Wildlife and/or the United States Fish and Wildlife Service. d. No plants or wildlife shall be collected, taken, or removed from the construction areas or areas of off-site improvements, except as necessary for project-related vegetation removal or wildlife relocation. Salvage of native vegetation to be removed from construction areas is encouraged, but shall only be performed by qualified biologists and with written approval from the California Department of Fish and Wildlife. e. If San Joaquin kit fox known or pupping dens are observed in project areas, the project proponent shall contact the United States Fish and Wildlife Service and California Department of Fish and Wildlife to discuss appropriate actions.	
4.4-2: The Project Would Have a Substantial Adverse Effect on any Riparian Habitat or Other Sensitive Natural Community Identified in Local or Regional Plans, Policies, Regulations, or by the CDFG or USFWS.	Less than significant	No mitigation measures are required.	Less than significant
4.4-3: The Project Would Have a Substantial Adverse Effect on Federally Protected Wetlands, as Defined by Section 404 of the CWA (Including, But Not Limited to, Marsh, Vernal Pool, Coastal, etc.) Through Direct Removal, Filling, Hydrological Interruption or Other Means.	Less than significant	No mitigation measures are required.	Less than significant
4.4-4: The Project Would Interfere Substantially with the Movement of Any Native or Migratory Fish or Wildlife Species or With Established Native Resident or Migratory Wildlife Corridors or Impede the Use of Native Wildlife Nursery Sites.	Potentially Significant	Implement Mitigation Measures MM 4.4-1 through MM 4.4-12, above.	Less than significant
4.4-5: The Project Would Conflict With Any Local Policies or Ordinances	Less than significant	No mitigation measures are required.	Less than significant

Protecting Biological Resources, Such as a Tree Preservation Policy or Ordinance.			
4.4-6: The Project Would Conflict With the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan or Other Approved Local, Regional or State Habitat Conservation Plan.	Less than significant	No mitigation measures are required.	Less than significant
Cumulative Impacts			
Ecological Communities Previously Occurring within the Metropolitan Bakersfield General Plan Area	Less than significant	Implement Mitigation Measures MM 4.4-1 through MM 4.4-12.	Less than significant
Species of Concern Occurring within the Metropolitan Bakersfield General Plan Area	Potentially significant	Implement Mitigation Measures MM 4.4-1 through MM 4.4-12.	Less than significant
4.5 CULTURAL RESOURCES			
4.5-1: The Project Would Cause a Substantial Adverse Change in the Significance of a Historical or Archaeological Resource.	Potentially Significant	**MM 4.5-1: Archaeological Resources.** Prior to ground disturbance, or the issuance of grading or building permits, the project proponent shall retain a qualified lead archaeologist to carry out all mitigation measures related to archaeological resources. The approved monitor shall monitor all initial ground-disturbing activities (such as site preparation and initial grading) and excavations on the project site. If archaeological resources are encountered during implementation of the project, ground-disturbing activities will cease within the immediate vicinity of the find. The lead archaeologist shall establish a buffer area around the find and make an evaluation of the find to determine appropriate treatment that may include the development and implementation of a data recovery investigation or preservation in place. All cultural resources recovered will be documented on California Department of Parks and Recreation Site Forms to be filed with the California Historic Resources Information System (CHRIS). The archaeologist will prepare a final report about the find to be filed with the Applicant/landowner and the CHRIS. The report will include documentation and interpretation of resources recovered. Interpretation will include full evaluation of the eligibility with respect to the National Register of Historic Places and California Register of Historical Resources and CEQA. The developer, in consultation with the Lead	Less than significant

		Agency and Project Archaeologist, will designate repositories in the event that resources are recovered. **MM 4.5-2: Paleontological Resources.** During project construction, if a paleontological resource is found, the project contractor shall cease ground-disturbing activities within 50 feet of the find. A qualified paleontologist shall be obtained to evaluate the significance of the resource(s) and recommend appropriate treatment measures. Any fossils encountered and recovered shall be catalogued and donated to a public, non-profit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County. Accompanying notes, maps, and photographs shall also be filed at the repository. **MM 4.5-3: Historical Resources.** Prior to the issuance of grading or building permits, the project proponent shall ensure the following measures are implemented for resources, which are discretionarily considered historical resources for the purposes of this project: The construction zone shall be narrowed or otherwise altered to avoid resources. All avoidance areas delineated on the site plan shall be coordinated through the lead archeologist and submitted to the Kern County Planning and Natural Resources Department for approval. In coordination with the qualified archaeologist avoidance shall be ensured by the delineation of environmentally sensitive areas. Protective fencing shall not identify the protected area as a cultural resource area in order to discourage unauthorized disturbance or collection of artifacts. Consistent with Mitigation Measure 4.5-1 (above) a qualified archaeological monitor and Native American Monitor, shall monitor all project-related ground disturbing activities within 150 feet of the environmentally sensitive areas, in order to ensure avoidance. If avoidance is demonstrated to be infeasible, the resource shall be collected and curated at an appropriate curatorial facility. Or if avoidance is demonstrated to be infeasible, a detailed Cultural Resources Treatment Plan shall be prepared and implemented by a qualified archaeologist. The Cultural Resources Treatment Plan shall include a research design and a scope of work for data recovery of the portion(s) to be impacted by the project. Treatment may consist of (but would not be limited to): a sufficient avoidance buffer to protect the resource until data recovery and/or removal is completed; sample excavation;	

		surface artifact collection; site documentation; and, historical research, with the aim to target the recovery of important scientific data contained in the portion of the significant resource to be impacted by the project. The Cultural Resources Treatment Plan shall also include provisions for analysis of data in a regional context, reporting of results within a timely manner, and curation of artifacts and data at an approved facility. The reports documenting the implementation of the Cultural Resources Treatment Plan shall be submitted to and approved by the Kern County Planning and Natural Resources Director and shall also be submitted to the Southern San Joaquin Valley Information Center at California State University, Bakersfield.	
4.5-2: The Project Would Directly or Indirectly Destroy a Unique Paleontological Resource or Site or Unique Geologic Feature.	Potentially significant	**MM 4.5-4: Found Paleontological Resource.** During implementation of the proposed project, if a paleontological resource is found, the project contractor shall cease ground-disturbing activities within 50 feet of the find. A qualified paleontologist shall evaluate the significance of the resource(s) and recommend appropriate treatment measures. At each fossil locality, field data forms shall be used to record pertinent geologic data, stratigraphic sections shall be measured, and appropriate sediment samples shall be collected and submitted for analysis. Any fossils encountered and recovered shall be catalogued and donated to a public, non-profit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County. Accompanying notes, maps, and photographs shall also be filed at the repository.	Less than significant
4.5-3: The Project Would Disturb Any Human Remains, Including Those Interred Outside of Formal Cemeteries.	Potentially significant	**MM 4.5-5: Found Human Remains.** If human remains are uncovered during project construction, the project proponent shall immediately halt work, contact the Kern County Coroner to evaluate the remains, and follow the procedures and protocols set forth in Section 15064.4 (e)(1) of the California Environmental Quality Act Guidelines. If the County Coroner determines the remains are Native American, the coroner shall contact the Native American Heritage Commission, in accordance with Health and Safety Code Section 7050.5, subdivision (c), and Public Resources Code 5097.98 (as amended by Assembly Bill 2641). The Native American Heritage Commission shall designate a Most Likely Descendent (MLD) for the remains per Public Resources Code 5097.98. Per Public Resources Code 5097.98, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further	Less than significant

		development activity until the landowner has discussed and conferred with the most likely descendent regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. If the remains are determined to be neither of forensic value to the Coroner, nor of Native American origin, provisions of the California Health and Safety Code (7100 et. seq.) directing identification of the next-of-kin will apply. The MLD shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.	
Cumulative Impacts	Potentially significant	Implement Mitigation Measures MM 4.5-1 through MM 4.5-5, above.	Less than significant
4.6 ENERGY			
4.6-1: The Project Would Result in Potentially Significant Environmental Impact Due to Wasteful, Inefficient, or Unnecessary Consumption of Energy Resources, During Project Construction or Operation	Potentially significant	**MM 4.6-1**: The proposed Project, shall to the extent feasible and to the satisfaction of the Kern County Planning Department incorporate the following energy conservation and design features to reduce the level of energy consumption of the proposed Project. The following list is non-inclusive of all potential mitigation that may be included and may be added to at the discretion of Kern County as new technologies become available and feasible to be incorporated: Solar photovoltaics (PV) mounted on proposed structure's roofs to provide a portion of the future electrical demand and offset emissions from fossil fuel fired power plants. Encourage green building measures that contribute to reducing energy use to 25% less than Title 24 requirements; Solar water heating to provide non-industrial water heating; Ground mounted solar PV arrays to provide a portion of the estimated electrical demand for the proposed Wastewater Treatment and Recycle Facility; Commercial buildings shall be designed to meet LEED Silver standards; Roofs on all buildings shall be of a light color to reduce heat generation; Portions of parking lots (drive aisles) may be paved with concrete versus asphalt to reduce initial solar reflectance; Depending on the usage, portions of parking lots may be covered, and the parking lot roofs contain solar PV; Use LED lighting fixtures on all public streets and site lighting;	Less than significant

		Include dedicated EV parking at a rate more than required by current codes; Include EV charging facilities to encourage the usage of electric vehicles; Encourage the utilization of electric forklifts and other material handling vehicles to reduce usage of fossil fuels; Design circulation features into the public street improvements to include bus stops and/or other public transportation; Include bicycle friendly features to reduce Vehicle Miles Traveled (VMT) and to encourage non-vehicular transportation; Encourage the usage of high efficiency electric motors for the industrial uses and the wastewater treatment plant.	
4.6-2: The Project Would Conflict with or Obstruct State or Local Plan for Renewable Energy or Energy Efficiency	Potentially significant	Implement Mitigation Measures MM 4.3-1, and; MM 4.6-1.	Less than significant
4.7 GEOLOGIC AND SEISMIC HAZARDS			
4.7-1: The Project Would Expose People or Structures to Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving the Rupture of a Known Earthquake Fault.	Less than significant	No mitigation measures are required.	Less than significant
4.7-2: The Project Would Expose People or Structures to Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Strong Seismic Ground Shaking Including That Would Result in Potential Substantial Adverse Effects.	Potentially significant	**MM 4.7-1: Phased Grading.** The project proponent shall limit grading to the minimum area necessary for construction. Prior to the initiation of construction, the project proponent shall retain a California registered professional engineer to approve the final grading earthwork and foundation plans prior to construction. **MM 4.7-2: Geotechnical Study.** Prior to the issuance of building or grading permits for the project, the Project proponent shall conduct a full geotechnical study to evaluate soil conditions on the Project site and submit it to the Kern County Public Works Department for review and approval. The geotechnical study must be signed by a California-registered professional engineer and must identify the following: Maximum considered earthquake and associated ground acceleration;	Less than significant

		Potential for seismically induced liquefaction, landslides, differential settlement, and mudflows; Stability of any existing or proposed cut-and-fill slopes; Collapsible or expansive soils; Foundation material type; Recommendations for placement and design of facilities, foundations, and remediation of unstable ground. The project proponent shall determine the final siting of project facilities based on the results of the geotechnical study and implement recommended measures to minimize geologic hazards. The project proponent shall not locate project facilities on or immediately adjacent to a fault trace. All structures shall be offset at least 100-feet from any mapped fault trace. Alternatively, a detailed fault trenching investigation may be performed to accurately locate the fault trace(s) to avoid sighting improvements on or close to these fault structures and to evaluate the risk of fault rupture. After locating the fault, accurate setback distances can be proposed. The Kern County Public Works Department shall evaluate any final facility siting design developed prior to the issuance of any building or grading permits to verify that geological constraints have been avoided. **MM 4.7-3: Seismic Design on Site.** Prior to the issuance of grading permits, the project proponent shall retain a California registered engineer to design the project facilities to withstand probable seismically induced ground shaking at the site. All grading and construction on-site shall adhere to the specifications, procedures, and site conditions contained in the final design plans, which shall be fully compliant with the seismic recommendations of the California-registered professional engineer. The procedures and site conditions shall encompass site preparation, foundation specifications, and protection measures for buried metal. The final structural design shall be subject to approval and follow-up inspection by the Kern County Building Inspection Department. Final design requirements shall be provided to the on-site construction supervisor and the Kern County Building Inspector to ensure compliance. **MM 4.7-4:** Building locations shall be stabilized against the occurrence of liquefaction by dynamic compaction, or other accepted soil stabilization method approved by the County Building official. **MM 4.7-5: Geotechnical Evaluation.** Prior to the issuance of grading permits, a geotechnical evaluation, consisting of field exploration (drilling and soil sampling),	

		laboratory testing of soil samples, and engineering analysis, shall be prepared to determine soil properties related, but not limited, to ground-motion acceleration parameters, the amplification properties of the subsurface units at the specific site, the potential for hydrocompaction to affect the proposed facilities, and the potential for collapsible, subsiding, or expansive soils to affect the proposed facilities. These studies shall be used to determine the appropriate engineering for foundations and support structures as well as building requirements to minimize geotechnical hazard impacts. Copies of all analyses shall be submitted to the Kern County Public Works Department for review and approval. An approved copy of the evaluation shall be submitted to the Kern County Planning and Natural Resources Department. **MM 4.7-6: Minimizing Erosion.** The project proponent shall continuously comply with the following: The project proponent shall use existing roads to the greatest extent feasible to minimize erosion. Prior to approval of the grading permit, final plans shall be reviewed and approved by the Kern County Public Works Department to confirm existing roads were used to the greatest extent feasible. **MM 4.7-7: Minimizing Grading.** The project proponent shall continuously comply with the following: The project proponent shall limit grading to the minimum area necessary for construction and operation of the project. Final grading plans shall include best management practices (BMPs) to limit on-site and off-site erosion, a water plan to treat disturbed areas during construction and reduce dust, and a plan for the disposal of drainage waters originating on-site and from adjacent rights-of-ways (if required). The plans shall be submitted to the Kern County Public Works Department for review and approval.	
4.7-3: The Project Would Result in Substantial Soil Erosion or Loss of Topsoil.	Potentially significant	**MM 4.7-8: Soil Erosion and Sedimentation Control Plan.** The project proponent shall prepare a Soil Erosion and Sedimentation Control Plan to mitigate potential loss of soil and erosion. The plan shall be prepared by a California registered civil engineer or other professional approved to prepare said Plan and submitted for review and approval by the Kern County Public Works Department. The Soil Erosion and Sedimentation Control Plan shall include, but is not limited to, the following: 1. Best Management Practices to minimize soil erosion consistent with Kern County grading requirements and the California Regional Water Quality Control Board	Less than significant

		requirements pertaining to the preparation and approval of a Stormwater Pollution Prevention Plan (Best Management Practices recommended by the Kern County Public Works Department shall be reviewed for applicability); 2. Sediment collection facilities as may be required by the Kern County Public Works Department; 3. A timetable for full implementation, estimated costs, and a surety bond or other security as approved by the County; and 4. Other measures required by the County during permitting, including long-term monitoring (post-construction) of erosion control measures until site stabilization is achieved. Provisions to comply with local and state codes relating to drainage and runoff, including use of pervious pavements, and/or other methods to the extent feasible, to increase stormwater infiltration and reduce runoff onto agricultural lands.	
4.7-4: The Project Would be Located on an Unstable Geologic Unit or Soil That Would Result in On-site or Off-site Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse, Liquefaction, or Collapse.	Less than significant	No mitigation measures are required.	Less than significant
4.7-5: The Project Would Result in Adverse Impacts to People or Structures Resulting in a Risk of Loss, Injury or Death Including Flooding, as a Result of the Failure of a Levee or a Dam.	Less than significant	No mitigation measures are required.	Less than significant
4.7-6: The Project Would Result in Impacts from Being Located on Expansive Soil, as Defined in Section 1803.5.3 of the CBC (2016) Creating Substantial Risks to Life or Property.	Less than significant	No mitigation measures are required.	Less than significant
4.7-7: The Project Would Be Constructed on Soils Incapable of Adequately Supporting the Use of Septic Tanks or Alternative Wastewater Disposal Systems Where Sewers Are	Potentially significant	**MM 4.7-9: Septic Design Plans.** Prior to the issuance of permits, the project proponent shall provide evidence to the Kern County Planning and Natural Resources Department that the siting, design and construction of proposed septic system(s) and leach field disposal system(s) comply with the 2016 Kern County On-site Systems Manual as authorized by the California Water Board Local Agency Management Program (LAMP) and administered locally by the Kern County Environmental Health Services Department	Less than significant

Not Available for the Disposal of Wastewater.		(KCEHS). Proving the proposed septic design plans comply with these requirements will ensure that all standards for septic tanks, seepage pits, and soils are capable of adequately supporting the use of septic tanks. **MM 4.7-10: Final Leach Field Disposal System.** The final leach field disposal system shall be designed by a licensed engineer, taking into full consideration the recommendations provided in the June 2016 Kern County On-site Systems Manual.	
Cumulative Impacts	Potentially significant	Implement Mitigation Measures MM 4.7-1 through MM 4.7-10, above.	Less than significant
4.8 GREENHOUSE GASES			
4.8-1: The Project Would Generate Greenhouse Gas Emissions, Either Directly or Indirectly, That May Have a Significant Impact on the Environment.	Less than significant	No mitigation measures are required.	Less than significant
4.8-2: The Project Would Conflict with an Applicable Plan, Policy or Regulation Adopted for the Purpose of Reducing the Emissions of Greenhouse Gases.	Potentially significant	Implement Mitigation Measure MM 4.3-1, above.	Less than significant
Cumulative Impacts	Significant and unavoidable	Implement Mitigation Measure MM 4.3-1, above.	Significant and unavoidable
4.9 HAZARDS/HAZARDOUS MATERIALS			
4.9-1: The Project Create a Significant Hazard to the Public or the Environment Through the Routine Transport, Use or Disposal of Hazardous Materials.	Potentially significant	**MM 4.9-1: Hazardous Materials Business Plan.** During the life of the project, including decommissioning, the project operator shall prepare and maintain a Hazardous Materials Business Plan (HMBP), as applicable, pursuant to Article 1 and Article 2 of California Health and Safety Code 6.95 and in accordance with Kern County Ordinance Code 8.04.030, by submitting all the required information to the California Environmental Reporting System (CERS) at http://cers.calepa.ca.gov/ for review and approval. The HMBP shall: Delineate hazardous material and hazardous waste storage areas Describe proper handling, storage, transport, and disposal techniques Describe methods to be used to avoid spills and minimize impacts in the event of a spill Describe procedures for handling and disposing of unanticipated hazardous materials encountered during construction	Less than significant

		Establish public and agency notification procedures for spills and other emergencies including fires. Include procedures to avoid or minimize dust from existing residual pesticides and herbicides that may be present on the site The project proponent shall ensure that all contractors working on the project are familiar with the facility's HMBP as well as ensure that one copy is available at the project site at all times. In addition, a copy of the approved HMBP from CERS shall be submitted to the Kern County Planning and Natural Resources Department for inclusion in the projects permanent record. **MM 4.9-2: Spill Prevention Control and Countermeasures (SPCC) Response Plan.** Prior to the issuance of a certificate of occupancy for an individual parcel project which exceeds any of the thresholds established by Title 40, Code of Federal Regulations, Part 112, related to facilities requiring a Spill Prevention Control and Countermeasures (SPCC) Response Plan, the individual parcel proponent shall prepare and submit an SPCC Response Plan to the Kern County Public Health Services Department/ Environmental Health Division and the California Department of Water Resources. The individual parcel proponent shall ensure the project is implemented in compliance with the approved Spill Prevention Control and Countermeasures Response Plan.	
4.9-2: The Project Would Create a Significant Hazard to the Public or the Environment Through Reasonably Foreseeable Upset and Accidental Conditions Involving the Release of Hazardous Materials into the Environment.	Potentially significant	**MM 4.9-34: Discovered/Spilled Hazardous Waste Materials.** The Project proponent shall continuously comply with the following: If suspect materials or wastes of unknown origin are discovered during construction on the project site, which is thought to include hazardous waste materials the following shall occur: All work shall immediately stop in the vicinity of the suspected contaminant; Project Construction Manager shall be notified; Area(s) shall be secured as directed by the Project Construction Manager; Notification shall be made to the Kern County Environmental Health Services Division/Hazardous Materials Section for consultation, assessment, and appropriate actions; and, Copies of all notifications and correspondence shall be submitted to the Kern County Planning and Natural Resources Department.	Less than significant

		MM 4.9-~~45~~5: Hazardous Materials Specialist. Prior to issuance of the grading permit, a qualified hazardous materials specialist shall inspect each power pole on-site with a transformer. Those containing polychlorinated biphenyls shall be removed by the hazardous specialist and disposed of at an appropriate hazardous materials disposal site to the satisfaction of Department of Toxic Substances Control. The hazardous materials specialist shall provide a short report to the Kern County Planning and Natural Resources Department and the Kern County Environmental Health Services Division/Hazardous Materials Section for review and approval. Prior to construction, Pacific Gas and Electric Company (PG&E) shall be contacted regarding the disposition of pole-mounted transformers. In the event of a future release or leak of insulating fluids from any of the pole-mounted transformers, PG&E shall be contacted for their removal or replacement. **MM 4.9-~~56~~6: Known/Discovered Well Remediation.** Prior to start of construction, the abandoned petroleum prospect well shall be located, exposed, and re-abandoned, if required, to conform to the current abandonment requirements of the California Department of Conservation, Division of Oil, Gas and Geothermal Resources and the Kern County Department of Environmental Health Services. **MM 4.9-~~67~~7: Final Maps and Grading Plans, Notes.** The following note shall appear on all final maps and grading plans: "If during grading or construction, any plugged and abandoned or unrecorded wells are uncovered or damaged, the Department of Oil, Gas and Geothermal Resources will be contacted to inspect and approve any remediation required." **MM 4.9-~~78~~8: Underground Service Alert One-call.** Prior to grading or excavating the Underground Service Alert One-call center shall be contacted at (800) 227-2600. The proposed excavation area shall be delineated with white marking paint or with other suitable markers such as flags or stakes at least two days prior to commencing any excavation work. A "Dig Alert" ticket number would be issued at the time Underground Service Alert is contacted. Excavating is not permitted without this ticket number and is valid for twenty-eight days. Underground Service Alert would notify its member utilities having underground facilities in the area. Underground Service Alert does not notify nonmember utilities or energy companies, or Caltrans. **MM 4.9-~~89~~9: Ruptured Pipeline Safety**. If a rupturing of a pipeline should occur during excavation and construction activities the Kern County Fire Department and Pacific Gas and Electric Company should be contacted immediately. Natural gas transmission pipeline rupture most often indicated an emergency situation and 9-1-1 should be dialed. If an emergency is not indicated, the Kern County Fire Department Greenfield	

		Station 52, located at 312 Taft Highway, should be contacted at (661) 834-5144. Non-Emergency telephone numbers for the Kern County Fire Department number (661) 324-6551 and the project proponent shall follow all safety and cleanup regulations. **MM 4.9-9~~10~~: On-site Water Wells**. If the on-site water wells are not to be used for irrigation or industrial purposes, they shall be destroyed in accordance with California Well Standards as governed by the California Department of Water Resources, and permit requirements of the Kern County Environmental Health Services Division. **MM 4.9-1011~~:~~ Herbicides**. Prior to the issuance of grading or building permits for the project, if herbicides are to be utilized, the contractor or personnel applying herbicides must have the appropriate State and local herbicide applicator licenses and comply with all State and local regulations regarding herbicide use. Herbicides shall be mixed and applied in conformance with the product manufacturer's directions. The herbicide applicator shall be equipped with splash protection clothing and gear, chemical resistant gloves, chemical spill/splash wash supplies, and material safety data sheets for all hazardous materials to be used. To minimize harm to wildlife, vegetation, and waterbodies, herbicides shall not be applied directly to wildlife, products identified as non-toxic to birds and small mammals shall be used if nests or dens are observed. Herbicides shall not be applied if it is raining at the site, rain is imminent, or the target area has puddles or standing water, and shall not be applied when wind velocity exceeds 10 miles per hour. If spray is observed to be drifting to a non-target location, spraying shall be discontinued until conditions causing the drift have abated. **MM 4.9-1112~~:~~ Asbestos Containing Materials.** If asbestos containing materials are identified during construction (particularly in the concrete irrigation (transite) pipe located on-site, then the San Joaquin Valley Air Pollution Control District shall be contacted for removal and disposal procedures. These procedures shall be followed in order to eliminate asbestos exposure to construction workers and surrounding workers and residents.	
4.9-3: The Project Would Emit Hazardous Emissions or Handle Hazardous or Acutely Hazardous, Substances, or Waste Within One-	Less than significant.	No mitigation measures are required.	Less than significant.

Quarter Mile of an Existing or Proposed School.			
4.9-4: The Project Would Be Located on a Site That is Included on a List of Hazardous Materials Sites Compiled Pursuant to Government Code Section 65962.5 and, as a Result, Would Create a Significant Hazard to the Public or the Environment.	Less than significant.	No mitigation measures are required.	Less than significant.
4.9-5: The Project Would Be Located Within an Adopted Kern County Airport Land Use Compatibility Plan Resulting in a Safety Hazard for People Residing or Working in the Project Area	Less than significant	No mitigation measures are required.	Less than significant
4.9-6: The Project Would Result in a Safety Hazard for People Residing or Working in the Project Area from a Private Airstrip.	Less than significant	No mitigation measures are required.	Less than significant
4.9-7: The Project Would Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan.	Less than significant	No mitigation measures are required.	Less than significant
4.9-8: The Project Would Expose People or Structures to a Significant Risk of Loss, Injury or Death Involving Wildland Fires, Including Where Wildlands are Adjacent to Urbanized Areas or Where Residences Are Intermixed with Wildlands.	Less than significant	No mitigation measures are required.	Less than significant
Cumulative Impacts	Potentially significant	Implement Mitigation Measure MM 4.9-1 through MM 4.9-11~~12~~.	Less than significant
4.10 HYDROLOGY AND WATER QUALITY			

4.10-1: The Project Would Violate Any Water Quality Standards or Waste Discharge Requirements.	Potentially significant	Implement Mitigation Measure MM 4.7-8.	Less than significant
4.10-2: The Project Would Substantially Deplete Groundwater Supplies or Interfere Substantially with Groundwater Recharge Such That There Would be a Net Deficit in Aquifer Volume or a Lowering of the Local Groundwater Table Level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).	Potentially significant	Implement Mitigation Measure MM 4.17-1 through MM 4.17-5.	Less than significant
4.10-3: The Project Would Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, in a Manner Which Would Result in Substantial Erosion or Siltation On- or Off-Site.	Potentially significant	Implement Mitigation Measure MM 4.7-8.	Less than significant
4.10-4: The Project Would Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site.	Potentially significant	Implement Mitigation Measure MM 4.7-8.	Less than significant
4.10-5: The Project Would Create or Contribute Runoff Water Which Would Exceed the Capacity of Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff.	Less than significant	Implement Mitigation Measure MM 4.7-8.	Less than significant

4.10-6: The Project Would Otherwise Substantially Degrade Water Quality.	Less than significant	Implement Mitigation Measure MM 4.7-8.	Less than significant
4.10-7: The Project Would Place Housing Within a 100-Year Flood Hazard Area as Mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or Other Flood Hazard Delineation Map.	Less than significant	No mitigation measures are required.	Less than significant
4.10-8: The Project Would Place Within a 100-Year Flood Hazard Area Structures Which Would Impede or Redirect Flood Flows.	Less than significant	No mitigation measures are required.	Less than significant
4.10-9: The Project Would Expose People or Structures to a Significant Risk of Loss, Injury or Death Involving Flooding, Including Flooding as a Result of the Failure of a Levee or Dam.	Less than significant	No mitigation measures are required.	Less than significant
4.10-10: The Project Would Be Subject to Inundation By Seiche, Tsunami, or Mudflow.	Less than significant	No mitigation measures are required.	Less than significant
Cumulative Impacts	Potentially significant	Implement Mitigation Measure MM 4.7-8 and Mitigation Measure MM 4.17-5 and MM 4.17-6.	Less than significant
4.11 LAND USE AND PLANNING			
4.11-1: The Project Would Physically Divide an Existing Community or Contribute to the Decline of an Existing Community.	Less than significant	No mitigation measures are required.	Less than significant
4.11-2: The Project Would Conflict with Applicable Land Use Plan, Policy or Regulation of an Agency with Jurisdiction Over the Project.	Potentially significant	**MM 4.11-1: Master Precise Development Plan**. Prior to the issuance of any grading or building permit issued on the proposed project site, the project proponent shall process through the Kern County Planning and Natural Resources Department a Master Precise Development Plan in accordance with the requirements identified in Chapter 19.56 of the Kern County Zoning Ordinance. All future changes to the physical environment of the site and or the specific characteristics of the existing uses of the site, either by a Master Developer or	Less than significant

		subsequent future land owners shall require revision and/or modification of the Master Precise Development Plan in accordance with Chapter 19.56 of the Kern County Zoning Ordinance. The following thresholds have been established for the project site. The proposed uses on the site shall not exceed a maximum of 4,613,004square feet of industrial and/or commercial use as determined by the Kern County Planning Director.	
4.11-3: The Project Would Conflict with Applicable Habitat Conservation Plan or Natural Community Conservation Plans.	Less than significant	No mitigation measures beyond compliance with the Metropolitan Bakersfield Habitat Conservation Plan is required. No additional mitigation measures are proposed.	Less than significant
Cumulative Impacts	Less than significant	No mitigation beyond compliance with the goals, policies, and implementation measures of the Metropolitan Bakersfield General Plan and the Metropolitan Bakersfield Habitat Conservation Plan is required. No additional mitigation measures are proposed.	Less than significant
4.12 MINERAL RESOURCES			
4.12-1: The Project Would Not Result in the Loss of Availability of a Known Mineral Resource That Would be of Value to the Region and the Residents of the State.	Potentially significant	Implement Mitigation Measures MM 4.9-5~~6~~, 4.9-6~~7~~, 4.9-8~~9~~, and 4.9-9~~10~~. **MM 4.12-1: Natural Gas Pipeline Easements**. The Pacific Gas and Electric (PG&E) natural gas pipeline easement shall be included on all maps and grading plans to allow for continuous PG&E access for all maintenance activities	Less than significant
4.12-2: The Project Would Result in the Loss of Availability of a Locally Important Mineral Resource Recovery Site Delineated on a Local General Plan, Specific Plan or Other Land Use Plan.	Less than significant	No mitigation measures are required.	Less than significant
Cumulative Impacts	Less than significant	No mitigation measures are required.	Less than significant
4.13 NOISE			

4.13-1: The Project Would Result in Exposure of Persons to, or Generation of, Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance or Applicable Standards of Other Agencies.	Significant and unavoidable	**MM 4.13-1: Acoustical Analysis.** Prior to the submittal of any Precise Development Plan or modification to an approved Master Precise Development Plan: The project proponent shall be required to prepare an acoustical analysis to ensure that all appropriate noise control measures are incorporated in to the proposed project design so as to mitigate any noise impacts to off-site sensitive uses. Such noise control measures may include, but are not limited to: noise barrier use, site redesign, silencers, partial or complete enclosures of critical equipment, etc. Noise impacts shall be evaluated by the Planning and Natural Resources Department during the Precise Development Plan review process. **MM 4.13-2: Noise Levels.** The following measures are recommended to reduce short-term noise levels associated with project construction: 1. Construction activities at the project site shall comply with the hourly restrictions for noise-generating construction activities, as specified in the Kern County Noise Ordinance (Municipal Ordinance Code 8.36.020). Accordingly, construction activities shall be prohibited between the hours of 9:00 PM to 6:00 AM on weekdays, and between 9:00 PM to 8:00 AM on weekends. These hourly limitations shall not apply to activities where hourly limitations would result in increased safety risk to workers or the public. 2. Equipment staging and laydown areas shall be located at the furthest practical distance from nearby residential land uses. To the extent possible, staging and laydown areas should be located at least 500 feet of existing residential dwellings. 3. Where feasible construction equipment shall be fitted with approved noise-reduction features such as mufflers, baffles and engine shrouds that are no less effective than those originally installed by the manufacturer. 4. Haul trucks shall not be allowed to idle for periods greater than five minutes, except as needed to perform a specified function (e.g., concrete mixing). 5. On-site vehicle speeds shall be limited to 15 miles per hour, or less (except in cases of emergency). 6. Back-up beepers for all construction equipment and vehicles shall be broadband sound alarms or adjusted to the lowest noise levels possible, provided that the Occupational Safety and Health Administration and California Division of Occupational Safety and Health's safety requirements are not violated. On vehicles where back-up beepers are not available, alternative safety measures such as escorts and spotters shall be employed.	Significant and unavoidable

		MM 4.13-3: Noise Disturbance Coordinator. Prior to the issuance of grading permits, a "Noise Disturbance Coordinator" shall be established. The project operator shall submit evidence of methods of implementation and shall continuously comply with the following during construction: 1. The disturbance coordinator shall be responsible for responding to any local complaints about construction noise. 2. The disturbance coordinator shall determine the cause of the noise complaint (e.g., starting to early, bad muffler, etc.) and shall be required to implement reasonable measures such that the complaint is resolved.	
4.13-2: The Project Would Expose Persons to or Generation of Excessive Ground Borne Vibration or Ground Borne Noise Levels.	Potentially significant	Implement Mitigation Measure MM 4.13-2, above.	Significant and unavoidable
4.13-3: The Project Would Create a Substantial Permanent Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing Without the Project.	Potentially significant	Implement Mitigation Measures MM 4.13-2, above. **MM 4.13-4: Noise Reduction Methods**. The following notes shall be placed on all grading and building permits issued for the project site: Construction noise reduction methods such as shutting off idling equipment, installing temporary acoustic barriers around stationary construction noise sources, maximizing the distance between construction equipment staging areas and occupied residential areas, and use of electric air compressors and similar power tools, rather than diesel equipment, shall be used where feasible. During construction, stationary construction equipment shall be placed such that emitted noise is directed away from sensitive noise receivers. All equipment shall be fitted with factory equipped mufflers, and be in good working condition. Construction contracts shall specify that all construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers and other state required noise attenuation devices.	Less than significant
4.13-4: The Project Would Create a Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing Without the Project.	Significant and unavoidable	Implementation of Mitigation Measure MM 4.13-2, above. **MM 4.13-5: Written Notice to the Public.** Prior to commencement of any on-site construction activities (i.e., fence construction, mobilization of construction equipment, initial grading, etc.) the project proponent shall provide written notice to the public through mailing a notice.	Significant and unavoidable

		1. The mailing notice shall be to all residences within 1,000 feet of the project site, 15 days or less prior to construction activities. The notices shall include: The construction schedule, telephone number and email address where complaints and questions can be registered with the noise disturbance coordinator. 2. A minimum of one sign, legible at a distance of 50 feet, shall be posted at the construction site or adjacent to the nearest public access to the main construction entrance throughout construction activities that shall provide the construction schedule (updated as needed) and a telephone number where noise complaints can be registered with the noise disturbance coordinator. 3. Documentation the public notice has been sent and the sign has been posted shall be provided to the Kern County Planning and Natural Resources Department.	
4.13-5: The Project is Not Located Within an Airport Land Use Plan or, Where Such a Plan Has Not Been Adopted, Within Two Miles of a Public Airport or Public Use Airport, Would the Project Expose People Residing or Working in the Project Area to Excessive Noise Levels.	Less than significant	No mitigation measures are required.	Less than significant
4.13-6: The Project is Within the Vicinity of a Private Airstrip, Would the Project Expose People Residing or Working in the Project Area to Excessive Noise Levels.	Less than significant	No mitigation measures are required.	Less than significant
Cumulative Impacts	Significant and unavoidable	Implement Mitigation Measures MM 4.13-1 through MM 4.13-5 above.	Significant and unavoidable
4.14 POPULATION AND HOUSING			
4.14-1: The Project Would Directly Induce Substantial Population Growth.	Less than significant	No mitigation measures are required.	Less than significant
Cumulative Impacts	Less than significant	No mitigation measures are required.	Less than significant
4.15 PUBLIC SERVICES			

4.15-1: The Project Would Result in Adverse Physical Impacts Associated with New or Physically Altered Governmental Facilities or Result in the Need for New or Physically Altered Governmental Facilities and Have Significant Fiscal Impacts on Public Services.	Potentially significant	**MM 4.15-1: Fire Safety Plan.** Prior to the issuance of grading or building permits, the project proponent shall develop and implement a Fire Safety Plan for use during construction and operation. The project proponent will submit the Fire Safety Plan, along with maps of the project site and access roads, to the Kern County Fire Department for review and approval. The Fire Safety Plan will contain notification procedures and emergency fire precautions for construction and operations phases of the proposed project. **MM 4.15-2: Land Development Services Fee Schedule.** Prior to the issuance of grading or building permits, the project proponent shall coordinate with Kern County to determine the need for payment of land development services fees, in accordance with the Kern County Land Development Services Fee Schedule, for impacts to countywide public protection, sheriff's patrol and investigative services, and fire services.	Less than significant
Cumulative Impacts	Potentially significant	Implement Mitigation Measures MM 4.15-1 and 4.15-2, above.	Less than significant.
4.16 Transportation and Traffic			
4.16-1: The Project Would Not Conflict with an Applicable Plan, Ordinance, or Policy Establishing Measures of Effectiveness for the Performance of the Circulation System, Including but not Limited to Intersections, Streets, Highways and Freeways, Pedestrian and Bicycle Paths, and Mass Transit.	Less than significant	No mitigation measures are required.	Less than significant
4.16-2: The Project Would Not Conflict with an Applicable Congestion Management Program, Including, but not Limited to Level of Service Standards and Travel Demand Measures, or Other Standards developed by the County Congestion Management Agency for designated roads or highways.	Potentially significant	**MM 4.16-1: Supplemental Road Improvements.** Prior to final approval of any Master Precise Development Plan or recordation of any parcel map, the project proponent will provide to the County a written statement of intent, which will detail the approach used to satisfy obligations for supplemental road improvements. This written statement of intent and method proposed will be approved by the Kern County Public Works Department- Development Review. The applicant will have three approaches to fulfill the road improvement responsibilities: Lump Sum Payment: Any lump sum payment will be made prior to final approval of any Master Precise Development Plan, parcel map recordation or issuance of grading or building permits. All monies will be paid to the Kern County Roads Department. At the time of payment, the Kern County Roads Department will conduct a review of the distributed share amount and make adjustments, if required, based on increases to the construction cost index, other changes in standards or technology for required	Less than significant

		signalization or improvements, or updated development projects or proposals. The Kern County Roads Department may request, at a cost to be borne by the applicant, a supplemental traffic analysis to determine the correct lump sum payment. Construction of Road Improvements: If, in an approved summary of intent, the Project Applicant seeks to construct road improvements in lieu of a lump sum payment, the improvements will be constructed and accepted by the County prior to issuance of the Certificate of Occupancy for the related building permits. Deviations from this sequence of events may be approved by the Kern County Roads Department. Combination of Approach A and Approach B: The Project Applicant may choose to provide construction for certain roadway improvements and payment for others. This approach must be used in communication with the Kern County Roads Department. All monies designated for roadway improvements shall initially be identified and calculated during processing of the Master Precise Development Plan or parcel map, whichever comes first. All final payments and or construction of roadway improvements shall be completed at the issuance of any grading or building permit. **MM 4.16-2: Construction Traffic Control Plan.** Prior to the issuance of construction or building permits, the project proponent shall: Prepare and submit a Construction Traffic Control Plan to Kern County Public Works Department- Development Review and the California Department of Transportation offices for District 9, as appropriate, for approval. The Construction Traffic Control Plan must be prepared in accordance with both the California Department of Transportation Manual on Uniform Traffic Control Devices and Work Area Traffic Control Handbook and must include, but not be limited to, the following issues: Timing of deliveries of heavy equipment and building materials; Directing construction traffic with a flag person; Placing temporary signing, lighting, and traffic control devices if required including pedestrians and bicyclist; including, but not limited to, appropriate signage along access routes to indicate the presence of heavy vehicles and construction traffic; Ensuring access for emergency vehicles to the project sites; Temporarily closing travel lanes or delaying traffic during materials delivery, transmission line stringing activities, or any other utility connections; Maintaining access to adjacent property; and,	

		Specifying both construction-related vehicle travel and oversize load haul routes, minimizing construction traffic during the AM and PM peak hour, distributing construction traffic flow across alternative routes to access the project sites, and avoiding residential neighborhoods to the maximum extent feasible. Obtain all necessary encroachment permits for the work within the road right-of-way or use of oversized/overweight vehicles that will utilize county-maintained roads, which may require California Highway Patrol or a pilot car escort. Copies of the approved traffic plan and issued permits shall be submitted to the Kern County Planning and Natural Resources Department and the Kern County Public Works Department-Development Review. Enter into a secured agreement with Kern County to ensure that any County roads that are demonstrably damaged by project-related activities are promptly repaired and, if necessary, paved, slurry-sealed, or reconstructed as per requirements of the state and/or Kern County. Submit documentation that identifies the roads to be used during construction. The project proponent shall be responsible for repairing any damage to non-county-maintained roads that may result from construction activities. The project proponent shall submit a preconstruction video log and inspection report regarding roadway conditions for roads used during construction to the Kern County Public Work Department-Development Review and the Kern County Planning and Natural Resources Department. 5. Within 30 days of completion of construction, the project proponent shall submit a post-construction video log and inspection report to the County. This information shall be submitted in DVD format. The County, in consultation with the project proponent's engineer, shall determine the extent of remediation required, if any.	
4.16-3: The Project Would Cause an Increase in Operation-Related Safety Hazards or Result in a Change in Air Traffic Patterns, Including Either an Increase in Traffic Levels or a Change in Location that Would Result in Substantial Safety Risks.	Less than significant	No mitigation measures are required.	Less than significant
4.16-4: The Project Would Cause an Increase in Construction-Related Safety Hazards or Would Substantially Increase Hazards Due to a Design Feature (e.g.,	Potentially significant	Implement Mitigation Measure MM 4.16-2.	Less than significant

Sharp Curves or Dangerous Intersections) or Incompatible Uses (e.g., Farm Equipment).			
4.16-5: The Project Would Result in Inadequate Emergency Access.	Less than significant	Implement Mitigation Measure MM 4.16-2.	Less than significant
4.16-6: The Proposed Project Would Conflict with Adopted Policies, Plans or Programs Supporting Alternative Transportation (e.g., bus turnouts and bicycle racks).	Less than significant	No mitigation measures are required.	Less than significant
Cumulative Impacts	Significant and unavoidable	Implement Mitigation Measure MM 4.16-2.	Significant and unavoidable
4.17 UTILITIES			
4.17-1: The Project Would Exceed Wastewater Treatment Requirements of the Applicable Regional Water Quality Control Board.	Less than significant	No mitigation measures are required.	Less than significant
4.17-2: The Project Would Require or Result in the Construction of New Water or Wastewater Treatment Facilities or Expansion of Existing Facilities, the Construction of Which Would Cause Significant Environmental Effect.	Potentially significant	**MM 4.17-1:** All special equipment for the proposed Project, such as package treatment plants, their appurtenances, and their effluent disposal areas and methods shall be designed, located, and constructed in coordination with the Kern County Public Works Department, so as to preclude contamination, pollution, nuisance, and structural and mechanical instability. **MM 4.17-2: Package Treatment and Disposal Facilities.** Proposals and plans for package treatment and disposal facilities shall be subject to the review and approval of: 1. The State and County Environmental Health Services Departments for design and contamination aspects; 2. The Regional Water Quality Control Board for elements of pollution and nuisance; and 3. The Kern County Public Works Department for structural and mechanical integrity. Special structures, such as pump stations, pressure lines and sags, etc.	Less than significant

		shall be subject to the approval of the Kern County Public Works Department and the maintaining District. **MM 4.17-3: Wastewater Package Plant Facility.** The new wastewater package plant facility shall be constructed according to State specifications, with coordination of Kern County Public Works and Kern County Environmental Health Services Departments and shall be operated in such a way as to not contaminate the underlying unconfined aquifer. **MM 4.17-4: Water System.** All facilities of the water system shall be designed and constructed to comply with Kern County Development Standards and approved by the Kern County Public Works Department.	
4.17-3: The Project Would Require or Result in the Construction of New Stormwater Drainage Facilities or Expansion of Existing Facilities.	Potentially significant	Implement Mitigation Measures MM 4.7-8.	Less than significant
4.17-4: The Project Would Have Insufficient Water Supplies Available to Serve the Project from Existing Entitlement and Resources and New or Expanded Entitlement is Needed.	Potentially significant	**MM 4.17-5: Water Meters.** Water meters shall be installed on all facilities. Once operations of the first facility constructed on-site have commenced, the Master Developer or subsequent future land owners shall be required to submit annual reports to the Kern County Planning Department and the Kern County Environmental Health Services Department detailing the annual water usage on site.	Less than significant
4.17-5: The Project Would Result in a Determination by the Wastewater Treatment Provider Which Serves or May Serve the Project That it Does Not Have Adequate Capacity to Serve the Project's Projected Demand in Addition to the Provider's Existing Commitments.	Potentially significant	Implement Mitigation Measures MM 4.17-1 through MM 4.17-5.	Less than significant
4.17-6: The Project Would be Served by a Landfill That Has Sufficient Permitted Capacity to Accommodate the Project's Solid Waste Disposal Needs.	Potentially significant	**MM 4.17-6: Recycling on Site.** During construction, demolition debris and construction wastes shall be recycled to the extent feasible. 1. An on-site recycling coordinator will be designated by the Project Applicant/ Developer to facilitate recycling of all construction waste through coordination with the on-site contractors, local waste haulers, and/or other facilities that recycle construction/demolition wastes. 2. The name and phone number of the coordinator will be provided to the Kern County Waste Management Department prior to issuance of building permits	Less than significant

		3. The on-site recycling coordinator will also be responsible for ensuring that wastes requiring special disposal are handled according to state and County regulations that are in effect at the time of disposal.	
4.17-7: The Project Would Comply with Federal, State, and Local Statues and Regulations Related to Solid Waste.	Potentially significant	Implement Mitigation Measure MM 4.17-6.	Less than significant
4.17-8: The Project Would Exceed the Capacity of the Electrical and Natural Gas Facilities Within the Project Area.	Potentially significant	**MM 4.17-7: Electrical Services.** Prior to approval of a Master Precise Development Plan or modification to an existing precise development plan on-site, the Master Developer or future land owner shall coordinate with Pacific Gas and Electric Company (PG&E) staff early in the planning stages to ensure that adequate facilities are incorporated into the Project design. Prior to issuance of grading and building permits the Project proponent shall coordinate with PG&E staff to determine the specific requirements regarding any potential electric service or facility issues needed to adequately accommodate the proposed Project. The Project proponent shall comply with and adhere to all requirements identified by PG&E to full mitigate impacts to electric services and facilities, as needed as Project construction progresses. **MM 4.17-8: Natural Gas.** Prior to approval of a Master Precise Development Plan or modification to an existing precise development plan on-site, the Master Developer or future land owner shall coordinate with Pacific Gas and Electric Company (PG&E) staff early in the planning stages to ensure that adequate facilities are incorporated into the Project design. Prior to issuance of grading and building permits the Project proponent shall coordinate with PG&E staff to determine the specific requirements regarding any potential natural gas service or facility issues needed to adequately accommodate the proposed Project. The Project proponent shall comply with and adhere to all requirements identified by PG&E to fully mitigate impacts to natural gas services and facilities, as needed as Project construction progresses. **MM 4.17-9: PG&E Notification**. The Project proponent shall notify PG&E six months prior to any construction activities in the immediate vicinity of PG&E Transmission Line 300B.	Less than significant
Cumulative Impacts	Potentially significant	Implement Mitigation Measures MM 4.17-1 through MM 4.17-9.	Less than significant
4.18 Wildfire			

4.18-1: The Project Would Substantially Impair an Adopted Emergency Response Plan or Emergency Evacuation Plan.	Less than significant	No mitigation measures are required.	Less than significant
4.18-2: The Project Would Due to Slope, Prevailing Winds, and Other Factors, Exacerbate Wildfire Risks, and Thereby Expose Project Occupants to, Pollutant Concentrations from a Wildfire or the Uncontrolled Spread of a Wildfire.	Less than significant	No mitigation measures are required.	Less than significant
4.18-3: The Project Would Require the Installation or Maintenance of Associated Infrastructure (Such As Roads, Fuel Breaks, Emergency Water Sources, Power Lines or Other Utilities) That May Exacerbate Fire Risk or That May Result In Temporary or Ongoing Impacts to The Environment.	Less than significant	No mitigation measures are required.	Less than significant
4.18-4: The Project Would Expose People or Structures to Significant Risks, Including Downslope or Downstream Flooding or Landslides, as a Result of Runoff, Post-Fire Slope Instability, or Drainage Changes	Less than significant	No mitigation measures are required.	Less than significant
Cumulative Impacts	Less than significant	No mitigation measures are required.	Less than significant

Chapter 2

Introduction

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Chapter 2
Introduction

2.1 Intent of the California Environmental Quality Act

The Kern County Planning and Natural Resources Department, as lead agency, has determined that a Project Level Recirculated Environmental Impact Report (REIR) must be prepared for the proposed 99 Houghton Industrial Park Project. The proposed Project would permit the development of a light to medium industrial park containing approximately 4,613,004 square feet (ft^2) (net building area) of warehousing, distribution, and retail showroom uses.

This Recirculated Draft EIR has been prepared pursuant to the following:

- California Environmental Quality Act (Public Resources Code [PRC], Section 21000 et seq.);
- CEQA Guidelines (California Code of Regulations [CCR], Title 14, Chapter 3, Section 15000 et seq.); and
- Kern County CEQA Implementation Document.

The overall purposes of the CEQA process are to:

- ensure that the environment and public health and safety are protected in the face of discretionary projects initiated by public agencies or private concerns;
- provide for full disclosure of the project's environmental effects to the public, the agency decision-makers who will approve or deny the project, and responsible and trustee agencies charged with managing resources (e.g., wildlife, air quality) that may be affected by the project; and
- provide a forum for public participation in the decision-making process with respect to environmental effects.

2.2 Purpose of this Recirculated Draft Environmental Impact Report

This document is the Recirculated DEIR for the 99 Houghton Industrial Park. This introduction provides the manner in which changes were made to the previous DEIR, background information concerning this document, and the procedure for commenting on this Recirculated DEIR.

The 99 Houghton Industrial Park Project Environmental Impact Report was originally circulated for public comment from February 13, 2018, with a comment closing date of April 2, 2018, by the Kern County Planning Department acting as the lead agency. On March 13, 2018, prior to the end of the original comment period, the project was formally withdrawn from circulation. The County has received and considered written comments that were received after the close of the public comment period.

County staff has determined that changes should be made in the Draft EIR that was originally circulated for public comment. In some cases changes have been made to the project and in some cases new or revised information or analysis has been included in the Recirculated Draft EIR.

The Guidelines adopted by the Governor's Office of Planning and Research for the California Environmental Quality Act (Guidelines) provide that a lead agency is required to recirculate an environmental impact report when *significant new information* is added to an EIR after public review of the Draft EIR has begun. New information can include changes in the project description, changes in the environmental setting, as well as other additional data or information. This information may relate to new environmental impacts, severity of such impacts, alternatives or mitigation. Recirculation of an EIR is covered by CEQA Guidelines Section 15088.5.

As mandated by State law, the minimum public review period for this document is 45 days. CEQA Guidelines Section 15088.5 (f) (1) provides that when an Environmental Impact Report (EIR) is substantially revised and the entire EIR is circulated, Kern County, as lead agency, may require that reviewers submit new comments, and the lead agency need not respond to those comments received during the earlier circulation period. Kern County will therefore respond in the Final Recirculated EIR only to new comments received regarding this Recirculated Draft EIR received during this comment period

Additions to the text of the 2018 DEIR are indicated with underline formatting, and text deletions are indicated with strikethrough formatting.

An EIR is a public informational document used in the planning and decision-making process. This Project Level REIR will analyze the environmental impacts of the proposed Project. The Kern County Planning Commission and Board of Supervisors will consider the information in the REIR, including the public comments and staff responses to those comments, during the public hearing process. As a legislative action, the final decision is made at the Board of Supervisors where the proposed Project may be approved, conditionally approved, or denied. The purpose of a Recirculated EIR is to identify:

- the significant potential impacts of the proposed Project on the environment and indicate the manner in which those significant impacts can be avoided or mitigated
- any unavoidable adverse impacts that cannot be mitigated
- reasonable and feasible alternatives to the proposed Project that would eliminate any significant adverse environmental impacts or reduce the impacts to a less-than-significant level

A Recirculated EIR also discloses growth-inducing impacts; impacts found not to be significant; and significant cumulative impacts of past, present, and reasonably anticipated future projects.

CEQA requires that a Recirculated EIR reflect the independent judgment of the lead agency regarding the impacts, the level of significance of the impacts (both before and after mitigation), and mitigation measures proposed to reduce the impacts. A Recirculated Draft EIR is circulated to responsible agencies, trustee agencies with resources affected by the project, and interested agencies and individuals. The purposes of public and agency review of a Recirculated Draft EIR include sharing expertise, disclosing agency analyses, checking for accuracy, detecting omissions, discovering public concerns, and soliciting counterproposals.

Reviewers of a Recirculated draft EIR should focus on the sufficiency of the document in identifying and analyzing the possible impacts on the environment and ways in which the significant effects of the proposed Project might be avoided or mitigated. Comments are most helpful when they suggest additional specific alternatives or mitigation measures that would provide better ways to avoid or mitigate significant environmental effects.

Issues to Be Resolved

Section 15123(b)(3) of the CEQA Guidelines requires that a Recirculated EIR contain issues to be resolved, which includes the choices among alternatives and whether or how to mitigate significant impacts. The major issues to be resolved regarding the proposed Project include decisions by the lead agency as to whether or not:

- the Recirculated Draft EIR adequately describes the environmental impacts of the proposed Project;
- the recommended mitigation measures should be adopted or modified; or
- additional mitigation measures need to be applied.

2.3 Terminology

To assist readers in understanding this Recirculated EIR, terms used are defined in the following manner.

- *Project* means the whole of an action that has the potential for resulting in a physical change in the environment, directly or indirectly.
- *Environment* means the physical conditions that exist in the area that would be affected by a proposed Project, including land, air, water, minerals, flora, fauna, ambient noise and objects of historical or aesthetic significance. The area included in this definition is the area in which significant direct or indirect impacts would occur as a result of the proposed Project. The environment includes both natural and artificial conditions.
- *Impacts* analyzed under CEQA must be related to a physical change. Impacts are:
  - direct or primary impacts that are caused by the proposed Project and occur at the same time and place or
  - indirect or secondary impacts that are caused by the proposed Project and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect or secondary impacts may include growth-inducing impacts and other effects related to induced changes in the pattern of land use; population density or growth rate and related effects on air, water and other natural systems, including ecosystems.
  - the California Supreme Court recently ruled that the environment's impact on a project fall outside the scope of CEQA except to the extent that impacts from a project exacerbate such impacts. This Recirculated DEIR includes the environment's impacts on a project for informational purposes, and to address the exacerbation component of the Court's decision.

- *Significant impact on the environment* means a substantial or potentially substantial, adverse change in any of the physical conditions in the area affected by the proposed Project, including land, air, water, minerals, flora, fauna, ambient noise and objects of historical or aesthetic significance. An economic or social change by itself is not considered a significant impact on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant.

- *Mitigation* consists of measures to avoid or substantially reduce the proposed Project's significant environmental impacts by:
  - avoiding the impact altogether by not taking a certain action or parts of an action;
  - minimizing impacts by limiting the degree or magnitude of the action and its implementation;
  - rectifying the impact by repairing, rehabilitating or restoring the affected environment;
  - reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action: or
  - compensating for the impact by replacing or providing substitute resources or environments.

- *Cumulative impacts* are two or more individual impacts that, when considered together, are considerable, compound, or increase other environmental impacts. The following statements also apply when considering cumulative impacts:
  - The individual impacts may be changes resulting from a single project or separate projects.
  - The cumulative impact from several projects is the change in the environment that results from the incremental impact of the proposed Project when added to other closely related past, present and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over time.

This Recirculated EIR uses a variety of terms to describe the level of significance of adverse impacts. These terms are defined as follows:

- *Less than significant:* An impact that is adverse but that does not exceed the defined thresholds of significance. Less than significant impacts do not require mitigation.

- *Significant:* An impact that exceeds the defined thresholds of significance and would or could cause a substantial adverse change in the environment. Mitigation measures are recommended to eliminate the impact or reduce it to a less than significant level.

- *Significant and unavoidable:* An impact that exceeds the defined thresholds of significance and cannot be eliminated or reduced to a less than significant level through the implementation of mitigation measures.

2.4 Decision-Making Process

CEQA requires lead agencies to solicit and consider input from other interested agencies, citizen groups, and individual members of the public. CEQA also requires the proposed Project to be monitored after it has been permitted to ensure that mitigation measures are carried out.

CEQA requires the lead agency to provide the public with a full disclosure of the expected environmental consequences of the proposed Project, and with an opportunity to provide comments. In accordance with CEQA, the following is the process for public participation in the decision-making process:

- **Notice of Preparation/Initial Study (NOP/IS).** Kern County prepared and circulated an NOP/IS to responsible, trustee, and local agencies for review and comment on May 1, 2009. The NOP/IS and responses to the NOP are included in Appendix A, *Initial Study/Notice of Preparation and Notice of Preparation Responses*. In conjunction with this public notice, a scoping meeting was held by Kern County on May 22, 2009, to provide a forum for public comments on the scope of the EIR.

- **Recirculated Draft EIR Preparation/Notice of Completion (NOC).** A Recirculated Draft EIR will be circulated for review and comment to appropriate agencies and additional individuals and interest groups who have requested to be notified of EIR projects. Per Section 15105 of the CEQA Guidelines, Kern County will provide for a 45-day public review period on the Recirculated Draft EIR. Kern County will provide responses to comments to each agency or person who provided written comments on the Recirculated EIR two weeks before the scheduled Planning Commission hearing.

- **Preparation and Certification of Final Recirculated EIR.** The Kern County Planning Commission will consider the Final Recirculated EIR and the proposed Project, acting in an advisory capacity to the Kern County Board of Supervisors. Upon receipt of the Planning Commission's recommendation, the Board of Supervisors will also consider the Final Recirculated EIR, along with all public comments, and take final action on the proposed Project. At least one public hearing will be held by both the Planning Commission and Board of Supervisors to consider the Final Recirculated EIR, take public testimony, and either approve, conditionally approve, or deny the proposed Project.

Notice of Preparation

In accordance with Section 15082 of the CEQA Guidelines, as amended, the Kern County Planning and Natural Resources Department circulated an NOP/IS to the State Clearinghouse, public agencies, special districts, and members of the public for a 30-day public review. The public review period for the NOP/IS began on May 1, 2009, and ended on June 1, 2009. The NOP/IS was also posted in the Kern County Clerk's office for 30 days and sent to the State Clearinghouse at the Governor's Office of Planning and Research to solicit statewide agency participation in determining the scope of the Recirculated EIR. The purpose of the NOP/IS was to formally convey that the County, as the lead agency, solicited input regarding the scope and proposed content of the Recirculated EIR. The NOP/IS and all comment letters are provided in Appendix A of this Recirculated EIR.

Scoping Meeting

Pursuant to Section 15206 of the CEQA Guidelines, the lead agency is required to conduct at least one scoping meeting for all projects of statewide, regional, or area-wide significance. The scoping meeting is for jurisdictional agencies and interested persons or groups to provide comments regarding, but not limited to, the range of actions, alternatives, mitigation measures, and

environmental effects to be analyzed. A public scoping meeting was held at 1:30 p.m. on May 22, 2009, at the Kern County Public Services Building, 2700 M Street, Conference Room 1A, Bakersfield, California.

Notice of Preparation/Initial Study and Scoping Meeting Results

Nine (9) comment letters were received during the scoping process. Specific environmental concerns raised in written comments provided to staff during circulation of the NOP/IS for the proposed Project are discussed below. The NOP/IS and all comments are included in Appendix A, along with the Summary of Proceedings from the Scoping Meeting.

Notice of Preparation Written Comments

Table 2-1, *Summary of Written Comments on Notice of Preparation/Initial Study*, summarizes the comments received in response to the NOP/IS. Copies of the original comments are included in Appendix A.

Table 2-1. Summary of Written Comments on Notice of Preparation/Initial Study

Commenter	Summary of Comment
Sierra Club - Kern-Kaweah Chapter (letter dated May 27, 2009)	The EIR should address the following issues: incompatibility with the Metropolitan Bakersfield General Plan, need for the project, farmland conversion, air quality, biological resources, global warming, water supplies, energy and solar photovoltaics, traffic, aesthetics and light pollution, alternatives, and cumulative impacts.
Department of Agriculture and Measurement Standards (letter dated May 21, 2006)	The Department is concerned about the project depleting prime agricultural land to industrial uses. The EIR should address issues involving compatibility with industrial uses and the scope of impact upon the surrounding agricultural properties.
Kern County Resource Management Agency, Roads Department (letter dated May 18, 2009)	When the traffic impact study for the proposed Project is submitted to the County, the Roads Department would like a copy for review and comment.
Division of Oil, Gas and Geothermal Resources (DOGGR) (letter dated May 5, 2009)	The proposed Project is located outside the administrative boundaries of any oil or gas field, and there is one plugged and abandoned oil well within the Project boundaries. The abandoned well will need to be addressed if structures, roads, or parking lots are planned in proximity to it.
Tejon Indian Tribe (letter dated May 24, 2009)	The proposed Project is located in an area that Tejon Indian Tribe ancestors used in the past; however, the Tribe has no information or concerns at this time.
Native American Heritage Commission (NAHC) (letter dated May 22, 2009)	The NAHC, as the state trustee agency, recommended various actions in order to adequately assess the project-related impacts on historical resources.
California Department of Transportation (letter dated May 20, 2009)	A traffic impact study is needed for the proposed Project. An encroachment permit may be needed for the proposed Project, for any work in the State right-of-way.

Table 2-1. Summary of Written Comments on Notice of Preparation/Initial Study	
Commenter	Summary of Comment
San Joaquin Valley Air Pollution Control District (letter dated June 1, 2009)	The EIR should include a quantitative emissions analysis, a discussion of greenhouse gas emissions generated by the project and the effect they will have (if any) on global climate change, a discussion of potential odors / sensitive receptors, potential health impact of Toxic Air Contaminants (if any), existing District regulations, feasible mitigation measures that will reduce air quality impacts.
Kern County Superintendent of Schools (letter dated May 13, 2009)	The Kern County Superintendent of Schools office represents the Greenfield Union and Kern High School Districts with regard to the imposition of developer fees. The collection of statutory fees shall be collected at the time that building permits are issued. Currently, these fees are set at $0.47 per square foot, an amount subject to adjustment every two years.

Availability of Recirculated Draft EIR

This Recirculated Draft EIR is being distributed directly to agencies, organizations, and interested groups and persons for comment during a 45-day formal review period, in accordance with Section 15087 of the State CEQA Guidelines. This Recirculated Draft EIR and the full administrative record for the proposed Project, including all studies, is available for review during normal business hours, Monday through Friday, at the Kern County Planning and Natural Resources Department, located at:

Kern County Planning and Natural Resources Department
2700 "M" Street, Suite 100
Bakersfield, CA 93301-2370
Phone: (661) 862-8600, Fax: (661) 862-8601

Additionally, this Recirculated Draft EIR is available at the following library:

Kern County Library/Beale
Local History Room
701 Truxtun Avenue
Bakersfield, CA 93301

2.5 Format and Content

This Recirculated Draft EIR addresses the potential environmental effects of the proposed Project and was prepared following input from the public and the responsible and affected agencies, through the EIR scoping process, as discussed previously. The content of this Recirculated Draft EIR was established based on the findings in the NOP/IS, and public and agency input. Based on the findings of the NOP/IS and amendments to CEQA Guidelines in 2018, a determination was

made that a Recirculated DEIR is required to address potentially significant environmental effects on the following resources:

- Aesthetics/Urban Decay
- Agricultural Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Geologic and Seismic Hazards ~~Geology and Soils~~
- Energy
- Greenhouse Gases
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation (discussed in Section 4.14, Public Services)
- Transportation/Traffic
- Utilities
- Wildfires

Required Recirculated DEIR Content and Organization

This Recirculated Draft EIR includes all sections required by CEQA. Table 2-2, *Required EIR Contents,* contains a list of sections required under CEQA, along with a reference to the chapter in which they can be found in this document.

Table 2-2. Required EIR Contents

Requirement/CEQA Section	Location in EIR
Table of contents (Section 15122)	Table of Contents
Summary (Section 15123)	Chapter 1
Project description (Section 15124)	Chapter 3
Significant environmental impacts (Sections 15126 and 15126.2)	Chapter 1; Sections 4.1–4.16; Chapter 5
Environmental setting (Section 15125)	Sections 4.1–4.16
Mitigation measures (Section 15126.4)	Chapter 1; Sections 4.1–4.16
Cumulative impacts (Section 15130)	Chapter 1; Sections 4.1–4.16; Chapter 5
Alternatives to the proposed project (Section 15126.6)	Chapter 6
Growth-inducing impacts (Section 15126.2)	Chapter 1; Section 4.13; Chapter 5
Effects found not to be significant (Section 15128)	Chapter 1; Sections 4.1–4.16; Chapter 5
Unavoidable significant environmental impacts (Section 15126.2)	Chapter 1; Sections 4.2, 4.3, 4.7, 4.12, and 4.15; Chapter 5
Organizations and persons consulted (Section 15129)	Chapter 8
List of preparers (Section 15129)	Chapter 9
References (Section 15129)	Chapter 10

Recirculated DEIR Organization

The content and organization of this Recirculated Draft EIR are designed to meet the requirements of CEQA, the CEQA Guidelines, and the Kern County CEQA Implementation Document, as well as to present issues, analysis, mitigation, and other information in a logical and understandable way. This Recirculated Draft EIR is organized into the following sections:

- Chapter 1, *"Executive Summary,"* provides a project description and a summary of the environmental impacts and mitigation measures.
- Chapter 2, *"Introduction,"* provides CEQA compliance information, overview of the decision-making process, organization of the Recirculated EIR and a responsible and trustee agency list.
- Chapter 3, *"Project Description,"* provides a description of the location, characteristics, objectives and the relationship of the project to other plans and policies.
- Chapter 4, *"Environmental Setting, Impacts and Mitigation Measures,"* contains a detailed environmental analysis of the existing conditions, project impacts, mitigation measures and unavoidable adverse impacts.
- Chapter 5, *"Consequences of Project Implementation (Mandatory CEQA Sections),"* presents an analysis of the project's cumulative and growth-inducing impacts and other CEQA requirements, including significant and unavoidable impacts and irreversible commitment of resources.
- Chapter 6, *"Alternatives,"* describes a reasonable range of alternatives to the project that could reduce the significant environmental effects that cannot be avoided.

- Chapter 7, *"Responses to Comments,"* is reserved for responses to comments on this Recirculated Draft EIR.
- Chapter 8, *"Organizations and Persons Consulted,"* lists the organizations and persons contacted during preparation of this Recirculated Draft EIR.
- Chapter 9, *"Preparers,"* identifies persons involved in the preparation of the Recirculated Draft EIR.
- Chapter 10, *"Bibliography,"* identifies reference sources for the Recirculated Draft EIR.
- Chapter 11, *"Acronyms and Abbreviations,"* lists all acronyms and abbreviations mentioned throughout the Recirculated Draft EIR with corresponding definitions.
- *"Appendices"* provide information and technical studies that support the environmental analysis contained within the Recirculated Draft EIR.

The analysis of each environmental category in Chapter 4 is organized as follows:

- *"Introduction"* provides a brief overview on the purpose of the section being analyzed with regard to the project.
- *"Environmental Setting"* describes the physical conditions that exist at this time and that may influence or affect the topic being analyzed.
- *"Regulatory Setting"* provides state and federal laws and the Metropolitan Bakersfield General Plan (MBGP) goals, policies, and implementation measures that apply to the topic being analyzed.
- *"Impacts and Mitigation Measures"* discusses the impacts of the project in each section, presents the determination of the level of significance and provides a discussion of feasible mitigation measures to reduce any impacts.

2.6 Responsible and Trustee Agencies

Projects or actions undertaken by the lead agency, in this case the Kern County Planning and Natural Resources Department, may require subsequent oversight, approvals or permits from other public agencies in order to be implemented. Other such agencies are referred to as "responsible agencies" and "trustee agencies." Pursuant to Sections 15381 and 15386 of the State CEQA Guidelines, as amended, responsible agencies and trustee agencies are defined as follows:

- A "*responsible agency"* is a public agency that proposes to carry out or approve a project, for which a lead agency is preparing or has prepared an EIR or Negative Declaration. For the purposes of CEQA, the term "responsible agency" includes all public agencies other than the lead agency that have discretionary approval power over the projects. (Section 15381).
- A "*trustee agency"* is a state agency having jurisdiction by law over natural resources affected by a project that are held in trust for the people of the State of California. (Section 15386).

  The various public, private, and political agencies and jurisdictions with a particular interest in the proposed Project include but are not limited to the following:

Federal Agencies

- U.S. Fish and Wildlife Service
- Department of Agriculture (USDA)
- Department of Interior
- Environmental Protection Agency
- Farm Service Agency
- Federal Highway Administration (FHWA)
- U.S. Army Corps of Engineers
- USDA, Forest Service

State Agencies

- Department of Conservation
- Reclamation Board
- Department of Conservation, Division of Oil, Gas & Geothermal Resources (DOGGR)
- Department of Mines and Geology
- Department of Fish and Wildlife
- Department of Water Resources
- Office of Historic Preservation
- Governor's Office of Planning and Research
- California Air Resources Board
- California Integrated Waste Management Board
- Regional Water Quality Control Board (RWQCB) – Central Valley Region
- California Department of Transportation (Caltrans) District 6
- California Native American Heritage Commission
- California Public Utilities Commission
- California Department of Forestry and Fire Protection (CalFire)

Local Agencies

- Kern Council of Governments (Kern COG)
- Kern County Administrative Office

- Kern County Board of Supervisors
- Kern County Economic Development Department
- Kern County Department of Agriculture
- Kern County Public Works Department
- Kern County Fire Department
- Kern County Library Facilities
- Kern County Parks and Recreation Department
- Kern County Planning Commission
- Kern County Sherriff's Department
- Kern County Water Agency (KCWA)
- Greenfield County Water District
- Kern County Superintendent of Schools
- Kern High School District
- Greenfield Union School District
- San Joaquin Valley Air Pollution Control District (SJVAPCD)
- City of Bakersfield Public Works Department
- City of Bakersfield Development Services Department

2.7 Incorporation by Reference

In accordance with Section 15150 of the *CEQA Guidelines* to reduce the size of the report, the following documents are hereby incorporated by reference into this Recirculated Draft EIR and are available for public review at the Kern County Planning and Natural Resources Department. A brief synopsis of the scope and content of these documents is provided below.

- **Metropolitan Bakersfield General Plan (MBGP) (2007)** - The MBGP is a policy document designed to give long-range guidance for decision-making affecting the future character of the Metropolitan Bakersfield planning area. It represents the official statement of the community's physical development as well as its economic, social and environmental goals. The MBGP has the following elements: Land Use, Circulation, Housing, Conservation, Open Space, Noise, Safety, Public Services and Facilities, and Parks. An additional element includes the Kern River Plan, which helps to define goals and policies for issues unique to the Metropolitan Bakersfield area. The MBGP was utilized throughout this Recirculated EIR as the fundamental planning document governing development on the proposed Project site. Background information and policy information from the Plan are cited in several sections of the Recirculated EIR.

- **Metropolitan Bakersfield Habitat Conservation Plan (MBHCP) (April 1994)** - The MBHCP, as amended, and implementing agreements and ordinances provide a method of collecting funds for the acquisition and perpetual management of habitat land for the purpose of creating preserves. The MBHCP and associated implementing ordinances and agreements are available through the Kern County Planning and Natural Resources Department. The plan provides descriptions of species of concern and habitat areas within the Metropolitan Bakersfield General Plan Area. Development projects within Metropolitan Bakersfield pay mitigation fees, which are used to buy habitat lands. These lands are managed by wildlife agencies or by entities approved by wildlife agencies. Measures to avoid taking a protected species are also listed in the MBHCP. The amount of habitat preserved must always be greater than what is being developed. The boundaries of the MBHCP study area match the boundaries of the MBGP, which consists of 408 square miles.

- **Kern County Zoning Ordinance (July 2016)** - According to Chapter 19.02.020, Purposes, Title 19 was adopted to promote and protect the public health, safety, and welfare through the orderly regulation of land uses throughout the unincorporated area of Kern County. Further, the purposes of this title are to:
    - Provide the economic and social advantages resulting from an orderly planned use of land resources;
    - Encourage and guide development consistent with the Kern County General Plan (KCGP);
    - Divide Kern County into zoning districts of a number, size and location deemed necessary to carry out the purposes of the KCGP and this title;
    - Regulate the size and use of lots, yards and other open spaces;
    - Regulate the use, location, height, bulk and size of buildings and structures;
    - Regulate the intensity of land use;
    - Regulate the density of population in residential areas;
    - Establish requirements for off-street parking;
    - Regulate signs and billboards; and
    - Provide for the enforcement of regulations of Chapter 19.02.020.

- **County of Kern Housing Element 2015-2023 (2016)** - The development and preservation of adequate and affordable housing is important to the well-being of the residents and the economic prosperity of the County. To plan for the development of adequate housing for all income segments, a Housing Element was prepared as a part of the KCGP. This document specifically addresses housing needs and resources in the County's unincorporated areas. The Housing Element must maintain consistency with the other elements of the KCGP.

- **Destination 2030: Regional Transportation Plan (RTP)** - The latest Regional Transportation Plan (RTP) was adopted in 2018. The 2018 RTP/Sustainable Communities Strategy (SCS) establishes a set of regional transportation goals, objectives, policies, and actions intended to guide development of the planned multimodal transportation systems in Kern County. It was developed through a continuing, comprehensive, and cooperative planning process, and

provides for effective coordination between local, regional, State, and federal agencies. This RTP/SCS provides transportation and air quality goals, policies and actions for now and into the future, and includes programs and projects for congestion management, transit, airports, bicycles and pedestrians, roadways, and freight. The 2018 RTP/SCS continues the implementation of California's Sustainable Communities and Climate Protection Act (Senate Bill [SB] 375) which requires the inclusion of a Sustainable Communities Strategy that reduces greenhouse gas emissions from passenger vehicles and light duty trucks by 5 percent per capita by 2020 and 10 percent per capita by 2035. In addition, it provides a discussion of all mechanisms used to finance transportation and air quality (including greenhouse gas) program implementation (Kern Council of Governments [COG], 2018).

- **Kern County Airport Land Use Compatibility Plan -** The Kern County Airport Land Use Compatibility Plan (ALUCP) was originally adopted in 1996 and has since been amended to comply with Aeronautics Law, Public Utilities Code (Chapter 4, Article 3.5) regarding public airports and surrounding land use planning. As required by that law, proposals for public or private land use developments that occur within defined airport influence areas are subject to compatibility review. The principle airport land use compatibility concerns addressed by the plan are: (1) exposure to aircraft noise; (2) land use safety with respect to both people and property on the ground and the occupants of aircraft; (3) protection of airport air space; and (4) general concerns related to aircraft overflights.

  The ALUCP identifies policies and compatibility criteria for influence zones or planning area boundaries. The ALUCP maps and labels these zones as A, B1, B2, C, and D, ranging from the most restrictive (A - airport property-runway protection zone) to the least restrictive (D - disclosure to property owners only). As required by law, the following affected cities have adopted the ALUCP for their respective airports: City of Bakersfield, City of California City, City of Delano, City of Shafter, City of Taft, City of Tehachapi, and City of Wasco.

2.8 Sources

This Recirculated Draft EIR is dependent upon information from many sources. Some sources are, for example, studies or reports that have been prepared specifically for this document. Others are studies or reports that may provide background information related to one or more issue areas that have been discussed in this document. The sources and references used in the preparation of this Recirculated Draft EIR are listed in Chapter 10, *"Bibliography,"* and are available for review during normal business hours at the:

Kern County Planning and Natural Resources Department
2700 "M" Street, Suite 100
Bakersfield, California 93301-2370

This Draft Recirculated DEIR is also available on the Kern County Planning and Natural Resources Department website:
https://kernplanning.com/planning/environmental-documents/.

Chapter 3

Project Description

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Chapter 3
Project Description

3.1 Project Overview

This Environmental Impact Report (EIR) has been prepared to identify and evaluate potential environmental impacts associated with implementation of 99 Houghton Industrial Park Project (proposed Project). When the Notice of Preparation (NOP) was initially circulated in May 2009, the proposal consisted of the same parcels with different proposed land use designation and zoning classifications, and a larger net building space. However, after the circulation of the NOP and further analysis of the proposed Project, the project proponent elected to reduce the net building space and allow for highway commercial and general commercial land uses. Table 3-1, *Project Statistics*, provides a comparison the changes to the proposed Project between the time of the NOP and this EIR. The size of the project site has not changed. The characteristics of the Project site are summarized in Table 3-2, *Description of Site*. All associated technical studies prepared for the proposed Project have been reviewed and updated as needed to reflect these changes to the proposed Project.

Table 3-1. Project Statistics

Total Project Site Boundary		Net Building Space	Proposed MBGP Land Use Designations				Proposed Zoning Classifications			
			GC	HC	LI	SI	M-1 PD	M-2 PD	CH PD	C-2 PD
Previous (NOP)	314.31 acres	5,134,253 square feet (ft^2)	N/A	N/A	129.73 acres	184.58 acres	129.73 acres	184.58 acres	N/A	N/A
Current (DEIR)	314.30 acres	4,613,004 ft^2	22 acres	9.01* acres	107.72 acres	159 acres	107.72 acres	159 acres	25 acres	22 acres
Change	-0.01 acre	-521,249 ft^2	+22 acres	+9.01* acres	-22.01 acres	-25.58 acres	-22.01 acres	-25.58 acres	+25 acres	+22 acres

Metropolitan Bakersfield General Plan (MBGP) Land Use Designations:
GC = General Commercial; HC = Highway Commercial; LI = Light Industrial; SI = Service Industrial

Kern County Zoning Classifications:
M-1 (Light Industrial); M-2 (Medium Industrial); CH = Highway Commercial; C-2 = General Commercial; PD = Precise Development Combining

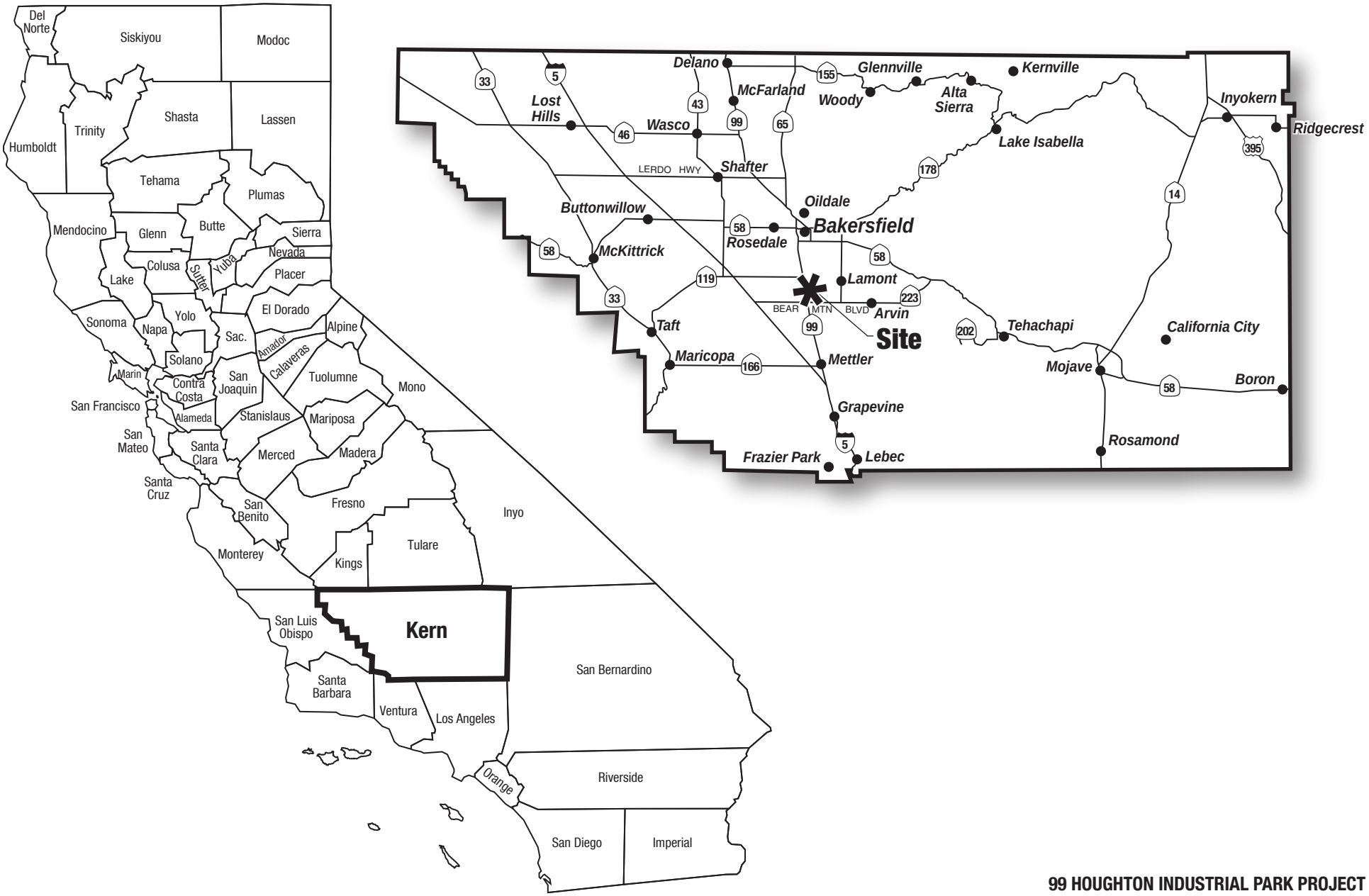
* The project site currently contains 15.99 acres of exiting HC land use designation under the MBGP; therefore, the proposed project would have a total of 25 acres of HC land use designation.

Table 3-2. Description of Site

Developer/Total Acreage	Entitlements	Location
99 Houghton Industrial Park 314 acres	General Plan Amendment No. 1, Map 143-07; Zone Change No. 2, Map 143-07; Conditional Use Permit No. 5, Map 143-07; Conditional Use Permit No. 6, Map 143-07; Exclusion from Agricultural Preserve No. 13	APN 185-140-08; bounded by South Union Avenue to the east, State Route 99 to the west, DiGiorgio Road to the north, and Houghton Road to the south

As shown in Table 3-1, *Project Statistics*, and Table 3-2, *Description of Site*, above, the proposed Project encompasses approximately 314 acres, and is located north of Houghton Road, east of State Route 99 (SR-99), west of South Union Avenue, and south of DiGiorgio Road, in Kern County (Figure 3-1, *Regional Vicinity*, and Figure 3-2, *Project Vicinity*). The proposed Project would allow for development of a light to medium industrial park containing approximately 4,613,004 square feet (net building area) of warehousing, distribution, and retail showroom uses. A private package sewer treatment plant is proposed to provide sewer services for the Project site. Development of the proposed Project would require the following decisions by the Kern County Planning Commission and Board of Supervisors:

- approval of a General Plan Amendment (GPA) to amend the existing land use designation from R-IA (Resource – Intensive Agriculture) to LI (Light Industrial), SI (Service Industrial), GC (General Commercial), and HC (Highway Commercial);
- approval of a Zone Change (ZCC) to remove the existing A (Exclusive Agriculture) zoning classification and rezone the Project site to M-1 PD (Light Industrial, Precise Development Combining), M-2 PD (Medium Industrial, Precise Development Combining), CH PD (Highway Commercial, Precise Development Combining), and C-2 PD (General Commercial, Precise Development Combining);
- approval of a Conditional Use Permit for a Sewer Treatment Plant; and
- ~~approval of a Conditional Use Permit for a Water Treatment Plant; and~~
- approval of an agricultural preserve exclusion from Agricultural Preserve No. 13.



not to scale

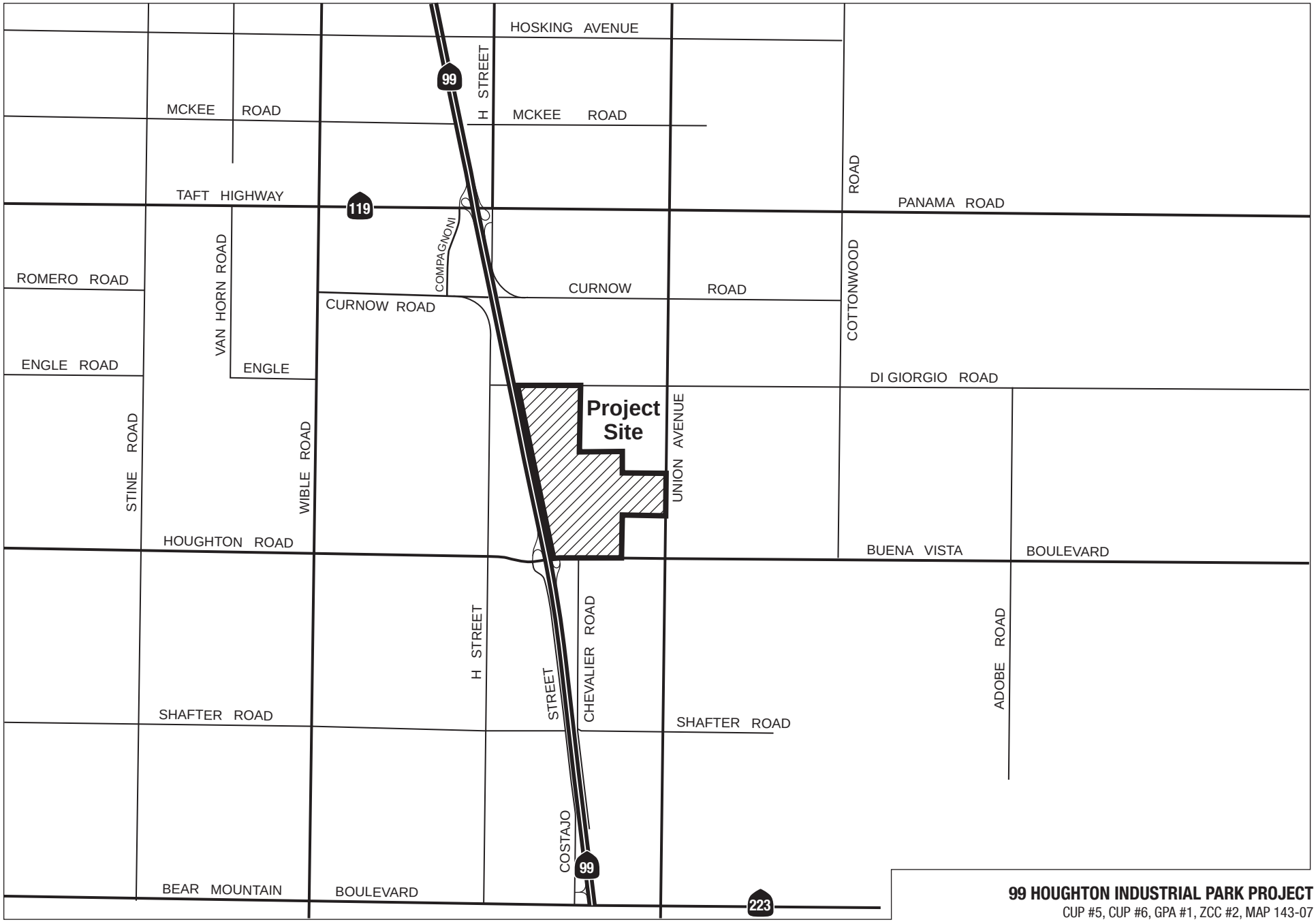
99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07

AGRICULTURAL PRESERVE #13 EXCLUSION

Regional Vicinity

Figure 3-1



99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07

AGRICULTURAL PRESERVE #13 EXCLUSION

Project Vicinity

Figure 3-2

3.2 Project Location and Setting

Project Location

The proposed Project is situated in the southern San Joaquin Valley in Kern County, California; refer to Figure 3-1, *Regional Vicinity*. It is located approximately 1.10 miles south of the Bakersfield City limits (approximately 8.6 miles south of downtown), within the administrative boundaries of the Metropolitan Bakersfield General Plan (MBGP) in Kern County. The proposed Project consists of approximately 314 acres, generally located north of Houghton Road, east of SR-99, west of South Union Avenue, and south of DiGiorgio Road. South Union Avenue (SR-204), Houghton Road, and the DiGiorgio Road alignment provide the primary access to and from the Project area. Refer to Figure 3-2, *Project Vicinity*.

The proposed Project is located within a portion of Section 7, Township 31 South (S), Range 28 East (E), Mount Diablo Base and Meridian (MDBM). The latitude and longitude of the approximate center of the site is 35°14'34.10" North (N) and 119°0'40.69" West (W). The Universal Transverse Mercator (UTM) coordinates for the approximate center are East 3901819.39 meters and South 316999.72 meters, in Zone 11.

Regional Setting

Kern County is California's third largest county in land area, encompassing approximately 8,202 square miles and has a total population of 916,464 as of January 1, 2019 (California Department of Finance, 2019). The County is bound by Kings, Tulare, and Inyo counties to the north; San Bernardino County to the east; Los Angeles and Ventura counties to the south; and Santa Barbara and San Luis Obispo counties to the west. The County's geography is diverse, containing mountainous areas, agricultural lands, and desert areas. These areas are generally divided into three regions: the Valley Region, the Mountain Region, and the Desert Region. The Project site is located within the Valley Region, which is characterized by relatively low rainfall, relatively high average summer temperatures, and generally mild winters.

The dominant land use within the County is agriculture, although over the last few decades, urban development has occurred in and around the County's 11 incorporated cities. Bakersfield is the County's largest City, with a population of approximately 386,839 persons as of January 1, 2018 (California Department of Finance 2018). The Project site is located approximately 1.10 miles south of the Bakersfield city limits (8.6 miles south of downtown Bakersfield), 5.2 miles west of Lamont, 10 miles northwest of Arvin, 12.3 miles north of Mettler, and 25.7 miles east of Taft.

Local Setting and Surrounding Land Uses

Current Land Use

The Project site consists of disced land and has been utilized for row-crop agriculture consisting of cotton, alfalfa, carrot corn, wheat, and grain; a steel storage building associated with agricultural activities is located in the eastern portion of the site, near South Union Avenue. The topography of the Project site is relatively flat, sloping slightly from the northwest to the southeast with elevations ranging from approximately 331 feet above mean sea level (msl) to 340 feet above msl.

The majority of the Project site is currently designated by the Metropolitan Bakersfield General Plan (MBGP) as R-IA (Resource-Intensive Agriculture), while the southwest corner of the Project site is designated HC (Highway Commercial). The proposed Project has a Kern County Zoning Ordinance classification of A (Exclusive Agriculture). The Project site is located within an area that is designated by the California Department of Conservation (DOC) as Prime Farmland, Farmland of Statewide Importance, Semi-Agricultural and Rural Commercial Land, and Vacant or Disturbed Land (DOC, 2014a). The Project site does not contain Farmland of Local Importance (DOC, 2014a). The approximately 257.57 acres of the Project site is located within the boundary of Agricultural Preserve No. 13, as is the standard practice in Kern County for any land that is zoned A (Exclusive Agriculture). The Project site is not subject to a Williamson Act land use contract.

Kern County is one of the richest oil-producing counties in the United States with approximately 66 active oil fields[1]. The State Division of Oil, Gas, and Geothermal Resources (DOGGR) most recent information on Kern County's oil production is the 2018 Oil, Gas, and Water Production and Well Count by County (DOGGR, 2018). In 2018, Kern County produced 113,141,827 billion barrels of oil. According to DOGGR, the proposed Project is not located within an oil or gas field. There is one plugged and abandoned oil well located within the proposed Project boundaries (Big McKittrick Oil Company "Sea Cliff-Houghton" 1). In addition, one active, diesel-powered irrigation well and one domestic well are located on-site.

Surrounding Land Uses

Adjacent land uses include vacant land and agricultural uses to the north, agricultural uses and a small cluster of single-family residential homes to the east, SR-99 to the west, and agricultural uses and an automobile wrecking yard located south/southeast of Project site. Table 3-3, *Proposed Project Site and Surrounding Land Uses*, provides existing land uses and zoning classifications of the Project site and surrounding area.

Table 3-3. Proposed Project Site and Surrounding Land Uses

Direction from Project Site	Existing Land Use	*Existing Land Use Designation (Metropolitan Bakersfield General Plan)*	Existing Zone Classification (Kern County)
Project Site	Agriculture	R-IA (Resource-Intensive Agriculture) HC (Highway Commercial)	A (Exclusive Agriculture)
North	Agriculture; DiGiorgio Road	R-IA (Resource-Intensive Agriculture) LMR (Low Medium Density Residential, 4 to 10 units per acre) HMR (High Medium Density Residential, 7.26 to 17.42 units per acre) SR (Suburban, 4 units per acre) GC (General Commercial)	A-1 (Limited Agriculture) A (Exclusive Agriculture) E(1) RS MH (Estate 1 Acre, Residential Suburban Combining, Mobile Home Combining) E(2 ½) RS (Estate 2.5 Acres, Residential Suburban Combining) E(1/2) RS (Estate 0.5 Acres, Residential Suburban Combining)

[1] DOGGR GIS data. California Department of Conservation. (2019).

Table 3-3. Proposed Project Site and Surrounding Land Uses

Direction from Project Site	Existing Land Use	*Existing Land Use Designation (Metropolitan Bakersfield General Plan)*	Existing Zone Classification (Kern County)
			R-2 (Medium Density Residential, 16 units per acre)
East	Agriculture, Single-Family Residential, Commercial, SR-204	R-IA (Resource-Intensive Agriculture) RR (Rural Residential) SI (Service Industrial)	A (Exclusive Agriculture) A-1 (Limited Agriculture) E(10) RS (Estate 10 Acres, Residential Suburban Combining) M-2 PD (Medium Industrial, Precise Development Combining) CH (Highway Commercial)
West	SR-99; Agriculture, Fallow Land	PT (Public Transportation) R-IA (Resource-Intensive Agriculture)	A (Exclusive Agriculture) A-1 (Limited Agriculture) C-2 PD (General Commercial, Precise Development Combining)
South	Agriculture, Rural Residential, Automobile Wrecking Yard; Houghton Road	R-IA (Resource-Intensive Agriculture) RR (Rural Residential, 2½ acres per unit) HC (Highway Commercial)	A (Exclusive Agriculture) A-1 (Limited Agriculture) C-2 PD (General Commercial, Precise Development Combining)

3.3 Existing Planning and Zoning Regulations

The proposed Project is under the jurisdiction of the County and within the City of Bakersfield's Sphere of Influence. Land use and planning decisions are regulated by a variety of jurisdictional planning agencies and programs. Land use is governed by the jointly prepared, but separately adopted County/City Metropolitan Bakersfield General Plan and the Kern County Zoning Ordinance. Proposed Project development would also be regulated by the Metropolitan Bakersfield Habitat Conservation Plan. Applicable land use planning documents that regulate the proposed Project area are discussed below.

Metropolitan Bakersfield General Plan (MBGP)

The City and County have prepared and adopted the MBGP to provide cohesive land use planning for areas that lie both within the County's jurisdiction and the City's future service area. The MBGP is a separate but interrelated land use planning program within Kern County. It was updated by the County in 2007 and was updated by the City on January 20, 2016. The area covered by the MBGP coincides with the City of Bakersfield sphere of influence.

Kern County Zoning Ordinance

The Kern County Zoning Ordinance establishes the basic regulations under which land is developed. This includes allowable uses, building setback requirements, and development standards. Pursuant to state law, the Kern County Zoning Ordinance must be consistent with the Kern County General Plan and all Specific Plans. The basic intent of the Kern County Zoning

Ordinance is to promote and protect the public health, safety, and welfare via the orderly regulation of land uses throughout the unincorporated area of the county. This zoning code applies to all property in unincorporated Kern County, except land owned by the United States or any of its agencies.

The proposed Project is currently zoned A (Exclusive Agriculture). The purpose of the A zone is to designate areas suitable for agricultural uses and to prevent the encroachment of incompatible uses onto agricultural lands and the premature conversion of such lands to nonagricultural uses.

Metropolitan Bakersfield Habitat Conservation Plan

The goal of the MBHCP is to acquire, preserve, and enhance native habitats that support endangered and sensitive species, while allowing urban development to proceed as set forth in the MBGP. The study area covered by the MBHCP contains both City and County jurisdictions. The MBHCP is intended to meet the requirements of both state and federal endangered species acts. In addition, the MBHCP complies with state and federal environmental regulations set forth in the National Environmental Policy Act (NEPA) and CEQA. Upon payment of required mitigation fees and receipt of project approval, a developer/applicant would become a subpermittee and would be allowed the "incidental take" of covered species in accordance with state and federal endangered species laws. The proposed Project site is within the boundaries of the MBHCP.

3.4 Project Objectives

The Project proponent has defined the following objectives for the proposed Project:

- Facilitate quality development that is consistent with and implements the goals of the Kern County General Plan and Metropolitan Bakersfield General Plan.
- To develop the site consistent with the provisions of the Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards.
- Assure adequate planning for all community facilities including circulation improvements, drainage facilities, water, and wastewater facilities.
- Ensure that the project, in and of itself, does not contribute to the conversion of adjacent agricultural areas.
- Cluster commercial retail uses that provide goods and services near an interchange with SR-99 to accommodate interstate freight and reduce traffic congestion and air emissions.
- Accommodate new development that channels land uses in a phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.
- Address community circulation, both vehicular and pedestrian, utilizing available capacity with the existing circulation system, and provide fair-share system improvements to deficient intersections or road segments.
- Facilitate a planned development and related in-line tenants consistent with the market objectives of the applicant and its tenants.

- Accommodate growth within the proposed project while balancing environmental considerations.
- Provide an industrial center at the Houghton Road and SR-99 interchange in the southern metropolitan area adjacent to the City that would provide a broad range of goods and services that serve the regional market area.
- Allow for the development of a variety of commercial and industrial centers which are differentiated by their function, intended users and level of intensity.
- Provide new industrial development that captures the economic demands generated by the marketplace.
- Provide new development that will assist the County of Kern in obtaining fiscal balance in the years and decades ahead.

3.5 Proposed Project

The proposed Project includes a General Plan Amendment (GPA) and concurrent Change of Zoning District (ZCC) to modify the existing MBGP land use designations, and the Kern County Zoning Ordinance classifications on the 314-acre Project site. In addition, the Project includes a petition to exclude the Project site from Agricultural Preserve No. 13. The GPA and ZCC would allow for development of a light to medium industrial park containing approximately 4,613,004 square feet (net building area) of warehousing, distribution, and retail showroom uses. Table 3-4, *Existing and Proposed Land Use and Zoning,* below, provides the proposed GPA and ZCC summary for the proposed Project.

Table 3-4. Existing and Proposed Land Use and Zoning

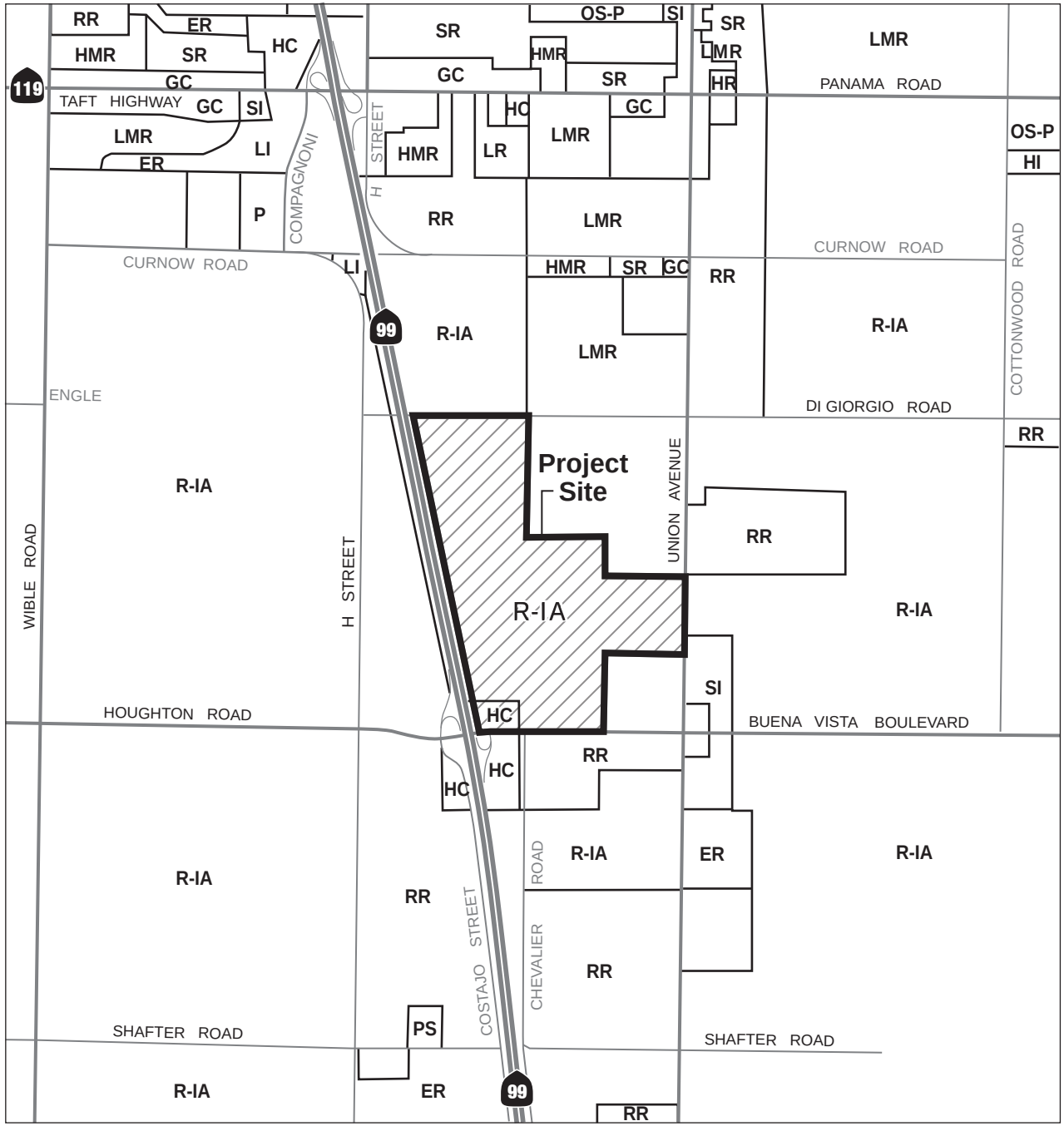
Existing MBGP Land Use Designations	Proposed MBGP Amendment (Land Use Designations)	Existing Zone Classification	Proposed Zone Change (Zone Classification)	Gross Acres
R-IA (Resource-Intensive Agriculture) HC (Highway Commercial)	GC (General Commercial)	A (Exclusive Agriculture)	C-2 PD (General Commercial, Precise Development Combining)	22
	LI (Light Industrial)		M-1 PD (Light Industrial, Precise Development Combining)	108
	SI (Service Industrial)		M-2 PD (Medium Industrial, Precise Development Combining)	159
	HC (Highway Commercial)		CH PD (Highway Commercial, Precise Development Combining)	25
			Total	**314***

Numbers have been rounded to the nearest whole number.
* Petition for Exclusion from Agricultural Preserve No. 13

Proposed General Plan Amendment

The Project proposes to amend the MBGP land use designations from R-IA (Resource-Intensive Agriculture) and HC (Highway Commercial), to LI (Light Industrial), SI (Service Industrial), HC

(Highway Commercial), and GC (General Commercial) (refer to Figure 3-3, *Existing General Plan Land Use Designations* and Figure 3-4, *Proposed General Plan Land Use Designations*). Approximately 108 acres would be amended to LI, approximately 159 acres would be amended to SI, approximately 9.01 acres would be amended to HC (Highway Commercial), and approximately 22 acres would be amended to GC (General Commercial). The Project site contains 15.99 acres of HC (Highway Commercial) that would remain unchanged. The LI designation is characterized by unobtrusive industrial activities that can be located in close proximity to residential and commercial uses with a minimum of environmental conflicts. The SI designation is characterized by industrial activities which involve outdoor storage or use of heavy equipment (MBGP, 2007).



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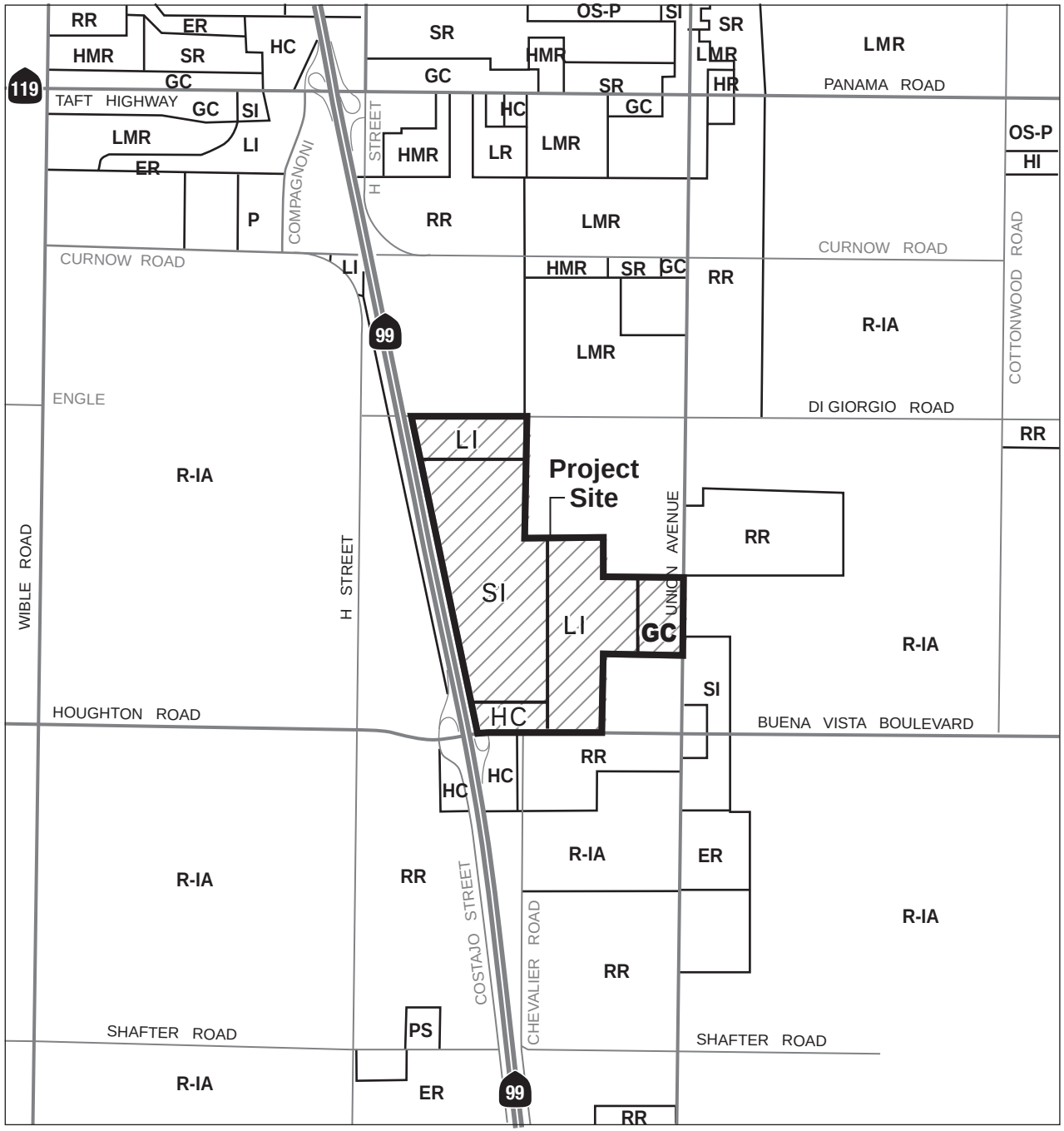
Land Use Designations

R-IA	Resource - Intensive Agriculture
LMR	Low Medium Residential
HMR	High Medium Residential
RR	Rural Residential
ER	Estate Residential
SR	Suburban Residential
GC	General Commercial
HC	Highway Commercial
LI	Light Industrial
SI	Service Industrial
HI	Heavy Industrial
OS-P	Parks and Recreation Facilities
PS	Public and Private Schools
P	Publicly Owned Facilities

99 HOUGHTON INDUSTRIAL PARK PROJECT
CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07
AGRICULTURAL PRESERVE #13 EXCLUSION

Existing General Plan Land Use Designations

Figure 3-3



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Land Use Designations

R-IA	Resource - Intensive Agriculture
LMR	Low Medium Residential
HMR	High Medium Residential
RR	Rural Residential
ER	Estate Residential
SR	Suburban Residential
GC	General Commercial
HC	Highway Commercial
LI	Light Industrial
SI	Service Industrial
HI	Heavy Industrial
OS-P	Parks and Recreation Facilities
PS	Public and Private Schools
P	Publicly Owned Facilities

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Proposed General Plan Land Use Designations

Figure 3-4

Proposed Zone Change

The Project proposes a Zone Change from A (Exclusive Agriculture) to M-1 PD (Light Industrial, Precise Development Combining), M-2 PD (Medium Industrial, Precise Development Combining), CH PD (Highway Commercial, Precise Development Combining), and C-2 PD (General Commercial, Precise Development Combining). Approximately 108 acres would be amended to M-1 PD, approximately 159 acres would be amended to M-2 PD, approximately 22 acres would be amended to C-2 PD, and approximately 25 acres would be amended to CH PD; refer to Figure 3-5, *Existing Zoning*, and Figure 3-6, *Proposed Zoning*, for a graphical representation of the proposed Project zone changes. As discussed in further detail below, all zones would be amended to contain the PD (Precise Development) Combining District overlay. The C-2 zoning classification is typically characterized by regional shopping centers and heavy commercial uses while CH zoning classification is typically characterized by gas stations, restaurants, and motels. The purpose of the M-1 zoning classification is to designate areas for wholesale commercial, storage, trucking, assembly-type manufacturing, and other similar industrial uses. The M-2 zoning designation is typically characterized by general manufacturing, processing, and assembly activities. The purpose of the PD Combining District is to designate areas with unique site characteristics or environmental conditions or areas surrounded by sensitive land uses to ensure that development in such areas is compatible with such constraints.

Precise Development Plans

Included with the proposed zone change to C-2, CH, M-1, and M-2 is the Precise Development (PD) Combining District. The purpose of the Precise Development (PD) Combining District is to designate areas with unique site characteristics or environmental conditions or areas surrounded by sensitive land uses to ensure that development in such areas is compatible with such constraints. All development in the PD Combining District shall be subject as a minimum to Special Development Standards as specified in Chapter 19.80 of the Kern County Zoning Ordinance; however, a Special Development Standard Plan Review shall not be required. The regulations established by the PD District shall be in addition to the regulations of the base district with which the PD District is combined.

Given the uncertainty regarding the specific use to be developed on site at this time, the PD Combining District is being included in the proposed zone change request. Implementation of the PD Combining District will ensure that as development of the site moves forward, the Kern County Planning and Natural Resources Department and the community at large will have the opportunity to publicly review site specific proposals to ensure compliance with the environmental impact report, the specific development standards and overall compatibility with the surrounding uses. Implementation of the site is expected to be processed under a Master Precise Development Plan.

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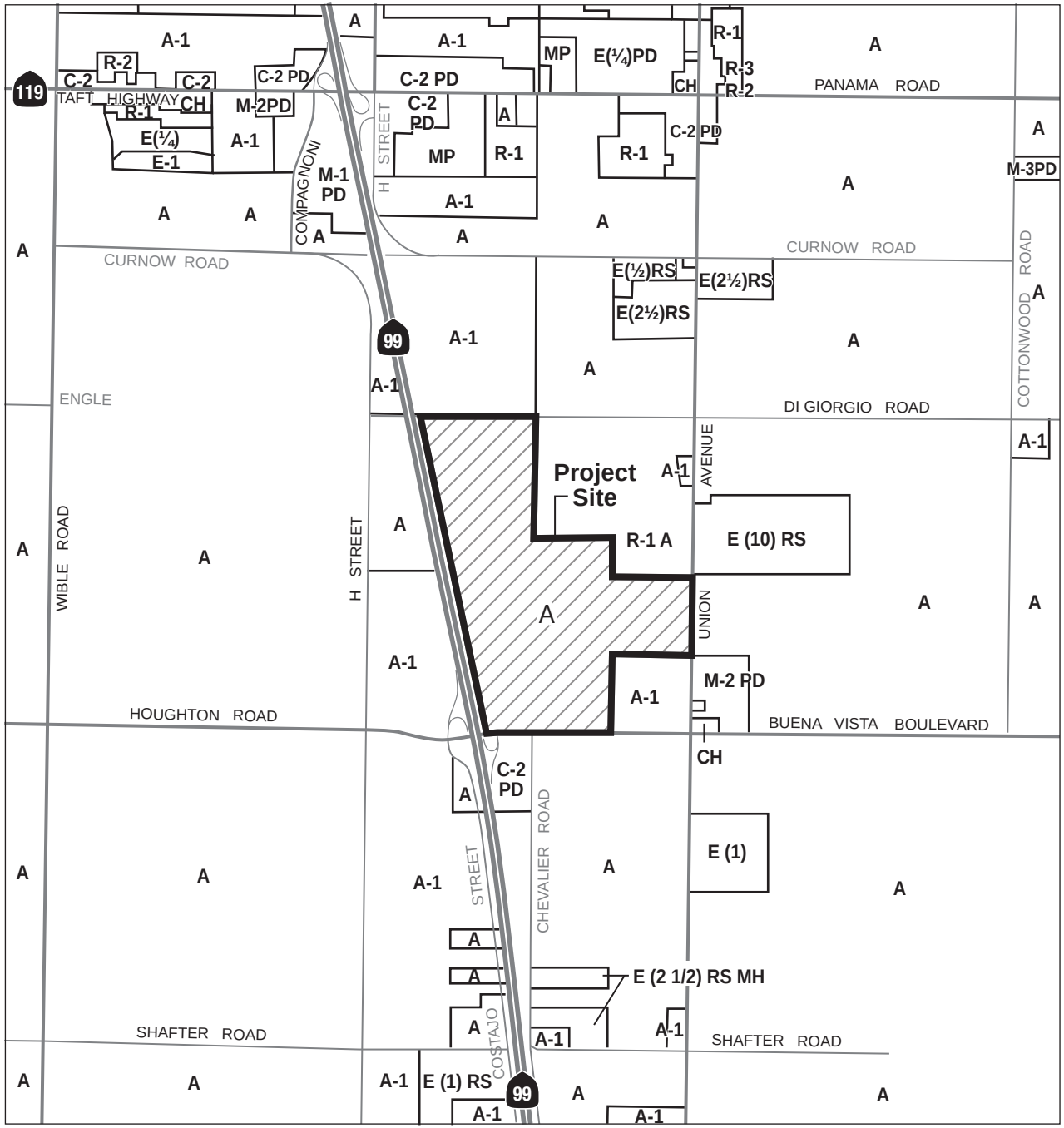

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Zoning Districts

A	Exclusive Agriculture
A-1	Limited Agriculture
C-2 PD	General Commercial, Precise Development Combining
C-2	General Commercial
CH	Highway Commercial
E (1/4)	Estate .25 Acres
E (1/2) RS	Estate .5 Acres, Residential Suburban Combining
E (1)	Estate 1 Acre
E (10) RS	Estate 10 Acres, Residential Suburban Combining
E (2 1/2) RS	Estate 2.5 Acre, Residential Suburban Combining
M-2 PD	Medium Industrial, Precise Development Combining
M-3 PD	Heavy Industrial, Precise Development Combining
MP	Mobile Home Park
R-1	Low Density Residential

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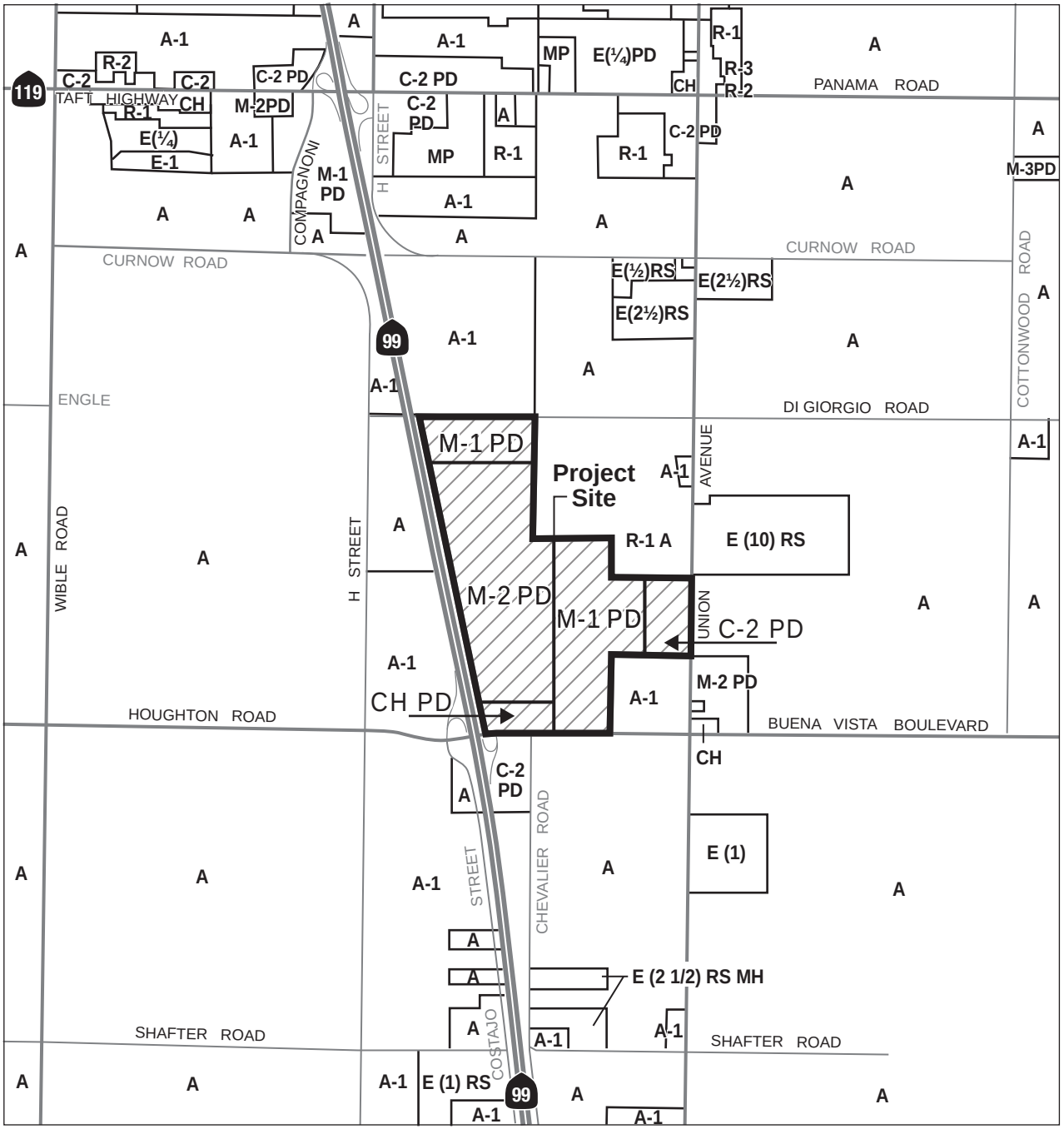
AGRICULTURAL PRESERVE #13 EXCLUSION

Existing Zoning

Figure 3-5



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Zoning Districts

A	Exclusive Agriculture
A-1	Limited Agriculture
C-2 PD	General Commercial, Precise Development Combining
C-2	General Commercial
C-2 PD	General Commercial Precise Development Combining
CH	Highway Commercial
CH PD	Highway Commercial Precise Development Combining
E (1/4)	Estate .25 Acres
E (1/2) RS	Estate .5 Acres, Residential Suburban Combining
E (1)	Estate 1 Acre
E (10) RS	Estate 10 Acres, Residential Suburban Combining
E (2 1/2) RS	Estate 2.5 Acre, Residential Suburban Combining
M-1	Light Industrial
M-1 PD	Light Industrial, Precise Development Combining
M-2	Medium Industrial
M-2 PD	Medium Industrial, Precise Development Combining
M-3 PD	Heavy Industrial, Precise Development Combining
MP	Mobile Home Park
R-1	Low Density Residential

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Proposed Zoning

Figure 3-6

Agricultural Preserve – Exclusion

An agricultural preserve defines the boundary of an area within the County that meets the criteria for property owners to enter into Williamson Act Land Use Contracts and Farmland Security Zone Contracts. Only land within an agricultural preserve is eligible for such contracts. The Kern County Board of Supervisor policy has established the criteria for inclusion into a preserve as land having a General Plan resource designation (RI–A), and having a zoning designation of A (Exclusive Agriculture). If approved, the requested MBGP designations of LI and SI would require the exclusion of approximately 257.57 acres from Agricultural Preserve No. 13 (refer to Figure 3-7, *Agricultural Preserve No. 13 Map*).

Parcel Map Processing

A Parcel Map shows the subdivision of land into parcels for sale and is recorded in the County Recorder's Office. Parcel Maps typically contain fewer "Lots" than Tract Maps and requirements for improvements (to the property) are less extensive than for Tract Maps. Industrial projects are done by Parcel Map if they plan to sell off the parcels. If one large complex is being developed, and parcels will not be sold, then a Parcel Map is not required. It is expected that the proposed Project will require Parcel Map processing; however, the certainty is unknown at this time.

Project Phasing

Implementation of the proposed Project is planned to be developed in phases over a twenty-five-year period. The layout for the individual phases is unknown at this time. The construction details regarding a construction start date is unknown at this time.

Water Supply

Water would be provided to the project site by the California Water Services Company (Cal Water), which provides service through of 24 Districts within California. The proposed project is not located within an existing service area but is approximately 0.5 mile south of the Bakersfield District (District). To serve the proposed project, Cal Water would require approval from the California Public Utility Commission (CPUC) to expand its service area to include the proposed project. Cal Water will submit an application to the CPUC and anticipates receiving approval to expand its serving to the proposed site in mid to late 2019. A water service line would be extended from an existing 12" Cal Water main located on the east side of Wible Road at the intersection with Engle Road (CR 918), then east along an alignment along the section line, currently a disturbed unimproved dirt dairy access road within the County's road reservation, to the intersection of S. H St. and DiGiorgio Road (CR 704), then continue east and across S.R. 99 to the northwest corner of the proposed project site along DiGiorgio Road. If needed by Cal Water, a second water main extension would begin at the current end of the 12" water main located on the south side of Shafter Road at the east side of the General Shafter Elementary School, continue east along Shafter Road in an existing right-of-way to the intersection with Costajo Road, then continue east and across SR-99 to the intersection with Chevalier Road in existing right-of-way, then continue north in existing right-of-way to the south side of the proposed project north of Houghton Road. A treated water service line would be constructed from the southwest corner of the proposed WWTP westerly under SR-99, continuing to the Kern Island Canal and the Kern Island Recharge Basins located near the northwest corner of S. H St & Houghton Road as an outfall location for excess treated recycled water. An agreement with Kern Delta District will be required.

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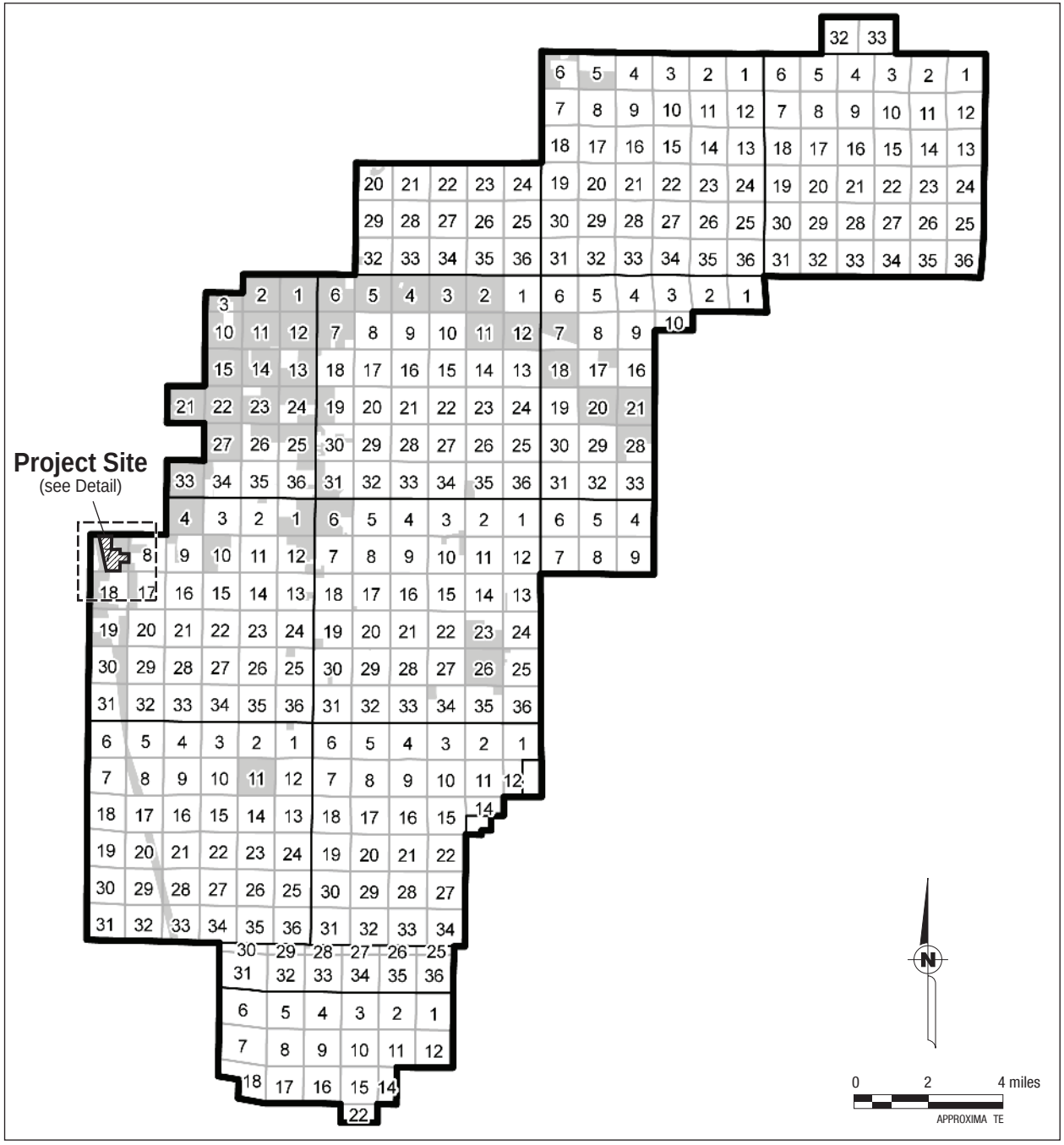

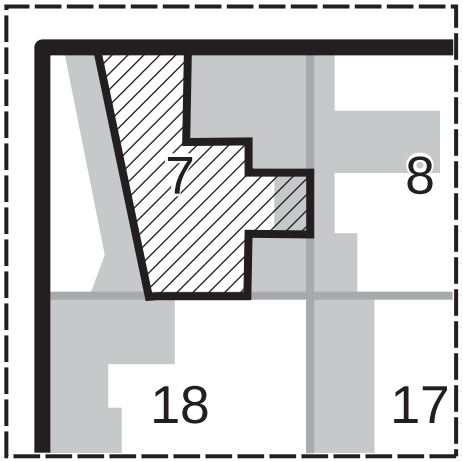

Project Site Detail

LEGEND

- 99 Houghton Project Site
- Agricultural Preserve 13
- Townships
- PLSS Sections
- Portion Excluded From Agricultural Preserve

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CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07
AGRICULTURAL PRESERVE #13 EXCLUSION

Agricultural Preserve No. 13 Map

Figure 3-7

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3.6 Entitlements Required

The Kern County Planning and Natural Resources Department, as lead agency for the proposed Project, has discretionary authority over the primary project proposal. Construction and operation of the proposed Project may require certain discretionary actions and approvals including, but not limited to, the following:

Kern County

- Consideration and certification of a final Environmental Impact Report (FEIR) with appropriate State CEQA Guidelines Sections 15091 Findings, 15093 Statement of Overriding Considerations, the mitigation measures monitoring reporting program by the Kern County Planning Commission and Kern County Board of Supervisors
- Approval by the Kern County Board of Supervisors for a general plan amendment for the proposed Project site, to amend the existing land use designation from R-IA (Resource – Intensive Agriculture) to LI (Light Industrial), SI (Service Industrial), HC (Highway Commercial), and GC (General Commercial)
- Approval by the Kern County Board of Supervisors for a zone change (ZCC) for the Project site, to remove the existing A (Exclusive Agriculture) zoning classification and rezone the Project site M-1 PD (Light Industrial, Precise Development Combining), M-2 PD (Medium Industrial, Precise Development Combining), CH PD (Highway Commercial, Precise Development Combining), and C-2 PD (General Commercial, Precise Development Combining)
- Approval by the Kern County Board of Supervisors for a conditional use permit (CUP) for a Sewer Treatment Plant;
- Exclusion of the Project site from Agricultural Preserve No. 13
- ~~Approval by the Kern County Board of Supervisors and processing of a parcel map(s)~~
- ~~Kern County Public Works Department – construction, grading, and building permits~~
- ~~Kern County Environmental Health Services Division – Water well permits, if applicable~~
- ~~Kern County Fire Department – Fire Safety Plan~~
- ~~Kern County Permit for Occupancy~~

Other Responsible Agencies

- California Department of Fish and Wildlife
- Agreements/Permits/Authorizations pursuant to the California and federal Endangered Species Acts, if necessary

- Approval by California Department of Transportation (Caltrans) for encroachment permit(s) for road access to the project site under Caltrans jurisdiction
- Regional Water Quality Control Board (RWQCB) permits
- State Water Resources Control Board National Pollutant Discharge Elimination System (NPDES) Permit
- General Construction Stormwater Permit (Preparation of a SWPPP)
- Approvals from the California Public Utilities Commission for any project elements to be constructed by regulated public utilities
- San Joaquin Valley Air Pollution Control District (SJVAPCD) – Fugitive Dust Control Plan, Authority to Construct, Permit to Operate, any other permits as necessary
- Other additional permits or approvals from responsible agencies may be required for the proposed Project

Upon completion of the environmental review process and prior to construction, the proposed Project would be reviewed through standard County plan check procedures, to verify that the Project conforms to all applicable County design criteria.

3.7 Cumulative Projects

CEQA requires that an EIR evaluate a project's cumulative impacts. Cumulative impacts are the project's impacts combined with the impacts of other related past, present and reasonably foreseeable future projects. As set forth in the CEQA Guidelines, the discussion of cumulative impacts must reflect the severity of the impacts, as well as the likelihood of their occurrence; however, the discussion need not be as detailed as the discussion of environmental impacts attributable to the project alone. As stated in CEQA, Public Resources Code, Section 21083(b) (2), "a project may have a significant effect on the environment if the possible effects of a project are individually limited but cumulatively considerable."

According to the CEQA Guidelines:

Cumulative impacts refer to two or more individual effects, which, when considered together, are considerable and which compound or increase other environmental impacts.

(a) The individual effects may be changes resulting from a single project or a number of separate projects.

(b) The cumulative impact from several projects is the change in the environment, which results from the incremental impact of the project when added to other closely related past, present, and reasonable foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time (California Code of Regulations [CCR], Title 14, Division 6, Chapter 3, §15355).

In addition, as stated in the CEQA Guidelines, it should be noted that:

The mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable (CCR, Title 14, Division 6, Chapter 3, Section 15064[I][5]).

Each environmental topic has a different way of evaluating cumulative effects. Cumulative impact discussions for each environmental topic area are provided at the end of each technical analysis contained within Chapter 4, under "*Impacts and Mitigation Measures*." The San Joaquin Valley Air Pollution Control District (SJVAPCD) requires use of a 1-mile radius to identify hazardous air pollutant emissions as well as most odor sources. The SJVAPCD also recommends a one-mile limit for hazardous air pollutants because such emissions primarily affect individuals that reside or work within the immediate vicinity (1 mile) of the emissions source. The Kern County Planning and Natural Resources Department's Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports requires a six-mile radius to assess cumulative impacts because housing growth, especially in rural areas, tends to affect a larger geographical area than developments located in urban areas.

As set forth in the CEQA Guidelines, related projects consist of "closely related past, present, and reasonable foreseeable probable future projects that would likely result in similar impacts and are located in the same geographic area" (CCR, Title 14, Division 6, Chapter 3, Section 15355). City and County files were reviewed to determine the number of permitted or planned projects within the 1 to 6-mile radius. The cumulative analysis in Chapter 4 of this Recirculated Draft EIR is based on a quantitative cumulative analysis of the projects located within this 6-mile radius of the proposed Project, as well as growth projections to the year 2030. Different resource-specific analyses use this 6-mile radius unless specific methodology deems other supplemental approaches are appropriate. Projects that are planned but have not been submitted for review or approved by the City or County are not included in this analysis because there is no way to know or ascertain what they might consist of, be approved, or be completed.

EIRs that have been prepared for various areas surrounding Bakersfield by the City and County have been incorporated into the Bakersfield General Plan EIR and the MBGP Update EIR (June 2002). The Bakersfield General Plan EIR states that between 1987 and 2010, an expected 112,620 dwelling units will be built. The MBGP Update EIR expects an additional 39,500 residential units from 2010 to 2020. Both of these EIRs considered the impacts from the development of additional residential construction within the proposed Project area.

The MBGP is the primary guide for land development in the proposed Project vicinity. The Land Use Element provides for a growth in commercial and industrial development similar to the existing rate and anticipates the growth rate will parallel the growth rate in residences to the unincorporated areas of the County. The proposed Project can and should be considered part of this projected growth.

Table 3-5, *Cumulative Projects List for Kern County,* lists pending projects within a six-mile radius of the Project site pertaining to Kern County projects. Table 3-6, *Cumulative Projects List for the City of Bakersfield,* lists pending projects within a six-mile radius of the Project site pertaining to City of Bakersfield Projects. These projects were considered when analyzing cumulative conditions and impacts

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Table 3-5. Cumulative Projects List for Kern County

Zone Map	Project	Location or APN	Acres	Description
142	Cruz, Gabriel/B Anderson	Western Section of South "H" Street, North of Bear Mountain Boulevard	N/A	AR Trucking, Products and Services; CUP
143	Recology Blossom Valley Organics/ Nicole Proiette	1261 North Wheeler Ridge Road	N/A	Modification of CUP 27, Map 143 (Community Recycling)
143	Douglas Kaiser	13627 Chevalier Road (APN 185-381-31)	15.25	Ag Truck Facility, CUP
142	Beard Family Trust	184-310-23	38.16	CUP for concrete batch plant per Section 19.12-030G of County Zoning Ordinance
143	Fresno MSA Limited Partnership dba Verizon Wireless	14911 Adobe Road (APN 185-310-03)	N/A	CUP to allow a 150-foot tall monopole wireless communication facility with associated equipment shelter
143	Dominguez/Cuevas by Afinar Civil Engineers	Northeast corner of Di Giorgio Road and South Union Avenue (APN 185-050-03)	17.89	GPA from RR to GC; ZCC from A to C-2
143	Delgado By Jaime Sandoval	Western Section of Union Avenue, 5/8 mile south of Bear Mountain Boulevard	N/A	GPA from 8.1 to 5.7/2.3; ZCC to E(5)
143	Jose Ramos By Jaime Sandoval	West of South Union Avenue, ½ mile south of Bear Mountain Blvd.	21.18	GPA from 8.1 to 5.7/2.3, ZCC to E (5)
142	Jon Moule	Northeast Corner of Progress Road and Shafter Road	20	GPA from R-IA to RR, ZCC from A to E (2½)
143	Bakersfield Land Company LLC by Delmarter	Costajo Road and Bear Mountain Blvd.	20	GPA RR to HC; ZCC from A-1 to CH
143	Nolan Campbell	13308 South Union Avenue	N/A	Metropolitan Bakersfield GPA from ER to Mineral and Petroleum; ZCC from E(1) to NR
142	DFI Commercial & Residential Project by CE	Weedpatch Highway between Mountain View Road and McKee	73	GPA to Commercial and Residential; ZCC to Commercial and Residential
143	Loma Vista Real Estate / D&D	3130 Di Giorgio Road	9.92	ZCC to E (2½) RS
142	Gill, Punit K by GW Wilson	Northeast Corner of Gosford and Chaidez	9.218	ZCC change to E (2½) RS
143	NSR Investors	South Side of Suckow, West of Flint	61.32	ZCC to 4-1 MP, M-1

Table 3-5. Cumulative Projects List for Kern County

Zone Map	Project	Location or APN	Acres	Description
143	Guadalupe Jimenez	17221 South Union Avenue	3.30	ZCC to M-1 or M-2
142	Juarez, Ethel	10604 South "H" Street	4.00	ZCC to C-2
143	Miguel de Leon	14103 South Union Avenue	9.64	ZCC from A to M-1 PD
143	K&P Stenderup Family Trust	Southwest corner of Bear Mountain Boulevard and Weedpatch Highway	20	ZCC from Agriculture to Commercial
143	Arnold S. Kirschenmann	Northwest corner of Bear Mountain Boulevard and Weedpatch Highway	20	ZCC for future development of Travel Plaza
123	Lopez, Pablo / Frank Slinkard	3018 Wood Lane	N/A	ZCC to R-1; CUP
160	Rudnick Feedlot / Philip and Daniel Rudnick	Old River Road 2 miles south of I-5 (APN 295-110-31)	320.00	CUP, Feedlot
161	Silver Oak / David & Douglas Kaiser	Northeast Corner of Teale Road and Adobe Road	632	CUP, Dairy
161	Rosa Dairy / Agricultural Man Systems	South of Herring, West of Wheeler Ridge Road	640	CUP, Dairy
161	Bloomfield / Tillema, Rich / John Schaap	Bear Mountain Road and Cottonwood Road	1,274	CUP, Dairy
124	Mayberry, Danny	3125 South Fairfaxs	N/A	CUP
124	Del Toro, Joe	5516 Weedpatch Highway (APN 174-011-05)	5.00	CUP, Ag Trucking Facility
124	Ana Maria Garay	6214 Kimber Avenue	2.50	CUP, firewood sales
124	Douglas Escalante	7401 Reynolds Street	1	CUP
124	Michael E. Ford	7837 East White Lane	4.51	CUP, outdoor event venue Section 19.08.085
160	California Bioenergy LLC	20400 Old River Road	300.57	CUP, co-digestion facility
124	Raul Perez	Southeast corner of Pacheco Road and Cottonwood	39.49	CUP, park (soccer fields)
124	Verizon Wireless	5941 Panama Lane	2.44	CUP to allow a wireless communication facility

Table 3-5. Cumulative Projects List for Kern County

Zone Map	Project	Location or APN	Acres	Description
123	THV Enterprises, Inc. Attn: Chris Ghasabyan	1015 Castro Lane	N/A	CUP to convert church to community care facility
124	Broadband Integrators Attn: Robert Gonzales	6217 Brundage Lane	N/A	CUP
124	Alfonso G. Moreno	1213 Feliz Drive	N/A	CUP
123	Salvador Cruz	Northwest corner of Taft Highway and Cerro Drive	0.12	GPA from GC to SI; ZCC from C-2 to M-2 PD
123	Munn and Fong Chau	Northwest corner of Michele Street and Taft Highway	6.78	GPA from SR to GC; ZCC from E(1) to C-2 PD
124	Firas Mufli	1300 Union Avenue	1.25	GPA, ZCC to C-2
124	Cornerstone Engineering / Louis Rodriguez	Southwest corner of Mountain View Road and Weedpatch Highway	73.17	GPA from E(R) to GC and HMR; ZCC from A to C-2 and R-3
124	Joshua Huff	113 Pepper Drive	2.11	GPA from 5.4 to 7.1; SPA
124	Valdez, Maria/San Joaquin Eng'g	170 and 180 Berkshire Lane	N/A	ZCC to C-2
124	Solis, Luis Manuel	6221 East Brundange Lane	2.70	ZCC to M-1 PD
123	Keith Spurlock	21 Stine Road	0.15	ZCC to small office
124	Ghaleb Haddad	1227 Ming Avenue	0.24	ZCC from R-1 to C-2
124	Ruben Escalera	328 Trinity Avenue	0.14	ZCC from R-1 to R-2
124	Carlos Amezcua	8005 Blackburn Street	2.52	ZCC from A-1 MH to E(1) RS MH and M-1 PD
124	Felipe Laines by LAV Consulting	1955 East Panama Lane	10.65	ZCC, parking/storage for trucks
124	Shakib Dashtipour	South Fairfax Road and East Panama Lane	N/A	ZCC E(2 ½) RS MH PE FPS to C-2 PD

Table 3-6. Cumulative Projects List for the City of Bakersfield

Project Number	Project	Location or APN	Acres	Description
Environmental Impact Reports				
07-2211	Crossroads EIR	South of Harris Road, north of Panama Lane, and west of Gosford Road	69.85	Tentative Tract Map / Site Plan Review
Zone Changes				
ZC 16-0365	N/A	N/A		ZCC from A to M-1
Annexations				
654	Michelle No. 1	N/A	6.83	Annexation
658	Taft Highway No. 2	N/A	15.24	Annexation
669	Panama No. 22	N/A	0.90	Annexation
667	Old River Road Detachment	Detachment "B"	1.48	Annexation
675	White No. 11	N/A	0.45	Annexation

File Number	Developer/Subdivider	Engineer	Acres	Tract Number
Tentative Tract Map				
T6503R	BAK BULLFROG LLC	R THOMPSON CONSULTING	N/A	6503
T6505	GLOBAL INVESTMENT & DEVELOPMENT, LL	HENDRICKS ENGINEERING		6505
T6514	GLOBAL INVESTMENT & DEVELOPMENT, LL	HENDRICKS ENGINEERING		6514
T6519	JAMES T MURPHY	PINNACLE ENGINEERING		6519
T6521	BVGG LLC.	PINNACLE ENGINEERING		6521
T6522R	RYER ISLAND LAND CO.	PINNACLE ENGINEERING		6522
T6531	LENNAR HOMES	SMITHTECH USA INC		6531
T6551	MARGUERITE GARRONE BENTZ	JOHN R WILSON		6551
T6585	GLOBAL INVESTMENT & DEV, LLC	HENDRICKS ENGINEERING		6585

File Number	Developer/Subdivider	Engineer	Acres	Tract Number
T6615	ENNIS LAND DEVELOPEMENT, LLC	QUAD KNOPF		6615
T6739	PB1-VENTURES, LLC	SMITHTECH USA INC		6739
T6741	SANTA BARBARA CAPITAL	McINTOSH & ASSOC		6741
T6744	SANTA BARBARA CAPITAL	McINTOSH & ASSOC		6744
T6745	SANTA BARBARA CAPITAL	McINTOSH & ASSOC		6745
T6747	SANTA BARBARA CAPITAL	McINTOSH & ASSOCIATES		6747
T6748	SANTA BARBARA CAPITAL	McINTOSH & ASSOC		6748
T6749	SANTA BARBARA CAPITAL	McINTOSH & ASSOCIATES		6749
T6750	SANTA BARBARA CAPITAL	McINTOSH & ASSOCIATES		6750
T6788	NIRMAL S GILL	SAN JOAQUIN ENGINEERING, INC		6788
T6792	PB3, PB6, PB7- VENTURES LLC	SMITHTECH USA		6792
T6802	FLOYD HINESLEY	PORTER-ROBERTSON		6802
T6807	DELRAY DEVELOPMENT	STANTEC CONSULTING INCV		6807
T6811	LYNX REALTY & MANAGEMENT	DEWALT CORPORATION		6811
T6849	TREND CAPITAL	MC INTOSH & ASSOCIATES		6849
T6859	ADAVCO, INC.	SMITHTECH USA INC		6859
T6860	ADAVCO, INC.	SMITHTECH USA INC		6860
T6865	EAST PANAMA LLC	DELMARTER & DEIFEL		6865
T6868	JM DEVELOPMENT INC.	MC INTOSH & ASSOCIATES		6868
T6871	COTTONWOOD VILLAS, LLC	HENDRICKS ENGINEERING		6871
T6873	PB 5 VENTURES LLC	SMITHTECH-USA		6873
T6874	PB 5 VENTURES LLC	SMITHTECH USA INC.		6874
T6875	PB5 VENTURES LLC	SMITHTECH USA		6875
T6880	LENNOX HOMES	SMITHTECH USA		6880
T6917	SITARAM HAPPY HOMES, LLC	PINNACLE ENGINEERING		6917

File Number	Developer/Subdivider	Engineer	Acres	Tract Number
T6919	KERN DELTA LAND DEVELOPMENT	CORNERSTONE ENGINEERING, INC.		6919
T6945	GGB PROPERTIES LLC	TERRA SURVEYING CONSULTANTS		6945
T7043	PB1-VENTURES, LLC	SMITHTECH USA, INC		7043
T7044	PB1-VENTURES, LLC	SMITHTECH USA, INC		7044
T7045	PB1-VENTURES, LLC	SMITHTECH USA, INC		7045
T7113	WINCHESTER WOOLLARD	PINNACLE ENGINEERING		7113
T7140	OLD RIVER LAND CO LLC	SUMMIT ENGINEERING		7140
T7190	PB3 VENTURES LLC	SMITHTECH USA		7190
T7191	PB3 VENTURES LLC	SMITHTECH USA		7191
T7192	PB3 VENTURES LLC	SMITHTECH USA		7192
T7193	PB7 VENTURES LLC	SMITHTECH USA		7193
T7194	PB7 VENTURES LLC	SMITHTECH USA		7194
T7195	PB6 VENTURES LLC	SMITHTECH USA		7195
T7196	PB6 VENTURES LLC	SMITHTECH USA		7196
T7213	OLD RIVER LAND CO	SUMMIT ENGINEERING		7213
T6181	GLOBAL INVESTMENT & DEVELOPMENT CO.	HENDRICKS ENGINEERING		6181
T6283R	S.W.M. DEVELOP. TRACT 6283	DELMARTER AND DEIFEL		6283
T6369	FLOYD HINSLEY	PORTER-ROBERTSON ENGINEERING		6369
T6410	HERSHEL & CLARISSA MOORE	DELMARTER AND DEIFEL		6410
T6442	ADAVCO, INC.	SMITHTECH USA, INC.		6442
T6616-2R	110 McCUTCHEN LLC	THE LUSICH COMPANY INC		6616
T7136	TRIMARK PACIFIC HOMES	THE LUSICH CO		7136
T7165	OLD RIVER LAND CO	SUMMIT ENGINEERING		7165
T7226	BERKSHIRE BAKERSFIELD LLC	DELMARTER & DEIFFEL		7226
T6520	LENOX HOMES	DELMARTER & DEIFFEL		6520

File Number	Developer/Subdivider	Engineer	Acres	Tract Number
T6712	ADAVACO, INC.	SMITHTECH USA INC.		6712
T7253	CLEAR CREEK HOMES	PORTER & ASSOC		7253
T7261	PANAMA LANE PROPERTIES, LLC	MC INTOSH & ASSOCIATES		7261
T6746	SANTA BARBARA CAPITAL	McINTOSH & ASSOCITATE		6746
T6969	CENTEX HOMES	McINTOSH & ASSOCIATES		6969
T6759	CENTEX HOMES	MC INTOSH & ASSOCIATES		6759
T6743	SANTA BARBARA CAPITAL	McINTOSH & ASSOCIATES		6743
T6825	CENTEX HOMES	MC INTOSH & ASSOCIATES		6825
T6536	LENNAR HOMES OF CALIFORNIA	SMITHTECH USA INC		6536
T6760	CENTEX HOMES	McINTOSH & ASSOC		6760
T6742	SANTA BARBARA CAPITAL	McINTOSH & ASSOCIATES		6742
T6397	ADAVCO INC	SMITHTECH USA		6397
T6607	MICHEL GARONE	PORTER-ROBERTSON ENGINEERING		6607
T6755	GLOBAL INVESTMENT & DEVP LLC	HENDRICKS ENGINEERING		6755
T7263	PANAMA LANE PROPERTIES, LLC	McINTOSH & ASSOC		7263
T6663	THE JOHN M ANTONGIOVANNI TRUST	PACIFIC ENGINEERING ASSOCIATES, INC		6663
T7301	AKERS LLC	PASQUINI ENGINEERING INC		7301
T7262	PANAMA LANE PARTNERS, LLC	McINTOSH & ASSOCIATES		7262
T6899	M. S. WALKER & ASSOCIATES, INC.	CRC ENTERPRISES		6899
T7029	EAST PANAMA LLC	DELMARTER & DEIFEL		7029
T7267	RIVER RANCH COMMUNITY, LLC	DPSI		7267

File Number	Developer/Subdivider	Engineer	Acres	Tract Number
T7304	OLD RIVER ROAD, LLC	DPSI		7304

Tentative Parcel Map

Project Number	Subdivider	Engineer	File Number	Map Type
12023	BEECH A/C PROPERTIES, LLC	JASON VAN CUREN, PLS	P12023	STANDARD
12086	WIBLE INVESTORS II, LLC	SMITHTECH USA	P12086	STANDARD
12123	GTIS GID HOLDINGS, LLC	SMITHTECH USA INC.	P12123	STANDARD
12122	GTIS GID HOLDINGS, LLC	SMITHTECH USA INC.	P12122	STANDARD
12167	STEVE ANTONGIOVANNI ET. AL.	McINTOSH & ASSOCIATES	P12167	STANDARD
12169	ROLL REAL ESTATE DEVELOPMENT LLC	DPSI	P12169	CONDOMINIUM
12173	M&R INVESTMENT GROUP, LLC	McINTOSH & ASSOC	P12173	STANDARD
11864	SUKHVINDER SINGH GHUMAN	HIGHER GROUND	P11864R	STANDARD
11118	CASTLE & COOKE CALIFORNIA, INC	MC INTOSH & ASSOCIATES	P11118R	STANDARD
11554	WILLIAM LEE	DEE JASPAR & ASSOCIATES	P11554	STANDARD
11592	LEONARDO LOPEZ	HENDRICKS ENGINEERING	P11592	STANDARD
11614	JESUS & ADRIANA CONTRERAS	WILEY D HUGHES SURVEYING	P11614	STANDARD
11718	BAKERSFIELD GROVE LTD, LLC	M.S. WALKER & ASSOC INC	P11718	STANDARD
11773	GREGORY D BYNUM ASSOC	McINTOSH & ASSOC	P11773	STANDARD
11783	METRO NOVA DEVELOPMENT	DEWALT CORP	P11783	STANDARD
11809	OLD RIVER LAND CO LLC	SUMMIT ENGINEERING	P11809	STANDARD

11874	PANAMA & GOSFORD RETAIL LLC	HIGHER GROUND	P11874	STANDARD
11331	THREE GILLS INC, A CALIFORNIA CORP	DELMARTER AND DEIFEL	P11331	STANDARD
11472	ARNULFO ZEPEDA	NELMS SURVEYING INC	P11472	STANDARD
11879	CASTLE & COOKE COMMERCIAL-CA	McINTOSH & ASSOC	P11879	STANDARD
11865	CASTLE & COOKE COMMERCIAL\	McINTOSH AND ASSOC	P11865	STANDARD
10606	RUBEN MIRONOWSKI	DAWSON ENGINEERING & ASSOC.	P10606	STANDARD
11992	BENTON PARK LLC	H3 ASSOCIATES	P11992	STANDARD

Specific Plan Review

Project Number	Type	Address	Dwelling Units	Description
13-0266	COMMERCIAL	9855 COMPAGNONI STREET	N/A	HIGHWAY PATROL STATION
SPR16-0252	COMMERCIAL	9800 & 9804 COMPAGNONI STREET	N/A	HOTEL AND RESTAURANT – 78 ROOMS / 54,679 SQUARE FEET
12-0254	COMMERCIAL	4607 WIBLE RD	0	AUTO DEALERSHIP - 6,000 S.F.
12-0247	COMMERCIAL	1800 WHITE LN	0	OFFICE - 864 S.F.
12-0280	INDUSTRIAL	5551 DISTRICT BLVD	0	WAREHOUSE BG - 6,600 S.F.
12-0289	COMMERCIAL	4621 WHITE LN	0	MEDICAL OFFICE - 845 S.F.
12-0311	COMMERCIAL	7800 SILVER DOLLAR WAY	0	TRAILER SALES / SHOP - 7000 S.F.
12-0358	COMMERCIAL	700 PLANZ RD	0	RETAIL BG - 3,300 S.F.
12-0319	MISCELLANEOUS	9100 ELLASHOSH ST	0	CHURCH - 1,500 S.F.
12-0073	COMMERCIAL	571 Panama Ln	0	1541 sf Addition to existing convenience store
12-0432	COMMERCIAL	6900 McCutchen Rd	0	18,701 square foot office/warehouse buildings
13-0061	COMMERCIAL	3515 PANAMA LN	0	Fitness Club - 18,370 sf
13-0149	INDUSTRIAL	67 East White Lane	0	Auto dismantling facility in an M-3
13-0060	INDUSTRIAL	7225 Schirra Ct	0	9,750 sf warehouse
13-0164	INDUSTRIAL	4200 Resnick Ct	0	Warehouse/office 14,560sf
13-0171	INDUSTRIAL	7700 District Blvd	0	Warehouse/Office 30,860sf
13-0169	COMMERCIAL	3221 Taft Hwy	0	Convenience Store addition 591sf
13-0206	MISCELLANEOUS	1451 MADISON AVE	0	75-foot tall stealth wireless communications facility
12-0002	INDUSTRIAL	5010 YOUNG ST	0	75,600 square foot industrial office/warehouse building
13-0347	COMMERCIAL	5100 YOUNG ST	0	22,316 SF general office building & 1,836 SF addition to existing building
13-0319	INDUSTRIAL	3451 Panama Lane	0	70' stealth wireless comm. facility in a C-2
13-0354	INDUSTRIAL	3232 STINE RD	0	84-foot tall stealth wireless facility in a C-1 zone
13-0364	INDUSTRIAL	4801 S H ST	0	72' stealth wireless facility in a C-1
13-0377	INDUSTRIAL	5102 PARK DIANE AVE	0	6,506 sf general office & 1,216 storage buildings

13-0371	COMMERCIAL	2540 WIBLE RD	0	1850 sf Restaurant
13-0389	COMMERCIAL	5300 GASOLINE ALLEY DRIVE	0	5400sf ADD to service garage
13-0397	MISCELLANEOUS	5614 WOODMERE DRIVE	0	12000 sf church
14-0078	INDUSTRIAL	5913 WOODMERE DR	0	industrial office/warehouse 4235 sf
14-0124	COMMERCIAL	8601 South H St	0	13,401sf assembly building & 8,480 sq ft social hall
14-0125	INDUSTRIAL	5907 WOODMERE	0	3920sf Industrial office / Warehouse
14-0169	COMMERCIAL	4250 Ashe Road	0	two modular office buildings totaling 11,610 sq ft
14-0215	RESIDENTIAL	4103 Rock Lake Dr	2	492 sf 2d DU
14-0323	INDUSTRIAL	6013 Nathaniel Way	0	7,157 sf office/warehouse
14-0283	INDUSTRIAL	4516 District Blvd	0	6,000 sf warehouse (additional to existing)
14-0408	INDUSTRIAL	5500 Gasoline Alley Drive	0	12,100-square foot auto dealership repair shop
14-0456	INDUSTRIAL	5813 NATHANIEL WAY	0	Office/Warehouse - 4130sf
15-0019	COMMERCIAL	2500 White Ln	0	Restaurant - 1,776 s.f. w/Drive through
14-0466	INDUSTRIAL	5700 Woodmere Drive	0	Retail/Warehouse - 6,006 s.f.
15-0047	COMMERCIAL	3117 WILSON RD	0	Banquet Hall 16,451 s.f.
15-0132	COMMERCIAL	3105 AUTO MALL DR	0	672 SF automobile sales office
15-0151	INDUSTRIAL	5901 WOODMERE DR	0	4248 sf Ofc/Warehouse
15-0159	INDUSTRIAL	5815 WOODMERE DR	0	3920 sf ofc/warehouse
15-0105	COMMERCIAL	5701-6411 Gosford Road	0	786,370-sq ft retail center in M-2
15-0231	INDUSTRIAL	4325 Stine Road	0	6,000-sf industrial office/warehouse building
15-0203	COMMERCIAL	2303-2305 S Union Ave	0	51,815 sf RETAIL CENTER
15-0274	COMMERCIAL	7700 District Boulevard	0	15,210 SF RESTARUANT/BREWERY BLDG
14-0177	MISCELLANEOUS	5703 Nathaniel Way	0	11,088 sf church building in an M-1
15-0393	RESIDENTIAL	6503 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6507 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6511 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6601 JERNO DR	2	1 DUPLEXE of 57 TOTAL

15-0393	RESIDENTIAL	6605 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6609 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6613 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6617 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6703 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6707 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6711 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6715 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6719 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6801 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6807 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6811 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6815 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6819 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6600 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6606 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6612 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6616 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6702 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6706 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6712 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6716 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6722 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6800 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	6806 JERNO DR	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5200 GASOL CT	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5204 GASOL CT	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5208 GASOL CT	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5212 GASOL CT	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5216 GASOL CT	2	1 DUPLEXE of 57 TOTAL

15-0393	RESIDENTIAL	5000 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5004 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5010 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5016 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5102 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5108 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5114 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5200 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5208 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5216 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5001 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5005 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5009 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5013 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5017 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5103 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5107 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5111 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5115 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5205 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5209 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5217 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0393	RESIDENTIAL	5221 CALLADO LN	2	1 DUPLEXE of 57 TOTAL
15-0430	COMMERCIAL	4550 PANAMA LN	0	TIRE SHOP - 8099 SF
15-0446	COMMERCIAL	5203 YOUNG ST	0	ATHLETIC TRAINING FACILITY
15-0425	COMMERCIAL		0	10.023 sf outpatient medical clinic
15-0365	COMMERCIAL	4151 Mexicali Dr	0	720 s.f. Modular Medical office building
15-0486	COMMERCIAL	6600 COLONY ST	0	1850 S.F. RESTRAUNT w/ Drive thru
15-0509	MISCELLANEOUS	4300 STINE ROAD	0	63 FT STEALTH WIRELESS TOWER
16-0026	COMMERCIAL	3699 Wilson Rd	0	351 SF ADD. TO CONVENIENCE STORE

16-0037	RESIDENTIAL	5201 GASOL CT	216	APT COMPLEX - 216 units
16-0070	COMMERCIAL	2201 S UNION AVE	0	WRHSE conversion to Truck repair shop
16-0171	INDUSTRIAL	7224 SCHIRRA CT	0	Warehouse - 20,000 sf
16-0113	RESIDENTIAL	1418 ROSALIA DR	2	2ND DU
16-0198	RESIDENTIAL	2301 WILSON RD	2	2ND DU
16-0174	COMMERCIAL	6300 White Lane	0	CRV Recycling facility
16-0192	INDUSTRIAL	6514 & 6515 Woodmere Dr	0	Ofc Bldg 26,925 sf
16-0245	COMMERCIAL	7315 WHITE LN	0	Car Wash & detail shop
16-0256	MISCELLANEOUS	4500 Hughes Lane	0	Water Well
16-0257	MISCELLANEOUS	3411 Hosking Ave (	0	water well (#225-01)
16-0191	COMMERCIAL	3301 Wible Rd`	0	Mini Mart addition
16-0288	MISCELLANEOUS	3608 Brisbane Ave	0	Unmanned water treatment facility
16-0357	INDUSTRIAL	2612 Pacheco Rd	0	TEMP. Auto Storage
16-0356	INDUSTRIAL	2620 Pacheco Rd	0	TEMP. Auto Storage
16-0358	INDUSTRIAL	2604 Pacheco Rd	0	TEMP. Auto Storage
16-0368	COMMERCIAL	5700 Gasoline Alley Dr	0	64,675 sq ft auto service repair shop
16-0376)	COMMERCIAL	2128 SOUTH UNION AVE	0	commercial truck repair facility 16,090 sf
16-0417	COMMERCIAL	7701 WHITE LN	0	CRV Recycling
16-0482	RESIDENTIAL	4602 CROSSHAVEN AVE (#B)	2	2nd du
16-0460	COMMERCIAL	6710 COLONY ST	0	RETAIL BLDG - 22000 sf
16-0474	COMMERCIAL	2309 South Union Ave	0	14,428 sf Banquet Hall
16-0481	INDUSTRIAL	8701 SWIGERT CT	0	9694 SF Ofc/Warehouse
16-0474	COMMERCIAL	8101 STINE RD	0	11715 SF ENTRY & DINING HALL ADD.

Source: City of Bakersfield, July and August 2017.

Section 4.1

Aesthetics

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Section 4.1
Aesthetics

4.1.1 Introduction

This section discusses impacts associated with the potential for the proposed Project to degrade the existing visual character or quality of the site and its surroundings through changes in the existing landscape. Potential effects are evaluated relative to important visual features (e.g., scenic highways, scenic features), and the existing visual landscape and its users.

Degradation of the visual character of a site is usually addressed through a qualitative evaluation of the changes to the aesthetic characteristics of the existing environment, and the proposed Project-related modification that would alter the visual setting. Aesthetics, as addressed under the California Environmental Quality Act (CEQA), refers to visual considerations in the physical environment. Because a person's reaction and attachment to a given viewshed are subjective, visual changes inherently affect viewers differently. Accordingly, aesthetics analysis, or visual resource analysis, is a systematic process to logically assess visible change in the physical environment and the anticipated viewer response to that change. This Aesthetics section of this Recirculated Draft Environmental Impact Report (RDEIR) describes the existing landscape character of the project site, existing views of the surrounding area from various on-the-ground vantage points, the visual characteristics of the project site, and the landscape changes that would be associated with the implementation of the proposed project, as seen from various vantage points.

Issues of visual blight are addressed by considering the potential for urban decay that may be precipitated or exacerbated in metropolitan Bakersfield and its environs and by considering the indirect changes in visual quality that could occur as a result of the proposed Project. Visual blight related to urban decay is defined as a general deterioration of the urban landscape that is characterized by long-term building vacancies, poor building maintenance, and increased vandalism. This definition of urban decay is based on the *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) (124 Cal. App. 4th 1184) decision.

The term *visual blight*, as referred to in this Recirculated Draft Environmental Impact Report (RDEIR), is a condition where real property, by reason of its appearance, is detrimental to the property of others or to the aesthetic value of adjacent properties or reduces the aesthetic appearance of the neighborhood. The analysis regarding potential impacts from urban decay is based on the Urban Decay Study prepared in August 2017 by The Natelson Dale Group, Inc. See Appendix K, *Urban Decay Study*, and Appendix N, *Original Technical Studies*.

4.1.2 Environmental Setting

Local Character

The proposed Project is located is located approximately 1.10 miles southeast of the Bakersfield City limits, within the Metropolitan Bakersfield General Plan, in Kern County. The proposed

Project consists of approximately 314.3 acres, generally located north of Houghton Road, east of State Route (SR) 99, west of South Union Avenue, and south of DiGiorgio Road. The proposed Project location is illustrated on Figure 3-2, *Project Vicinity*, of the Recirculated Draft EIR.

On-site topography is relatively flat, with elevations ranging between 331 and 340 feet above mean sea level (msl). The proposed Project is mostly vacant; however, a steel storage building associated with agricultural activities is located in the eastern portion of the site, near South Union Avenue. The proposed Project site consists of disked land and has been previously utilized for row-crop agriculture consisting of cotton, alfalfa, carrot, corn, wheat, and grain. Views across the proposed Project site are currently unobstructed due to the existing agricultural use of the site and level terrain. Public viewers of the site include motorists traveling along the surrounding roadways. Refer to Figure 4.1-1, *Photograph Vantage Point Locations*, and Figures 4.1-2, *Key Observation Point A*, 4.1-3, *Key Observation Point B,* 4.1-4, *Key Observation Point C*, and 4.1-5, *Key Observation Point D*, that show representative pictures of the proposed Project site and surrounding area.

Key Observation Points (KOPs) Existing Conditions

Existing land uses in the area include vacant land and agricultural uses to the north, agricultural uses and a small cluster of single-family residential homes to the east, SR-99 to the west, and agricultural uses and an automobile wrecking yard located south/southeast of proposed Project site.

KOP A - Northward Views from Houghton Road.

Views northward toward the project site consist of existing agricultural land that depending on the season is vegetated or fallow with exposed bare ground. From this vantage point the proposed Project site appears completely flat with no structures or landforms. On the northwesterly side and northerly side of the proposed Project site off-site trees are visible. Prominent landforms to the northwest and north are absent and significant landform features area lacking. Distant views of the mountains to the northeast and available depending on the weather conditions and air quality but are largely obscured by intervening vegetation and structures. There are no prominent views of the project site from this location as significant features in the landscape are lacking. Refer to Figure 4.1-2, *Key Observation Point A*.

KOP B - Eastward Views from Houghton Road.

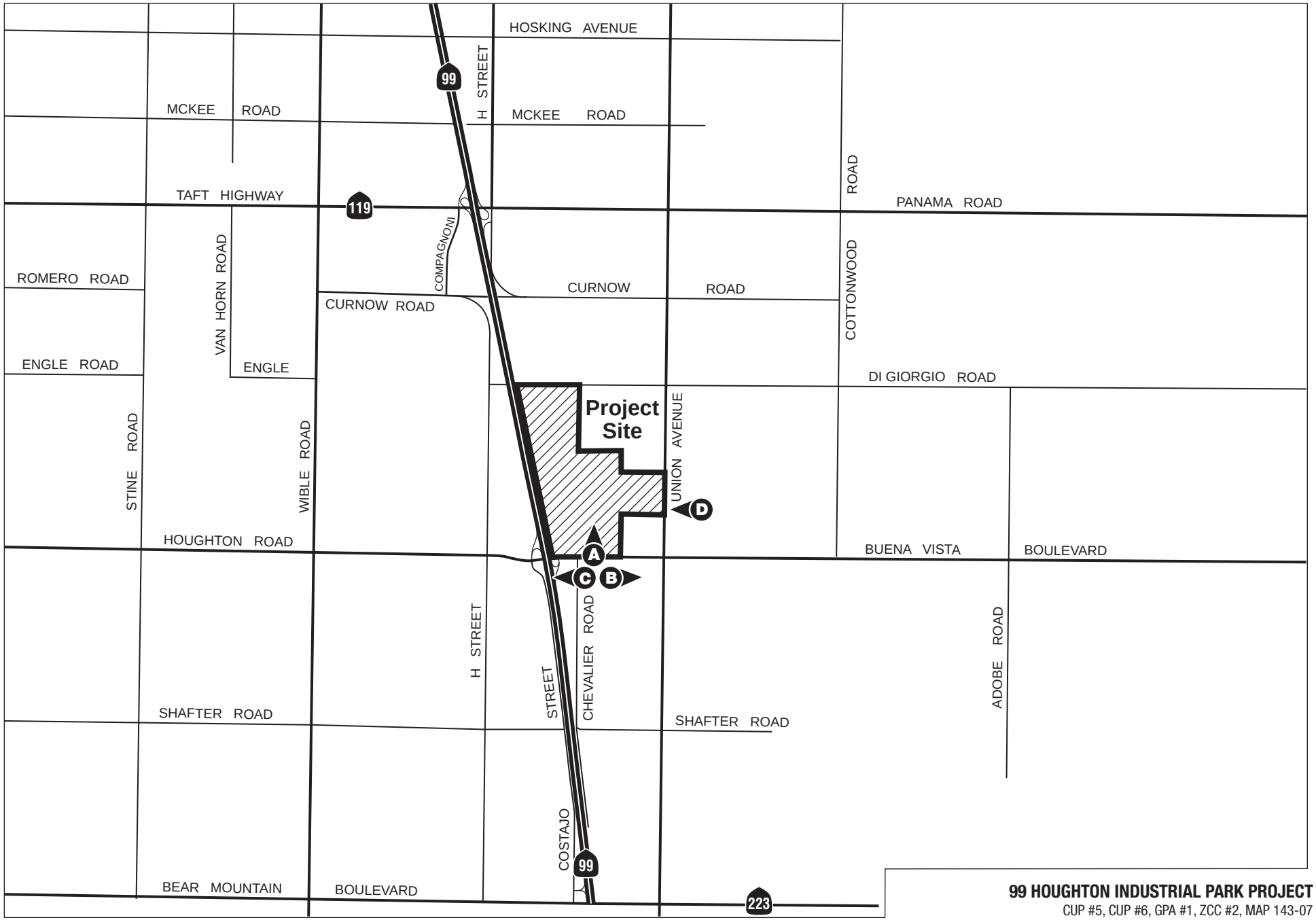
Views eastward and northeasterly toward the project site consist of existing agricultural land that depending on the season is vegetated or fallow with exposed bare ground. The northerly side of the Houghton Road shoulder is heavily disturbed and largely unvegetated and contains wooden utility poles that run along the entire southern project boundary. Approaching Union Avenue views of the automobile wrecking yard come into view and the palm trees lining the eastern project boundary are visible. Distant views of the mountains between the central valley and points east are visible depending on weather and air quality conditions but partially obscured from intervening structures and trees. There are no prominent views of the project site from this location as significant features in the landscape are lacking. Refer to Figure 4.1-3, *Key Observation Point B*.

KOP C - Westward Views from Houghton Road.

Views westward and northwesterly toward the project site consist of existing agricultural land that depending on the season is vegetated or fallow with exposed bare ground. The northerly side of the Houghton Road shoulder is heavily disturbed and largely unvegetated and contains wooden utility poles that run along the entire southern project boundary. Approaching SR-99 there is a dirt road that "T's" with Houghton Road and provides access to the interior of the site. At this point Houghton Road begins to slope upward to provide elevation for the overpass over SR-99. Approaching SR-99 there are trees visible on the westerly side of SR-99. There are no prominent views of the project site from this location as significant features in the landscape are lacking. Refer to Figure 4.1-4, *Key Observation Point C.*

KOP D - Westward Views from Union Avenue.

Views from Union Avenue westward across the project site consist of existing agricultural land that depending on the season is vegetated or fallow with exposed bare ground. The westerly side of Union Avenue is lined with mature palm trees and utility poles that run along the entire southern project boundary (the palm trees are visible in the Photo for KOP-B). Westerly views from Union Avenue approaching Houghton Road consist of a small cluster of single-family rural residential homes with numerous out buildings and other structures, as well as automobile wrecking yard at the northwest corner of the intersection. A sparse tree line on the westerly side of SR-99 is visible, but there are no prominent distant views from this vantage point and there are no significant features in the landscape. Refer to Figure 4.1-4, *Key Observation Point D.*



99 HOUGHTON INDUSTRIAL PARK PROJECT

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AGRICULTURAL PRESERVE #13 EXCLUSION

Photo Vantage Point Locations

Figure 4.1-1

View looking north across the Project site from Houghton Road.

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not to scale

Key Observation Point A

Figure 4.1-2

View looking east along Houghton Road towards Union Avenue.

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Key Observation Point B

Figure 4.1-3

View looking west along Houghton Road towards SR-99 ramps (adjacent to the Project's southern boundary).

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Key Observation Point C

Figure 4.1-4

View looking west across the Project site from Union Avenue.

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Key Observation Point D

Figure 4.1-5

Regional Character

The unincorporated area outside of Metropolitan Bakersfield is currently dominated by agricultural lands (crops and orchards) and other resources designated industrial uses, crisscrossed by country roads, and interspersed with older farmhouses. The majority of housing development and urbanization is taking place within the surrounding planning areas of Metropolitan Bakersfield and the City of Shafter.

Lighting Environment

The Bakersfield area has a nighttime light environment that is visible from great distances, but the character of the nighttime environment changes with increasing distance from the downtown area.

The proposed Project site is devoid of any substantial development. As such, the area produces little light. Light that is produced would be minimally visible from any off-site areas or to drivers on adjacent roadways. Because the majority of the surrounding area is also vacant or have very low residential densities, there are no substantial light sources in the immediate vicinity. Minimal light and glare emanates from the single-family residential uses east of the proposed Project site and the automobile wrecking yard southeast of the Project site. The existing agricultural land to the north and south do not currently create substantial or unusual amounts of light or glare onto the proposed Project site. Additionally, because the surrounding areas are used for agriculture, no sensitive light receptors are located near the proposed Project.

There are two typical types of light intrusion. First, light emanates from the interior of structures and passes out through windows. Second, light projects from exterior sources, such as street lighting, security lighting and landscape lighting. Glare mainly results from sunlight reflection off flat building surfaces, with glass typically contributing the highest degree of reflectivity. Light introduction can be a nuisance to adjacent residential areas and diminish the view of the clear night sky, and if uncontrolled, can disturb wildlife in natural habitat areas. Perceived glare is the unwanted and potentially objectionable sensation as observed by a person as they look directly into the light source of a luminaire.

Light spill-over is typically defined as the presence of unwanted and/or misdirected light on properties adjacent to the property being illuminated.

Economic Environment

To determine whether the proposed Project would create condition for urban decay, the local market and the economic character of existing commercial development are evaluated. The economic setting is based on 2017 The Natelson Dale Group's (TNDG's) Urban Decay Study, which is included as Appendix K of this Recirculated Draft EIR. The analysis in the Urban Decay Study was based on market research and interviews with area real estate brokers, along with other sources of economic data.

Taxable sales in retail stores in Bakersfield accounted for 56 percent of total sales in Kern County in 2014 (TNDG 2017). The City with the next highest retail store sales was the City of Shafter, which had retail stores sales representing six (6) percent of total sales in Kern County. Bakersfield

serves a retail shopping destination for the larger surrounding metropolitan area as well as Kern County as a whole (TNDG 2017).

The overall vacancy rate of retail space in Bakersfield has declined from approximately 14 percent in 2010 to 10.7 percent at the end of 2015. This was up slightly from the 9.6 percent vacancy rate at the end of 2014. The slight uptick in the vacancy rate resulted from the closing of grocery stores, in addition to the construction of several retail shopping centers with speculative space, but not from weakness in the retail market. This slight uptick would likely be temporary as several of the large vacancies are expected to be leased throughout this year (TMDG 2017).

4.1.3 Regulatory Setting

This regulatory framework identifies the federal, State, regional, and local statutes, ordinances, or policies that govern the light, glare, viewshed, and scenic character that must be considered by Kern County during the decision-making process for projects that have the potential to affect aesthetics.

Federal

U.S. Department of Transportation

The U.S. Department of Transportation Act of 1966, Section 4(f), "Protection of Publicly Owned Park, Recreation Area, Wildlife or Waterfowl Refuge, or Land from Historic Sites," was established to provide certain protections to publicly owned parks; recreation areas; wildlife and waterfowl refuges; and land from historic sites of national, State, or local significance. Section 4(f) requires that the federal agency must show that there are no feasible or prudent alternatives to the use of these areas.

The project would not result in the conversion of existing publicly owned park areas. Therefore, project compliance with the U.S. Department of Transportation Act of 1966 was not considered in this analysis.

National Scenic Byways Program

The National Scenic Byways program is part of the U.S. Department of Transportation, Federal Highway Administration (FWHA). The program was established under the Intermodal Surface Transportation Efficiency Act of 1991 and was reauthorized in 1998 under the Transportation Equity Act for the 21st Century. Under the program, the U.S. Secretary of Transportation recognizes certain roads as National Scenic Byways or All-American Roads based on their archaeological, cultural, historic, natural, recreational, or scenic qualities. There are no National Scenic Byways or All-American Roads located within Kern County.

U.S. Department of Agriculture, Forest Service

The National Trails System Act (NTSA) of 1969 seeks to preserve scenic and natural qualities along trails and recognizes the rights of private landowners and provides that "full consideration shall be given to minimizing the adverse effects upon the adjacent landowner or user and his operation" in the development and use of a trail (National Park Service [NPS], 2009).

The NTSA assigns management responsibility for trails to various federal resource agencies, depending on which agency holds jurisdiction over the public lands on which the trail is located in a given area (U.S. Forest Service, U.S. Park Service, or BLM). The Pacific Crest Trail was created under the NTSA to provide for outdoor recreation opportunities and the conservation of significant scenic, historic, natural, or cultural qualities. The Pacific Crest Trail stretches 2,650 miles from Mexico to Canada through California, Oregon, and Washington and is designated in the KCGP as a scenic feature. The U.S. Forest Service administers the Pacific Crest Trail in the vicinity of the project, even though there are no federally owned lands involved with this project. The Pacific Crest Trail is located approximately 24 miles southeast of the project site at its closest point. Therefore, project compliance with the NTSA was not considered in this analysis.

State

California Environmental Quality Act (CEQA)

CEQA Guidelines define a "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance" (California Code of Regulations [CCR], Title 14, § 15382, 2010).

California Department of Transportation (Caltrans)

The California Department of Transportation (Caltrans) manages the California Scenic Highway Program, which was created in 1963 by the California legislature to preserve and protect scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to highways. The program includes a list of highways that are eligible for designation as scenic highways or have been designated as such. A highway may be designated as scenic based on certain criteria, including how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes on the traveler's enjoyment of the view. State laws governing the Scenic Highway Program are found in the Streets and Highways Code, Sections 260 through 263.

The County does not contain Designated State Scenic Highways or scenic resources. However, the County does include segments of three Eligible State Scenic Highways consisting of SR-14 north of Mojave, SR-58 east of Mojave, and an approximately 5-mile-long segment of SR-41, which crosses through the extreme northwest corner of the County (Caltrans, 2017). The nearest Eligible State Scenic Highway to the proposed project is more than 50 miles east of the proposed project.

Local

Metropolitan Bakersfield General Plan (MBGP)

The Aesthetics Element of the Metropolitan Bakersfield General Plan evaluates the visual and aesthetic setting of Metropolitan Bakersfield and assesses the potential for visual impacts. According to the Aesthetic Element, the proposed Project is not identified as a significant scenic resource.

The Metropolitan Bakersfield General Plan provides goals and policies for the design features of development projects in order to reduce impacts of such projects. The aesthetic goals and policies are discussed in Table 4.1-1, *Metropolitan Bakersfield General Plan Goals and Policies For Aesthetics*, below.

Table 4.1-1. Metropolitan Bakersfield General Plan Goals and Policies for Aesthetics

Goals and Policies: Land Use Element
Goal #3: Accommodate new development which is compatible with and complements existing land uses.
Goal #7: Establish a built environment which achieves a compatible functional and visual relationship among individual buildings and sites.
Policy #21: Encourage a separation of at least one-half mile between new commercial designations.
Policy #26: Encourage adjacent commercial uses to be of compatible height, setback, color and materials.
Policy #28: Require that commercial development provide design features such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to noise, traffic, parking, and differences in scale.
Policy #30: Street frontages along all new commercial development shall be landscaped.
Policy #34: Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors.
Policy #35: Encourage upgrading of visual character of heavy manufacturing industrial areas through the use of landscaping or screening of visually unattractive buildings and storage areas.
Policy #36: Require that industrial uses provide design features, such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration.
Policy #37: Street frontages along all new industrial development shall be landscaped.
Policy #62: Encourage the use of creative and distinctive signage which establishes a distinctive image for the planning area and identifies principal entries to the metropolitan area, unique districts, neighborhoods and locations.
Policy #71: Promote the establishment of attractive entrances into communities, major districts, and transportation terminals, centers, and corridors within the planning area.
Policy #73: Encourage the establishment of design programs which may include signage, street furniture, landscape, lighting, pavement treatments, public art, and architectural design.
Goals and Policies: Public Services and Facilities Element - Street Lighting
Goal #2: Develop uniform Planning area street light location and design standards.
Policy #4: Require developers to install street lighting in all new developments in accord with adopted city standards and county policies.

Kern County Zoning Ordinance

Chapter 19.81, Dark Skies Ordinance (Outdoor Lighting)

Kern County approved a Dark Skies Ordinance in November 2011. The purpose of this ordinance is to maintain the existing character of Kern County by requiring a minimal approach to outdoor

lighting, recognizing that excessive illumination can create a glow that may obscure the night sky and excessive illumination or glare may constitute a nuisance. The ordinance provides requirements for outdoor lighting within specified unincorporated areas of Kern County to accomplish the following objectives:

- **Objective 1**: Encourage a safe, secure, and less light-oriented nighttime environment for residents, businesses, and visitors.
- **Objective 2**: Promote a reduction in unnecessary light intensity and glare and reduce light spillover onto adjacent properties.
- **Objective 3**: Protect the ability to view the night sky by restricting unnecessary upward projections of light.
- **Objective 4**: Promote a reduction in the generation of greenhouse gases by reducing wasted electricity that can result from excessive or unwanted outdoor lighting.

Kern County Development Standards

The Kern County Development Standards have specific regulations pertaining to lighting standards. Lighting shall be designed so that light is reflected away from surrounding land uses so as not to affect or interfere with vehicular traffic, pedestrians or adjacent properties.

4.1.4 Impacts and Mitigation Measures

Methodology

The potential aesthetic, light and glare impacts associated with projects are evaluated on a qualitative basis. The evaluation of Project impacts is based on professional judgment, the *Urban Decay Study* prepared by TNDG in August 2017, the Metropolitan Bakersfield General Plan goals and policies related to visual resources, and the significance criteria established by CEQA.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; and/or
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Project Impacts

Impact 4.1-1: The Project Would Have a Substantial Adverse Effect on a Scenic Vista.

The proposed Project is not designated as, or located near land designated as, visually significant or "scenic" according to the Metropolitan Bakersfield General Plan and the Kern County General Plan. Additionally, development of the proposed Project would not block or preclude views to any area containing important or what would be considered a scenic vista. Therefore, no scenic vista would be affected by development of the proposed Project, and impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.1-2: The Project Would Substantially Alter or Damage Scenic Resources, Including but not Limited to, Trees, Rock outcroppings, and Historic Buildings Within a State Scenic Highway.

According to the Metropolitan Bakersfield General Plan, the proposed Project is not located near what would be considered a visually appealing landform, scenic resource, or state designated scenic highway. The are no scenic trees or rock outcroppings, or historic buildings on the project site. Therefore, impacts are considered to be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.1-3: The Project Would Substantially Degrade the Existing Visual Character or Quality of the Proposed Project Site and Its Surroundings.

Impacts from Site Development

Project construction activities would temporarily disrupt views across the site, from surrounding areas. Graded surfaces, construction debris, construction equipment, and heavy truck traffic would be visible. Soil would be stockpiled and equipment for grading activities would be staged at various locations. These impacts would be short-term and would cease upon Project completion.

Project implementation would alter the nature and appearance of the proposed Project site from agricultural uses and primarily vacant land to light and service industrial development, and highway and general commercial uses. On-site structures would be visible from surrounding areas. This alteration of appearance is permanent and would continue throughout the life of the proposed Project. Views of the primarily vacant agricultural land that currently comprise the proposed Project site are available to motorists and pedestrians along the surrounding roadways. Other than the steel storage building associated with agricultural activities is located in the eastern portion of the site, near South Union Avenue, the majority of views of the proposed Project site are currently unobstructed, so the change in visual character from open space to developed conditions would be a distinct visual alteration of the Project site.

Although the visual appearance of the proposed Project site may change, visual qualities would not be degraded. The proposed Project would include landscaping requirements and light and glare limiting requirements identified within the Kern County Zoning Ordinance and Development Standards. As shown in the figures presenting the Key Observation Points, views across the project site are largely unobstructed in the foreground and middle ground. Distant views; however, are not prominent and are partially obstructed by intervening vegetation and structures. Additionally, the proposed Project is located near to industrial and commercial uses existing to the east; therefore, the new industrial development would not be inconsistent with the adjacent uses. While placement of new structures associated with the proposed Project would alter the visual character of the site, this would not be considered a substantial degradation of the Project site. Visual changes to the proposed Project site and its surroundings are considered less than significant. To further reduce impacts, the proposed Project would incorporate mitigation related to project design, landscaping, architectural features, and screening. With the implementation of mitigation measures impacts would be further reduced.

Impacts from Urban Decay

Of the approximate 314.3-acre project area, the proposed Project retail components would include zoning classifications of approximately 22 acres for C-2 PD (General Commercial, Precise Development Combining) uses, 25 acres of CH PD (Highway Commercial, Precise Development Combining). The proposed Project would contain approximately 4,613,004 square feet (net building area) of warehousing, distribution, and retail showroom uses, which may draw business from existing commercial centers in the region. This could result in urban decay if other stores close as a result of the loss of business and the buildings remain vacant and unmaintained for extended periods of time.

The Retail Trade Area (RTA) used in this analysis is defined using Regional Statistical Areas (RSA). The RSA's are geographical polygons that have been defined by the Kern County Council of Governments (Kern COG) for the purposes of demographic analysis and regional planning. The RSA's are comprised of smaller geographical units called Transportation Analysis Zones (TAZ) which have also been defined by Kern COG and are comparable in size to census tracts.

The boundaries of the trade areas evaluated in this report are shown on Figure 4.1-6, *Retail Trade Areas*, and are defined as follows:

1. *Retail Trade Area (RTA)*: The RTA is comprised of three RSA's: Metropolitan Bakersfield Southwest, Metropolitan Bakersfield Southeast, and Greater Arvin.

   The RTA includes the bulk of the populated area and retail inventory in Metropolitan Bakersfield. The proposed Project site is near the southern boundary of the RTA. There is very little existing population to the south and more population growth is anticipated in areas to the north. For these reasons, most of the retail demand for the proposed Project is anticipated to come from the north of the site and very little from the south.

   The Urban Decay Study estimated total and net supportable retail space in the RTA. The total supportable retail space in the market area represents retail space that is projected to be supported by future demand. The percent of total supportable retail is an estimation of the proposed Project's share of future total demand, in the form of supportable retail store square footage.

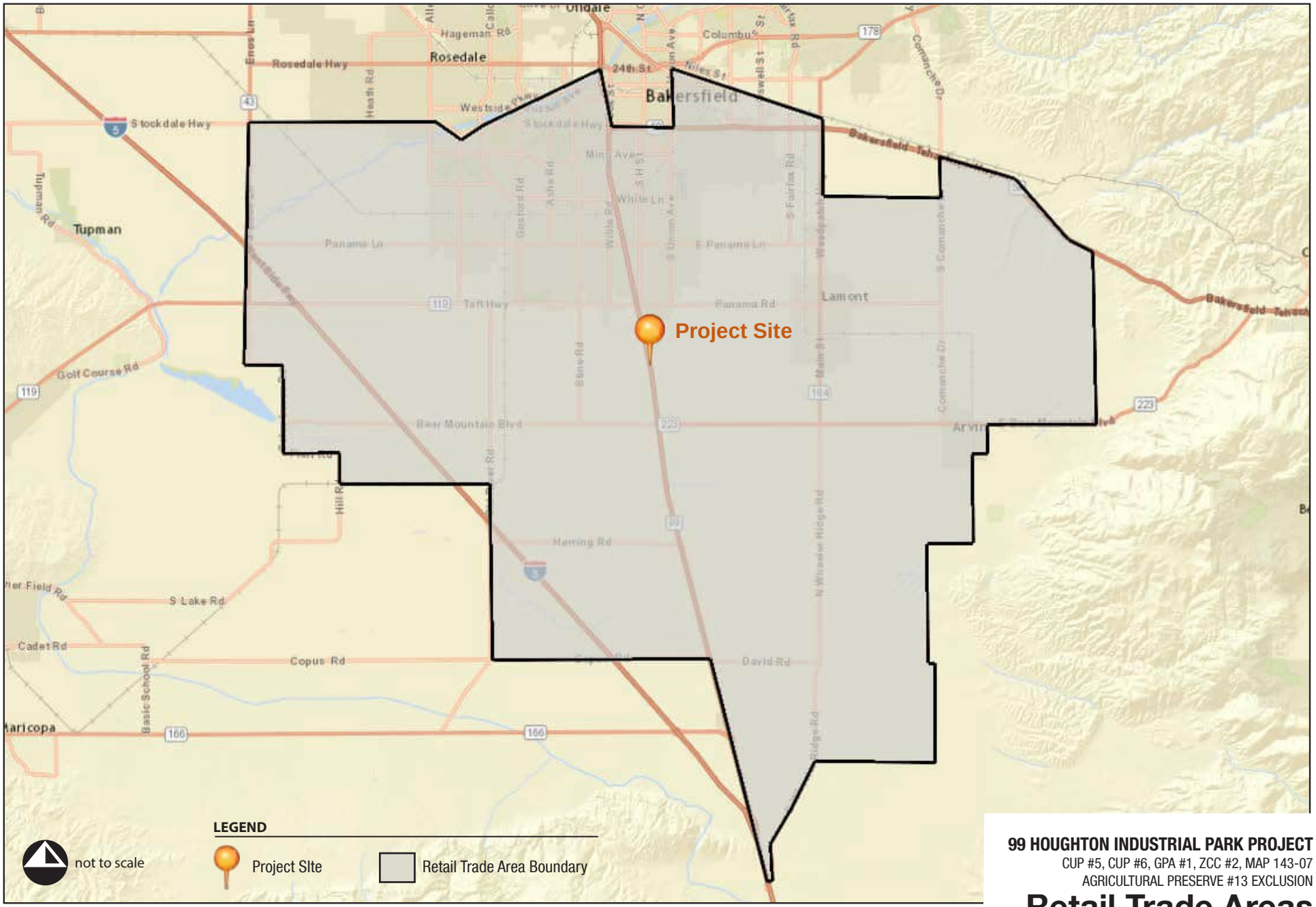
   The square footage projections shown in Table 4.1-2, *Total Supportable Retail Square Footage for the Retail Trade Area, are* based on sales per square foot estimates for each retail category that could potentially be represented by retailers in the proposed Project. The retail categories assessed in the RTA include apparel, general merchandise stores, drug stores, household and home furnishings, household appliance dealers, farm and garden supply stores, specialty/other, food stores, eating and drinking establishments, building materials/hardware, and automotive supplies and parts (TNDG 2010).

Table 4.1-2. Total Supportable Retail Square Footage for the Retail Trade Area

Retail Summary Category	2015	2020	2025	2030	2035
Shopper Goods	4,416,321	4,705,748	5,194,138	5,682,528	6,170,918
Convenience Goods	2,230,928	2,377,133	2,623,846	2,870,559	3,117,272
Heavy Commercial Goods	1,534,626	1,635,198	1,804,909	1,974,619	2,144,330
Total	8,181,875	8,718,079	9,622,893	10,527,706	11,432,520
Proposed Project as Percent of Total Supportable Retail Space					
Proposed Project (square feet)	0	511,380	511,380	511,380	511,380
Percent of Supportable Retail	0.0%	5.9%	5.3%	4.9%	4.5%

Source: Urban Decay Study, The Natelson Dale Group, Inc., August 2017.

From 2015 to 2020, the total supportable retail space in the RTA is projected to increase from approximately 8.2 million square feet to 8.7 million square feet. The proposed Project's retail square footage is projected to represent approximately 5.9 percent of the RTA's total supportable retail square footage in 2020. Based on projected growth in population and retail demand, the proposed Project's share of the RTA's total supportable square footage is projected to decrease to 5.3 percent by 2025 and 4.5 percent by 2035.



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Retail Trade Areas

Figure 4.1-6

The net supportable retail space is the net growth in available demand from period to period, again as represented by supportable retail space, over base demand in 2015, Refer to Table 4.1-3, *Net Supportable Retail Square Footage for the Primary Retail Trade Area*. The proposed Project's percent of net supportable space shows the proportion of new available (i.e., incremental) demand that would be represented by the proposed Project upon completion and in each period thereafter.

Net supportable retail square footage is based on demand from a combination of two sources: 1) the assumed recaptured of existing demand generated by trade area residents that is currently being spent outside the trade area; plus 2) growth in demand within the trade area based on projected increases in population.

Table 4.1-3. Net Supportable Retail Square Footage for the Primary Retail Trade Area

Retail Summary Category	2015	2020	2025	2030	2035
Shopper Goods	43,939	333,366	821,756	1,310,146	1,798,536
Convenience Goods	228,037	374,243	620,956	867,669	1,114,381
Heavy Commercial Goods	204,816	305,389	475,100	644,810	814,521
Total	476,793	1,012,998	1,917,811	2,822,625	3,727,438
Proposed Project as Percent of Total Supportable Retail Space					
Proposed Project (square feet)	0	511,380	511,380	511,380	511,380
Percent of Supportable Retail	0.0%	50.0%	26.7%	18.1%	13.7%

Source: Urban Decay Study, The Natelson Dale Group, Inc., August 2017.

The RTA is projected to generate approximately 1.01 million square feet of new net supportable retail space between 2015 and 2020 in the RTA. New net supportable retail space is projected to increase to 1.9 million square feet by 2025 and 3.7 million square feet by 2035. The proposed Project's retail square footage is estimated to represent approximately 50.5 percent of net supportable square feet in the RTA in 2020. The proposed Project's proportion of net supportable square footage is expected to decrease to 26.7 percent by 2025 and 13.7 percent by 2035.

The proposed Project does not represent a significant enough proportion of the existing demand in the market place to cause, in and of itself, significant closures of existing retail businesses in the RTA. In addition, existing economic conditions in the area's retail market have largely improved over the past five years, with vacancy rates declining from 14 percent (2010) to 10.7 percent (2015).

Even with relatively modest growth in population, the Urban Decay Study (provided in Appendix K) estimates that future net demand for retail space is more than sufficient to accommodate the proposed Project without significant impact on existing retailers. The proposed Project's retail space represents approximately 50 percent of the new net supportable retail space in the RTA by 2020.

The Urban Decay Study (provided in Appendix K) notes that technically there would be sufficient demand to support the retail components of the proposed Project by 2020. If the proposed Project's retail components are tied to its other proposed light industrial land uses, then it is likely that the retail would be developed at the same time as the other uses. As noted above, the proposed Project is anticipated to be built out over a 25-year development period.

While it is not possible to determine with absolute certainty that the proposed Project would have no economic effects on existing retail businesses in the trade area, it is anticipated that the proposed Project would not have a significant enough impact to cause urban decay. In this context, it is important to note that the terms "economic impact" and "economic effect" refer to loss of sales, or at most, closure of a business. Under CEQA, such purely economic impacts are not in themselves considered significant. To meet the definition of a "significant impact" under CEQA, there must be a substantial *physical* effect. For example, the competitive effects of a new project could result in a substantial economic impact to an existing business, leading to its closure and result in the vacancy of that space. If that space remained vacant for an extended period without regular maintenance such that it was subject to physical deterioration, then urban decay conditions could ultimately ensue. However, it is not anticipated that the proposed Project is likely to be the primary cause of the closure of any existing retailers, much less that it is likely to create conditions severe and prolonged enough to cause closures that would lead to physical urban decay.

Given these findings, it can be concluded that development of the proposed Project would not contribute to urban decay and a degradation of the existing visual character.

Mitigation Measures

MM 4.1-1: Prior to the issuance of building permits, the project operator shall demonstrate compliance with ~~one of~~ the following:

a. The project proponent shall present a plan to color treat the proposed warehouse and office buildings to blend in with the colors found in the surrounding natural landscape while not producing reflection, as approved by the Kern County Planning and Natural Resources Department;

MM 4.1-2: The following aesthetic features shall be required in site plans and building permits for commercial buildings located within 1,000 feet of the State Route 99 corridor:

a. Rooftop screening features shall be installed to create a visual screen for rooftop mechanical equipment, such as a parapet or screening material.

b. Reflective metal exteriors shall not be used as exterior architectural elements in buildings immediately adjacent to State Route 99.

MM 4.1-3: Prior to the issuance of building permits for any facilities on the project site, the project applicant shall submit to the Kern County Planning and Natural Resources Department for approval, a landscape plan that will effectively buffer foreground views of the proposed project site from State Route 99. This landscape plan shall include, but is not limited to, landscape structural elements (such as fencing), and planting materials consistent with current Kern County landscape requirements and shall be cleared of trash and debris at least monthly during the year.

The plan shall also include:

a. Preparation by a licensed Landscape Architect and approval by the Kern County Planning and Natural Resources Department Director prior to buffer planting;

b. The plan shall include California native, drought-tolerant plants.

c. The plan shall provide for an irrigation plan as required under the Kern County Zoning Ordinance 19.86.070.

d. Should perimeter fencing be proposed, fencing materials shall be constructed of any materials commonly used in the construction of fences and walls such as wood, stone, rock, tubular steel, wrought iron, or brick, or other durable materials. Masonry block walls shall be decorative and not bare masonry blocks. Decorative materials can include a façade, colored masonry blocks, or other materials. Fencing proposed around sumps may be chain-link with view obscuring slats. Barbed wire is not permitted.

e. A 20-foot wide perimeter buffer along any visible boundary from the State Route 99 frontage and shall be included as part of the landscape plan. This buffer shall consist of live ground cover, shrubs, or grass, and:

   1) One (1) tree having a minimum planting height of six (6) feet for every fifty (50) lineal feet of buffer;

   2) Shrubs which reach a minimum height of four (4) to six (6) feet.

   3) Live ground cover consisting of low-height plants, or shrubs, or grass shall be planted in the portion of the landscaped area not occupied by trees or evergreen shrubs.

   4) Bare gravel, rock, bark or other similar materials may be used, but are not a substitute for ground cover plantings, and shall be limited to no more than twenty-five (25) percent of the required landscape area.

   5) Landscaping shall be installed prior to final occupancy.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.1-4: The Project Would Create a New Source of Substantial Light and Glare That Would Adversely Affect Daytime or Nighttime Views of the Area.

The proposed Project may introduce new sources of lighting into the Project area. Introduction of new lighting from the proposed Project may include lights within and around the proposed industrial uses (warehousing, distribution, and retail showroom), parking lot lighting, and security lighting. Light sources from the on-site industrial development may have a significant impact on

the surrounding areas. Additionally, on-site light sources may create light spillover and glare impacts on surrounding land uses in the absence of mitigation.

The proposed Project represents an extension of urban growth and development south of the City of Bakersfield. Most of the lighting for the proposed Project would not substantially affect views in this area because the light generated would be typical of industrial development. There are no sensitive receptors to lighting within the proposed Project site, and the majority of the proposed lighting would be consistent with existing lighting in developing areas of Metropolitan Bakersfield. Lighting strategies such as directional lighting and lighting hoods would further minimize light and glare from these sources and reduce spill light and glare on adjacent properties.

Motorists would observe new light and glare in the area, especially in areas where no lights currently exist. Impacts to motorists resulting from lighting would be minimized through compliance with the Kern County Zoning Ordinance, and the goals, policies, and implementation measures of the General Plan. Compliance with the Kern County Dark Skies Ordinance would be required.

The lighting within the proposed Project site would comply with County standards, including Title 19.82.090(K) of the Kern County Zoning Ordinance, which indicates that lighting used to illuminate parking areas shall be directed away from any adjacent properties and streets. In accordance with the goals and policies previously outlined in this section, lights would be focused downward and would not be directed off-site. In addition, implementation of mitigation measures would minimize the potential for spillover lighting to affect motorists adversely to a less than significant level.

Mitigation Measures

MM 4.1-4: The project shall continuously comply with the following: project facility lighting shall comply with the applicable provisions of the *Dark Skies Ordinance* (Chapter 19.81 of the Kern County Zoning Ordinance), and shall be designed to provide the minimum illumination needed to achieve safety and security objectives. All lighting shall be directed downward and shielded to focus illumination on the desired areas only and avoid light trespass into adjacent areas. Lenses and bulbs shall not extend below the shields.

MM 4.1-5: Prior to the issuance of building permits for any facilities on the project site, the project applicant shall submit, and the Kern County Planning and Natural Resources Department shall have approved, plans verifying all outdoor lighting is designed so that all direct lighting is confined to the project site property lines and that adjacent properties and roadways are protected from spillover light and glare.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Impacts from Site Development

Construction of currently approved and pending projects in the Project vicinity would permanently alter the nature and appearance of the area through loss of open space. As development occurs throughout the proposed Project area, residents and visitors would notice the visual effects of urbanization. The significance of these visual and aesthetic changes is difficult to determine, because aesthetic value is subjective and potential impacts are site-specific. Security and parking lot lighting would introduce light and glare potential to the area. Cumulative impacts can be mitigated to less than significant levels with use of building materials that are consistent with the general character of the area, landscaping design and proper lighting techniques to direct light on-site and away from adjacent properties. Additionally, cumulative projects will be designed consistent with the land use designations, zoning requirements, and other requirements of the County. The absence of scenic vistas, major landforms, and scenic resources in the area all contribute to a finding of less than cumulatively significant with implementation of existing Kern County development regulations and Mitigation Measures MM 4.1-1 through MM 4.1-5.

Impacts from Urban Decay

The known active planned and pending retail projects in the PRTA would total approximately 1.4 million square feet of retail space. It is possible that the RTA could become overbuilt during the period between 2020 and 2035, unless aggregate retail development planned during that period is substantially reduced or delayed. If an overbuilt retail environment does develop, there would be a potential for business failures with resulting closures of retail facilities in the RTA. However, most of the future tenants of the proposed Project and planned and pending projects have not yet been identified. As such, it is currently not possible to identify which retail categories might become overbuilt, or to identify existing businesses in those categories which might be forced to close. For the purposes of the State CEQA Guidelines, it is not required, or valid, to engage in speculative analysis.

A more likely cumulative scenario is that infrastructure constraints and retail market conditions would result in a more gradual buildout of planned retail development, such that the pace of retail development would more closely follow the growth in retail demand, an assumption consistent with prevailing industry customs and practices (Appendix K, *Urban Decay Study*). Under this scenario, there is less potential for overbuilt conditions to occur, and consequently a reduced potential for building vacancies and urban decay to follow. Any attempt to identify businesses which might be affected under this scenario, whose closures might ultimately result in urban decay and degradation of visual character would be speculative in nature.

Attempting to predict whether actual retail projects will ultimately be proposed and developed, estimating the square feet of retail development that might ultimately be developed and/or the timing of the potential development would be speculative at best. As such, it is currently not possible to identify which retail categories could possibly become overbuilt, or to identify existing businesses in those categories which might be forced to close if the potential retail components of these projects are ultimately developed. Therefore, any attempt to identify specific vacancies which might possibly result, or to determine the potential for physical deterioration or urban decay, would be speculative in this context. For purposes of evaluating CEQA impacts, it is not required or valid

to engage in speculative analysis. Rather, it is assumed that these potential, yet unplanned, retail sites would be developed only if and when future demand dictates, which assumption is consistent with existing industry customs and practice. Therefore, there would be no significant cumulative impacts to existing or reasonably foreseeable retail facilities regarding urban decay or the degradation of visual character in the RTA with the implementation of mitigation measures.

Mitigation Measures

Implement Mitigation Measures MM 4.1-1 through MM 4.1-5, above.

Level of Significance after Mitigation

Impacts would be less than significant.

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Section 4.2

Agriculture

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Section 4.2
Agriculture

4.2.1 INTRODUCTION

The purpose of this section is to document the impacts associated with the conversion of agricultural land to nonagricultural use. This section also discusses the potential conflicts between proposed urban uses and current agricultural activities in the vicinity of the proposed Project. Mitigation measures are recommended to reduce the significance of impacts, where applicable. A Farmland Conversion Study was prepared by McIntosh & Associates in May 2009 (refer to Appendix N). A second Farmland Conversion Study was prepared by McIntosh & Associates in June 2017. See Appendix B, *Farmland Conversion Study*, and Appendix N, *Original Technical Studies*.

4.2.2 Environmental Setting

Regional Agricultural Setting

State of California

California had 80,500 farming operations for the year 2012 (the most recent year available). This number represents less than four percent of the nation's total farming operations, however, these farms account for approximately 12.8 percent of the national gross cash receipts from farming (McIntosh & Associates 2017).

California farmland totaled 25.4 million acres for the year 2010, down less than 0.5 percent from the year 2010 acreage, and the number of farms decreased by 0.4 percent from the year 2005. The average farm size in California is 312 acres, and approximately 400 crops are recognized in the State, including nearly half of the Unites States, fruits, nuts, and vegetables (McIntosh & Associates 2017).

Kern County

The Valley Region of Kern County is highly suitable for agricultural cultivation. Kern County contains 839,079 acres of harvested land. Within that acreage, 73,550 acres were harvested for vegetable crops, 442,146 acres were harvested for fruit crops, and 339,746 acres were harvested for field crops. Agriculture provides the backbone of the County's economy, with a 2015 total value of nearly $6.9 billion dollars, which was a decrease of approximately 9 percent from the 2014 crop value. The total harvested acreage decreased approximately 4.5 percent. The year 2015 top five commodities were grapes, almonds, citrus, milk and cattle (McIntosh & Associates 2017).

From 1990 to 2006 the County was ranked among California's leading counties in total urbanization and loss of farmland and during that time the amount of "important" and "interim" farmland in Kern County decreased by 88,338 acres. Approximately one-third (approximately 29,000 acres) of this decrease was due to urban-related changes, while two-thirds (approximately 58,000 acres) was associated with the idling of farmland. There are many reasons why farmland may be idled in a particular year and it is not necessarily an indication of permanent farmland loss.

Table 4.2-1, *Years 2013-2014 California Land Conservation (Williamson Act)*, provides total acreages of contracted lands in Kern County (McIntosh & Associates 2017).

Table 4.2-1. Years 2013-2014 California Land Conservation (Williamson Act)

Williamson Act Contract	Prime	632,177 acres
	Non-Prime	911,620 acres
Land Conservation Act Nonrenewal (Year 2011)	Prime	48,158 acres
	Non-Prime	31,628 acres
Farmland Security Zone Contract - Urban	Prime	25,316 acres
	Non-Prime	0 acres
Farmland Security Zone Contract – Non-Urban	Prime	133,751 acres
	Non-Prime	0 acres
Farmland Security Zone – Non-contracted*	Prime	13,172 acres
	Non-Prime	0 acres

Source: McIntosh & Associates, 2017.
*These lands have requested non-renewal of their contract and are in the process of "backing out" of the 9-year contract.

As shown above, a large numbers of property owners are continuing to nonrenew contracted acreage, resulting in a loss of 13,172 acres of prime and nonprime property in the last reporting year. The California Department of Finance (DOF) projects the County's population will grow from its January 1, 2017 population of 895,112 to more than 1.06 million in 2030. This growth in population will continue to decrease the amount of agricultural land in Kern County.

Metropolitan Bakersfield Area

Agriculture in the Metropolitan Bakersfield area has been extensive since the introduction of livestock in the 1860s. Livestock raising on large land grants and some production of grain under dry-farming methods were the chief agricultural pursuits until about 1880. Rapid agricultural development occurred after 1880 due to the development of irrigation (harnessing the uncontrolled flow of water from the Kern River), inexpensive land, favorable crop yields, the advent of two railroads, the development of the petroleum industry and access to markets. A review of the California Department of Food and Agriculture Annual Crop Reports indicates a history of high agricultural production for many crops over the years, continuing to the present time. Factors that have in the past influenced high agricultural productivity and continue today include climate, availability of water, dependable market demand and good soils.

Local Setting and Historic Uses

The proposed Project is generally located between Houghton Road to the south, Di Giorgio Road to the north, State Route (SR) 99 along the western edge, and South Union Avenue (SR-204) along the eastern frontage. Existing adjacent land uses include vacant land and agricultural uses to the north, agricultural uses and a small cluster of single-family residential homes to the east, SR-99 to the west, and agricultural uses and an automobile wrecking yard (Higgins Auto Wrecking) located south/southeast of proposed Project site. A dairy (Richmar Farms #2) is located approximately 1.25 miles southeast of the proposed Project at the northeast corner of South Union Avenue and Shafter Road. Existing dairies are generally located more than two miles east and southwest of the proposed Project.

The proposed Project includes approximately 314.30 acres of agricultural land. The Project site is currently designated R-IA (Resource-Intensive Agriculture) and HC (Highway Commercial), and is zoned A (Exclusive Agriculture). Historically, the Project site has been used for alfalfa and grain production, and sheep grazing. A steel storage building associated with agricultural activities is located in the eastern portion of the Project site, near South Union Avenue (SR-204). In addition, two active, 150 horsepower diesel-powered irrigation wells are located on the Project site. According to the Kern County Agricultural Commissioners Office permit records and information provided by the farmer, the information in Table 4.2-2, *Crops Planted on Proposed Project Site (2003-2015)*, lists the crops grown and pesticides permitted on the proposed Project site from 2004 to 2015:

Table 4.2-2. Crops Planted on Proposed Project Site (2003 - 2015)

Year(s)	Farming Company	Crops Planted	Pesticide and/or Chemical Use
2015	Mitchell Property Management, LP Permit No. 1502896	Alfalfa, Wheat, Fallow	Yukon, Lomite, Fusilade DX, Oroboost, Trifluralin, Boric Acid, MCPA, Dimethylamine Salt, Bromoxynil Octanoate, Ammonium Sulfate, Glyphosate, Isopropylamine Salt, Mepiquat Chloride, Thidiazuron, Fenproatin, Avermectin, Bifenthrin, Pyrithiobac-Sodium, Pyriproxyfen, Dicamba, Diglycolamine Salt, Prometryn, Indoxacarb, Acetamiprid, Glyphosate, Potassium Salt, Pyraflufen-Ethyl, Prowl, Roundup, Leaf Life
2014	Mitchell Property Management, LP Permit No. 1502896	Alfalfa, Corn / Fod	
2013	Mitchell Property Management, LP Permit No. 1502896	Alfalfa, Corn / Fod	
2012	Mitchell Property Management, LP Permit No. 1502896	Alfalfa	
2011	Mitchell Property Management, LP Permit No. 1502896	Alfalfa, Corn / Fod	
2010	Mitchell Property Management, LP Permit No. 1502896	Alfalfa, Oat, Fallow	
2009	Mitchell Property Management, LP Permit No. 1502896	Corn / Fod, Oat / Fod, Alfalfa, Sudan Grass	
2008	Doug Kaiser Farms Permit No. 1500895	Wheat, Alfalfa, Corn / Fod	
2007	Doug Kaiser Farms Permit No. 1500895	Alfalfa, Corn / Fod, Grain	
2006	Jerry P. Mitchell Family Part. L.P. Permit No. 1502896	Alfalfa	
2005	Jerry P. Mitchell Family Part. L.P. Permit No. 1502896	Grain, Alfalfa	
2004	Jerry P. Mitchell Family Part. L.P. Permit No. 1502896	Grain, Alfalfa	
2004	Jerry P. Mitchell Family Part. L.P. Permit No. 1502896	Alfalfa	

Source: Farmland Conversion Study, McIntosh & Associates, May 2009 (refer to Appendix N) and June 2017 (refer to Appendix B).

Additionally, the majority of the proposed Project site (approximately 257.57 acres) is within Agricultural Preserve No. 13 (Refer to Figure 3-7). The proposed Project site is not under a Williamson Act Land Use Contract.

The soil types that occupy the proposed Project consist of Bakersfield fine sandy loam (170.22 acres) and Cajon sandy loam (144.08 acres). The Bakersfield find sandy loam consists of very deep,

poorly drained soil with 0 to 1 percent slopes. The Cajon sandy loam consists of very deep, somewhat excessively drained soils with 0 to 2 percent slopes.

4.2.3 Regulatory Setting

State Regulations

Farmland Mapping and Monitoring Program (FMMP)

Maps of Important Farmlands are prepared by the California Department of Conservation as part of its Farmland Mapping and Monitoring Program (FMMP). Important Farmland maps are prepared periodically for most of the State's agricultural areas based on information from the Natural Resource Conservation Service's soil survey maps, land inventory, and monitoring criteria developed by the Natural Resource Conservation Service and land use information mapped by the California Department of Water Resources. These criteria generally are expressed as definitions that characterize the land's suitability for agricultural production, physical and chemical characteristics of the soil, and actual land use. Important farmland maps are generally updated every two years. The following provides descriptions for the eight mapping categories, five related to farmlands and three associated with nonagricultural purposes:

- *Prime Farmland*: Lands with the combination of physical and chemical features best able to sustain long-term production of agricultural crops. The land must be supported by a developed irrigation water supply that is dependable and of adequate quality during the growing season. It also must have been used for production of irrigated crops at some time during the four years before mapping data was collected.
- *Farmland of Statewide Importance*: Lands with agricultural land use characteristics, irrigation water supplies and physical characteristic similar to those of Prime Farmland but with minor shortcomings, such as a steeper slope or less ability to retain moisture.
- *Unique Farmland*: Lands with lesser-quality soils used for the production of California's leading agricultural cash crops. These lands usually are irrigated but may include non-irrigated orchards or vineyards, as found in some of the state's climatic zones.
- *Farmland of Local Importance*: Lands of importance to the local agricultural economy, as determined by each county's board of supervisors and a local advisory committee.
- *Grazing Land*: Lands in which the existing vegetation is suited to the grazing of livestock.
- *Urban and Built-up Land*: Lands occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. These lands are used for residential, industrial, commercial, construction, institutional, public administration, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.
- *Other Land*: Lands not included in any of the other mapping category.
- *Water*: Perennial water bodies with an extent of at least 40 acres.

Unless otherwise noted, a minimum of 10 acres is mapped for each category. A total of 48 counties covering 44.1 million acres are mapped every two years. Current land use information is gathered using aerial photographs, a computer mapping system, public review, and field reconnaissance. The conversion of prime farmland is considered very important at both local and statewide levels.

According to the 1998 through 2014 Kern County General Plan and Housing Element Annual Progress Reports, the total permanent conversion of agricultural designations in the unincorporated Kern County, outside the Metropolitan Bakersfield area, to urban uses is 19,973 acres (outside the Metropolitan Bakersfield area). Refer to Table 4.2-3, *Planned Land Use Designations Conversions to Non-Agricultural Use from 1998-2014 (in acres),* for a yearly breakdown of agricultural conversions for Kern County General Plans from 1998-2014.

Table 4.2-3. Planned Land Use Designations Conversions to Non-Agricultural Use from 1998-2014 (in Acres)

	Acres Converted to non-resources map codes designations (Loss)	Acres Converted to Soild Waste Buffer Area (Loss)	Acres Converted to Solar	Acres Converted to Resource Map Code Designations (Gained)	Total Acres Converted (Loss or Gain)
1998-1999	221	111		413	Gain of 81
1999-2000	23	2,285			Loss of 2,308
2000-2002	57	119		1,011	Gain of 835
2002-2003	1,163	253			Loss of 1,416
2003-2004	43				Loss of 43
2004-2005	87			125	Gain of 38
2005-2007	119				Gain of 871
2008	14			9	Loss of 23
2009	53	801	430		Gain of 4,001
2010	117		7,477		Loss of 6,634
2011	50		8,803		Loss of 8,694
2012			434		Loss of 434
2013	1,434	128	1,383		Loss of 2,547
2014	56.38		3,968		Loss of 3,700
Total:	3,387.38				25,799 5,826

Source: County of Kern General Plan EIR (2004) & Annual GPA Update Reports (2004-2014)

The CEQA statute defines "agricultural land" for the purposes of assessing environmental impacts using the FMMP categories of "prime farmland," "farmland of statewide importance," or "unique farmland." (Pub. Resources Code § 21060.1) (a).) Where land has not been surveyed by the FMMP, "agricultural land" is defined consistent with the Williamson Act's definition of "prime agricultural land." (Pub. Resources Code § 21060.1 (b).)

California Land Conservation Act (Williamson Act)

The California Land Conservation Act (Williamson Act) was adopted initially by the State of California in 1965, with the basic intent of encouraging the preservation of the State's agricultural lands in view of the increasing trends toward their urbanization. The Williamson Act established a land contract procedure whereby the County Board of Supervisors could stabilize (i.e., not increase) taxes on certain qualifying lands in return for an owner's guarantee to keep the lands in agricultural preserve status for a ten-year period. A Williamson Act contract is automatically renewed each year, unless a notice of non-renewal is initiated by the land owner or the County. Once a notice of

non-renewal is given, the contract remains in place on the land for the remaining nine-year term. After the nine years, the land is no longer restricted to agricultural or open space uses. Additionally, once a notice of non-renewal is submitted, the taxes on the land are annually reassessed in accordance with a formal set in the Williamson Act.

The Williamson Act defines "prime agricultural lands" as follows:

- All land that qualifies for rating as Class I or Class II in the Natural Resource Conservation Service Land Use Capabilities Classifications;
- Land that qualifies for rating 80 through 100 in the Storie Index Rating (a numerical value indicating the relative suitability of a soil group for general agricultural practices);
- Land that supports livestock used for the production of food and fiber and that has an annual carrying capacity equivalent to at least one animal unit per acre, as defined by the United States Department of Agriculture;
- Land planted with fruit- or nut-bearing trees, vines, bushes, or crops that have a nonbearing period of less than five years and will normally return during the commercial bearing period from the production of unprocessed agricultural plant production not less than two hundred dollars ($200) per acre per year; and
- Land that has returned from the production of unprocessed agricultural plant products a gross value of not less than two hundred dollars ($200) per acre per year for three of the previous five years.

As of December 2015, 14.8 million acres of farm and ranch land of the State's 30 million acres were protected by Williamson Act contracts. This is a slight decrease in reported enrollment compared with approximately 15.4 million acres reported in the 2014 Status Report. This cumulative nonrenewal acreage constitutes 3.8 percent of the Williamson Act enrollment (DOC, 2016). At a County level, according to the Kern County 2014-2015 Williamson Act Open Space Subvention Report, a total of 1,468,900 acres of farmland is currently enrolled in Williamson Act contracts. Of this total, 99.31 acres are in the non-renewal process. The majority of the proposed Project site (approximately 257.57 acres) is within Agricultural Preserve No. 13; however, the site is not under a Williamson Act Land Use Contract.

Farmland Security Zone Contract

The California Department of Conservation passed the Farmland Security Zone legislation (Govt. Code Sec. 51296) in 1998. The Farmland Security Zone allows counties to establish an additional program for farmlands to enter into contracts with the State. This legislation allows landowners whose land is under a Williamson Act contract to petition to the county board of supervisors to annul the Williamson Act contract for a Farmland Security Zone Contract. A Farmland Security Zone Contract is a 20-year contract that allows the property owner to receive 35 percent more in tax savings than a Williamson Act contract. According to the Kern County Williamson act Open Space Subvention Report for the years 2014-2015, 1,468,900 acres have been enrolled in Farmland Security Zone Contracts.

Public Resources Code Section 21060.1

The Public Resources Code Section 21060.1 defines agricultural land for the purposes of assessing environmental impacts using the FMMP. The FMMP was established in 1982 to assess the location, quality and quantity of agricultural lands and the conversion of these lands. The FMMP provides analysis of agricultural land use and land use changes throughout California.

Farmland Conversion Report: 2004 to 2006

- According to the Farmland Conversion Report: 2004 to 2006, prepared by the Farmland Mapping and Monitoring Program in the Department of Conservation, Farmland of Local Importance is classified as:

  "Farmland of Local Importance is land of importance to the local economy, as defined by each county's local advisory committee and adopted by its Board of Supervisors.

- Farmland of Local Importance is either currently producing, or has the capability of production, but does not meet the criteria of Prime Farmland, Farmland of Statewide Importance or Unique Farmland. Authority to adopt or to recommend changes to the category of Farmland of Local Importance rests with the Board of Supervisors in each county."

Local Regulations

The area of the proposed Project is governed by agricultural and farmland regulations established by the State of California. The Metropolitan Bakersfield General Plan and the Kern County Zoning Ordinance, control local land uses within agricultural areas. These documents identify the types of land uses permitted in agricultural zones and define the development parameters within each land use category.

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan identifies goals and policies that are intended to provide for the planned management, conservation and wise utilization of agricultural land within the Planning area. Implementation of these goals and policies serve to direct growth and promote agricultural conservation through development in accordance with the Metropolitan Bakersfield General Plan. Refer to Table 4.2-4, *Metropolitan Bakersfield General Plan Goals and Policies for Agricultural Land*.

Table 4.2-4. Metropolitan Bakersfield General Plan Goals and Policies for Agricultural Land

Goals and Policies: Land Use, Open Space, and Conservation Element
Goal #1: "Provide for the planned management, conservation, and wise utilization of agricultural land in the planning area."
Goal #2: "Promote soil conservation and minimize development of prime agricultural land as defined by the following criteria: Capability Class I and/or II irrigated soils, 80-100 Storie Index rating, Gross crop return of $200 or more per acre per year, and Annual carrying capacity of one animal per acre per year."
Goal #3: "Establish urban development patterns and practices that promote soil conservation and that protect areas of agricultural production of food and fiber crops, and nursery products."
Policy #1: "Determine the extent and location of all prime agricultural land within the study area."
Policy #2: "Review projects that propose subdividing or urbanizing prime agricultural land to ascertain how continued commercial agricultural production in the project vicinity would be affected."
Policy #3: "Protect areas designated for agricultural use, which includes Class I and II agricultural soils having surface delivery water systems, from the encroachment of residential and commercial subdivision development activities."
Policy #4: "Monitor the amount of prime agricultural land taken out of production for urban uses or added within the plan area."
Policy #6: "Continue implementing land grading ordinances that reduce soil erosion/siltation commonly associated with land development."
Policy #7: "Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible."
Policy #9: "Protect prime agricultural lands against unplanned urban development by adopting agricultural zoning, general plan agriculture designation, and by encouraging use of the Williamson Act and supporting programs and policies that provide tax and economic incentives to ensure the long-term retention of agricultural lands."
Policy #10: "Encourage landowners to retain their lands in agricultural production."
Policy #12: "Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction."
Policy #13: "Minimize the alteration of natural drainage and require development plans to include necessary construction to stabilize runoff and silt deposition through enforcement of grading and flood protection ordinances."
Policy #14: "When considering proposal to convert designated agricultural lands to non-agricultural use, the decision-making body of the city and County shall evaluate the following factors to determine the appropriateness of the proposal: • Soil quality; • Availability of irrigation water; • Proximity to non-agricultural uses; • Proximity to intensive parcelization; • Effect on properties subject to "Williamson Act" land use contracts; • Ability to be provided with urban services (sewer, water, roads, etc.); • Ability to effect the application of agricultural chemicals on nearby agricultural properties; • Ability to create a precedent-setting situation that leads to the premature conversion of prime agricultural lands; • Demonstrated project need; and • Necessity of buffers such as lower densities, setbacks, etc.

Kern County Zoning Ordinance (Title 19 of the Ordinance Code of Kern County)

Chapter 19.12 Exclusive Agriculture (A) District

The purpose of the Exclusive Agriculture (A) District (Chapter 19.12) is to designate areas suitable for agricultural uses and to prevent the encroachment of incompatible uses onto agricultural lands and the premature conversion of such lands to non-agricultural uses. Uses in the Exclusive Agriculture (A) district are limited primarily to agricultural uses and other activities compatible with agricultural uses. Allowable land uses within the Exclusive Agriculture (A) district are set forth in Sections 19.12.020 and 19.12.030 and include those associated with growing and harvesting of crops, breeding and raising animals, agricultural industries, residential uses to house farm workers or the landowner, Christmas tree farms, utility corridors, resource extraction, waste facilities, institutional/educational uses, and various miscellaneous uses such as animal shelters and clubs. Facilities permitted on properties zoned for Exclusive Agricultural (A) with approval of a conditional use permit (CUP) include those associated with recreation, entertainment, and tourist facilities, utilities and communications, resource extraction and energy development (i.e., wind and solar generators, mining, dams, batch plants), institutional uses (i.e., churches, zoos, government facilities), and schools.

4.2.4 Impacts and Mitigation Measures

Methodology

The potential impacts associated with the proposed Project are evaluated on a qualitative and quantitative basis through a comparison of the anticipated Project effects on agricultural activities. A change in the land use will normally be determined to be significant if the effects described in the Thresholds of Significance occur (see California Code of Regulations, title 14 §15064.7(a)). The evaluation of Project impacts as based on professional judgment, analysis of the County's agricultural resources policies and the significance criteria established by Appendix G of the State CEQA Guidelines, which the County has determined to be appropriate criteria for this Recirculated Draft EIR.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project could potentially have a significant effect if it would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use;
- Conflict with existing zoning for agricultural use or a Williamson Act contract;
- Conflict with existing zoning for, or cause rezoning of forest land (as defined in Public Resources Code section 12220(g)) or timberland (as defined in Public Resources Code section 4526);

- Result in the loss of forest land or conversion of forest land to non-forest use;
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland, to non-agricultural use or conversion of forest land to non-forest use; and/or
- Results in the cancellation of an open space contract made pursuant to the Williamson Act or Farmland Security Zone contract for any parcel of 100 or more acres (Section 15206(b)(3) Public Resources Code).

Project Impacts

Impact 4.2-1: The Project Would Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as Shown on the Maps Prepared Pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to Nonagricultural Use.

The Metropolitan Bakersfield General Plan area has been experiencing intense urbanization for the last two decades, and is actively annexing properties by providing the infrastructure needed to serve more densely populated communities. Urbanization in farming areas typically begins with conversion of one or a few parcels adjacent to the city limit line. The encroachment of urban uses on existing agricultural areas is prevalent adjacent to the City, where both farmers and urban neighbors operate with both negative and positive consequences. The challenge is to minimize the negative interactions and create the conditions for a long-term and mutually beneficial coexistence between farmers and urban residents. The negative interactions can be divided into the impacts that farmers can have on urban neighbors and the impacts that urban neighbors can have on farmers.

Kern County has ranked among the leading counties in California for urbanization and net loss of farmland. From 1990 to 2006, the amount of important and interim farmland in Kern County decreased by 88,338 acres. About one-third of this decrease was due to urban-related changes, while two-thirds was associated with the idling of farmland.

As previously discussed, from the years 1998 to 2015, a total of 3,387.38 acres were converted from agricultural to non-resource map code designations, outside the Metropolitan Bakersfield area. This proposed Project would convert approximately 314.30 acres of farmland in order to accommodate industrial development. These 314.30 acres include approximately 170.22 acres of soil capability Class II irrigated prime agricultural land and approximately 144.08 acres of soil capability Class III.

The Department of Conservation's FMMP designates the proposed Project as "prime." However, the FMMP maps the County at such a large scale that much of the smaller scale soil information is lost. The FMMP also focuses exclusively on soils, and does not consider any other indicator or agricultural viability. Therefore, additional analysis of the value of the proposed Project site for agricultural production is appropriate.

California Land Evaluation and Site Assessment Model (LESA)

The California Land Evaluation and Site Assessment Model (LESA) was applied to determine if the conversion of approximately 314.30 acres of farmland was significant. The Project's Farmland Conversion Study utilizes LESA to aid in determining the significance of the proposed Project's conversion of agricultural lands. LESA provides guidelines for rating the relative quality of land resources based on specified measurable features. Additionally, it is intended "to provide lead agencies with an optional methodology to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process." The LESA comprises two categories, Land evaluation (Land Capability Classification [LCC] and Storie Index Rating) and Site Assessment (project size, water resources, surrounding agricultural lands and protected resources lands). The following describes each category and the on-site scores (any site that scores between 80 and 100 points is significant).

Land Evaluation

The LLC analyzes suitability of soils for most kinds of crops. Determinations are made according to the limitations of the soils when used to grow crops and the risk of damage to soils when they are in agriculture. The Storie Index provides a numeric rating (out of 100 points) of the relative degree of suitability of value of a given soil for intensive agriculture. The soil types that occupy the proposed Project consist of Bakersfield fine sandy loam and Cajon sandy loam. According to the USDA Soil Survey of Kern County, California – Southwestern Part, the soil units within the proposed Project meet the requirements for prime farmland. The USDA Soil Survey of Kern County, California – Southwestern Part, does not include the Storie Index for each soil unit, therefore, the LE portion for the analysis accounts for 50 percent of the LESA score. The LCC score is 31.28; therefore, the land evaluation subtotal is 31.28 out of 50.

Site Assessment

The Site Assessment provides information on size, water availability, and surrounding land uses. The proposed Project produces a project size rating of 15; water resource availability rating of 15; a surrounding agricultural lands rating of 13.95; and a protected resource lands rating of zero. The combined Assessment score is 43.95 out of 50.

The LESA score for the proposed Project site is 75.23. This is considered significant because neither of the land assessment or site assessment sub-scores are less than 20 points.

Metropolitan Bakersfield General Plan Farmland Conversion Criteria

In order to determine whether the conversion of approximately 314.30 acres of FMMP designated prime land is in fact a significant impact, the proposed Project's consistency with the Metropolitan Bakersfield General Plan's policies regarding farmland conversion were considered. This analysis used the following criteria to evaluate the significance of this 314.30-acre conversion of farmland:

- soil quality;
- availability of irrigation water;
- proximity to nonagricultural uses;

- proximity to intensive parcelization;
- effect on properties subject to the "Williamson Act" land use contracts;
- ability to be provided with urban services (sewer, water, roads, etc.);
- ability to affect the application of agricultural chemicals on nearby agricultural properties;
- ability to create a precedent-setting situation that leads to the premature conversion of prime agricultural lands;
- demonstrated project need; and
- necessity of buffers such as lower densities, setbacks, etc.

Soil Quality

The Metropolitan Bakersfield General Plan's Conservation/Soils and Agriculture Element states among its goals to promote soil conservation and minimize development of prime agricultural land as defined by the following criteria:

- Capability Class I and/or II irrigated soils;
- 80-100 Storie Index rating;
- Gross crop return of $200 or more per acre per year; and
- Annual carrying capacity of one animal unit per acre per year.

The definition of "prime agricultural land" in the Williamson Act (Gov. Code §51201) is consistent with the Metropolitan Bakersfield General Plan's Conservation/Soils and Agriculture Element.

Implementation of the proposed Project would result in the conversion of approximately 314.30 acres of farmland to urban uses. The 314.30 acres include approximately 170.22 acres of Bakersfield fine sandy loam. This soil is classified by the USDA Soil Conservation Service as Class II which means it is prime agricultural land. Approximately 144.08 acres include Cajon sandy loam, which is classified by the USDA Soil Conservation Service as Class III, which means approximately 314.30 acres (or 100 percent of the proposed Project) would meet the requirements for prime farmland if undeveloped and water for irrigation is available. Based on the Farmland Conversion Study, Table 6, the proposed Project does not exceed the gross crop threshold of gross crop return of $200 or more a year. In 2015, the unit value per ton (of crop) was $135 for wheat and $169 for alfalfa (McIntosh & Associates 2017).

Approval and implementation of the proposed Project would result in a significant impact from the conversion of approximately 314.30 acres of soil that meets the requirements for prime farmland if water for irrigation were available.

Availability of Irrigation Water

The most recent data provided by the California Department of Water Resources indicates that the unconfined water table is approximately 100 to 105 feet below ground surface (bgs) beneath the project site. Two active, (150 horsepower) diesel-powered irrigation wells are situated on the project site. The west well is located adjacent to SR-99 where a concrete-lined ditch also serves as an identifying landmark. The northwest well is located near the northwest corner of the proposed Project site. The main sources of water for irrigation are the two water wells located on the site. In addition, water from the Kern Island Canal, located on the west side of SR-99 is used when available. The methods of irrigation used on the proposed Project site is flood irrigation.

The availability of irrigation water at the proposed Project site contributes to the conclusion that conversion of the site from agricultural to a nonagricultural use would be significant.

Proximity to Non-Agricultural Uses

Planned future development and planned roadway system expansion near and within the proposed Project indicates that the site is in the logical path of development. The following factors indicate that the proposed Project area and adjacent properties will be affected by existing and planned urban development.

The proposed Project is bound by the DiGorgio Road alignment to the north, South Union Avenue to the east, Houghton Road to the south, and SR-99 to the west. The proposed future South Beltway alignment would be adjacent to the southern boundary of the proposed Project. In addition, a 56.33-acre residential development is proposed to the northwest, a 62-acre residential development is proposed to the north; a 17.89-acre general commercial development is proposed to the northeast; a 28.67-acre medium industrial development is proposed to the east; and a 36-acre residential development, along with a 20-acre light industrial development are proposed south of the proposed Project. Approved tracts and proposed projects near the Project site (within the County of Kern) indicate that the site is in the logical path of urbanization.

Given the adjacent existing and proposed residential, commercial, and industrial development surrounding the proposed Project site, implementation of the proposed Project would represent an extension of existing nonagricultural uses and is considered a less than significant impact.

Proximity to Intensive Parcelization

The encroachment of urban uses on existing agricultural areas can result in negative interactions between farmers and urban neighbors. Farming operations can affect urban neighbors by creating inconveniences or discomforts such as equipment noise, odors from manure, and other chemicals and dust or smoke. Urban uses can create adverse impacts to farmers such as the introduction of pests, disease and weeds, increased complaints about noise, dust, smoke, odors and spray drift from pesticide and fertilizer use, restrictions to the application of pesticides and chemicals, increased flooding and siltation increase traffic, vandalism and trespassing.

The proposed Project would be significantly and unavoidably affected by the close proximity of urbanized areas. Farming practices will be more restricted as to the manner of application and type

of herbicides and pesticides that can be utilized in the vicinity of these urbanized areas. The proposed Project, as well as others in the area, is the next logical step for urbanization in this area due to the planned urban development near the property and its significant impacts to the crop production.

Effect of Properties Subject to Williamson Act Land Use Contracts

As of 2015, the County of Kern has determined that 1,468,900.00 acres of land in Kern County are under Williamson Act Land Use Contracts and 144,339.68 acres under the Farmland Security Zone contract. Non-renewals initiated for the year totaled 99.31 acres of prime and non-prime property. Both of these contracts require that lands be within an established Agricultural Preserve. Agricultural lands that are not in a preserve face the greatest threat of conversion, as they are assessed higher property taxes due to their proximity to urbanization.

The proposed Project is not under a Williamson Act Land Use Contract. Between the years 2009-2015, many of the properties under existing Williamson Act Land Use Contracts (in the vicinity of the proposed Project) had planned for the eventual urbanization of those lands by nonrenewing their contracts. However, there are numerous properties to the east (including one parcel that is directly adjacent to the proposed Project) and west of the proposed Project site that are under Williamson Act Contracts. Therefore, resultant impacts to agricultural resources as a result of proposed Project implementation are considered less than significant because existing restrictions and limitations have already been placed on local growers by these uses.

Ability to be Provided with Urban Services

The existing water purveyor, who provides irrigation solely for agricultural purposes, will not service the proposed Project with domestic water. Instead, the domestic water would be provided by an on-site private well with water treatment and distribution facilities. A private package sewer treatment plant is proposed to provide sewer services for the Project site.

The proposed Project is generally located north of Houghton Road (an arterial), east of SR-99, west of South Union Avenue (SR-204) (an arterial), and south of DiGiorgio Road (an arterial). Additionally, the County of Kern and City of Bakersfield have adopted the alignment of the West Beltway as a Specific Plan line approximately which is adjacent to the southern boundary of the proposed Project. This indicates that further urbanization is expected for the proposed Project area. Therefore, the conversion of the proposed Project site to urbanization is appropriate for the area, as it has the ability to be provided with urban services.

Ability to Affect the Application of Agricultural Chemicals on Nearby Agricultural Properties

Urban encroachment affects adjacent lands remaining in agricultural production as conflicts arise from the infringement of the new users, which include people and animals, into the area. Resultant impacts to agricultural resources as a result of proposed Project implementation are considered less than significant due to restrictions and limitations that have been placed on local growers within the proximity of planned urban developments.

Ability to Create a Precedent-Setting Situation that Leads to the Premature Conversion of Prime Agricultural Lands

Proposed urban development on properties adjacent to and near the proposed Project indicate that it is in an area of potential growth. Although agricultural lands nearby are currently producing agricultural crops, implementation of the proposed Project would not create a precedent-setting situation given the site is located adjacent to urban land use designations identified within the Metropolitan Bakersfield General Plan. There are a number of proposed residential, commercial, and industrial development projects, including the proposed West Beltway transportation corridor, and a number of properties that have indicated their intent to cease farming activities in the area by filing for non-renewal of their existing Williamson Act Land Use Contracts near the proposed Project.

Demonstrated Project Need

The Metropolitan Bakersfield General Plan states that the Bakersfield Planning Department projects the population of the plan area to be 468,175 in the year 2030. Population growth will result in the need for additional housing within the plan area; however, development of the proposed Project consists of non-residential uses and will not contribute to meet the Metropolitan Bakersfield's existing and future housing demand.

It is assumed that future development in the Metropolitan Bakersfield General Plan planning area would continue to include "prime" agricultural soils that exist on the Valley floor. This loss has not limited itself to Metropolitan Bakersfield but has become an issue of statewide concern. The Metropolitan Bakersfield General Plan concludes that conversion of prime agricultural lands to urban uses will result in a reduction of the regional agricultural economy and is considered a significant adverse impact. The Metropolitan Bakersfield General Plan currently designates the Project site as R-IA (Resource-Intensive Agriculture) and HC (Highway Commercial). Approval and implementation of the proposed Project would result in a significant impact from the conversion of approximately 314.30 acres of soil that meet the requirements for prime farmland if water for irrigation were available.

Planned urban development located northwest and within close proximity to the proposed Project indicates that this Project is on the logical path of development. The Metropolitan Bakersfield General Plan encourages the orderly outward expansion of new urban development that maintains continuity of existing development and allows incremental expansion of infrastructure and public services. The proposed Project complies with the Metropolitan Bakersfield General Plan's criteria.

Necessity of Buffers Such as Lower Densities, Setbacks, Etc.

If urban developments do not include buffer zones in their design, growers must sometimes allocate a portion of their land to the creation of a buffer zone adjacent to agricultural fields. As an example, growers might be required to refrain from spraying or harvesting the outside rows of their crops. In those cases, buffer zones represent a loss to the farmer of both crop production and income.

Buffer zones can consist of roads, canals, walls, easements, setbacks, etc. The future development of the Project is not proposing the creation of a buffer zone. However, the Kern County Zoning and

Land Division Ordinances will guarantee that adequate buffers be provided to avoid conflict between agricultural and urban uses. In addition, the proposed Project is bound by Di Giorgio Road alignment to the north, SR-99 to the west, South Union Avenue to the east, and Houghton Road to the south. These roadways will contribute to buffer the proposed Project from adjacent land uses.

Significance Conclusion

Due to the soil quality coupled with the availability of irrigation water at the proposed Project site, the Project site is considered prime farmland; therefore, conversion of the site to nonagricultural use would be a significant impact.

Mitigation Measures

MM 4.2-1: Prior to issuance of a grading or building permit, whichever occurs first, the project proponent shall provide written evidence of completion of one or more of the following measures to mitigate the loss 314.30 acres of agricultural land before conversion, at a one-to-one ratio.

- Funding and/or purchase of agricultural conservation easements (will be managed and maintained by an appropriate entity);
- Purchase of credits from an established agricultural farmland mitigation bank;
- Contribution of agricultural land or equivalent funding to an organization that provides for the preservation of farmland in California; or
- Participation in any agricultural land mitigation programs adopted by Kern County that provides equal or more effective mitigation than the measures listed above.

Mitigation land shall meet the definition of prime farmland or farmland of statewide importance established by the State Department of Conservation. Completion of the selected measure(s), or with the Planning Director's approval, a combination of the selected mitigation measures, can be on qualifying agricultural land within the San Joaquin Valley (San Joaquin, Stanislaus, Merced, Fresno, Madera, Kings, Tulare, Kern Counties) or outside the San Joaquin Valley with written evidence that the same or equivalent crops can be produced on the mitigation land.

Level of Significance after Mitigation

Impacts would be significant and unavoidable.

Impact 4.2-2: The Project Would Conflict with Existing Zoning for Agricultural Use, or a Williamson Act Contract.

According to the Kern County Zoning Ordinance, the proposed Project is zoned A (Exclusive Agriculture). The proposed Project is located within an Agricultural Preserve area. The majority of the proposed Project site (approximately 257.57 acres) is within Agricultural Preserve No. 13. However, the proposed Project is not under a Williamson Act Land Use Contract. The proposed

Project would not conflict with existing zoning for agricultural, nor a Williamson Act Land Use Contract.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.2-3: The Project Would Conflict with Existing Zoning for, or Cause Rezoning of, Forest Land (as Defined in Public Resources Code Section 12220(g)) or Timberland (as Defined in Public Resources Code Section 4526).

The proposed Project is not located on forest land as defined in Public Resources Code Section 12220(g), nor is the property zoned for such use as identified in the Kern County Zoning Ordinance. Implementation of the proposed Project would not result in the loss of forest land. No impact would occur.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

No impacts would occur.

Impact 4.2-4: The Project Would Result in the Loss of Forest Land or Conversion of Forest Land to Non-Forest Use.

The proposed project is not located on forest land as defined in Public Resources Code Section 12220(g), nor is the property zoned for such use as identified in the Kern County Zoning Ordinance. Implementation of the project would not result in the loss of forest land. No impact would occur.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

No impacts would occur.

Impact 4.2-5: The Project Would Involve Other Changes in the Existing Environment Which, Due to Their Location or Nature, Could Result in Conversion of Farmland, to Non-Agricultural Use or Conversion of Forest Land to Non-Forest Use.

The proposed development would occur within the Project site. No other changes in the existing environment would result from the proposed Project. The following provides a description of the existing and planned land uses surrounding the proposed Project site:

- The Proposed South Beltway Alignment is located along the southern project boundary.
- General Plan Amendment and Zone change is proposed for 28.67 acres west of the project site to allow for Light Industrial uses.
- General Plan Amendments located northwest of the site to allow for Service Industrial uses.
- General Plan Amendment located at the northeast corner of Hosking Road and Highway 99 to allow for retail commercial center with approximately 1 million square feet of leasable commercial space and a 300-room hotel (140,000 square feet) on 109 acres.
- General Plan Amendment located at Taft Highway and Chevalier to allow for General Commercial, Office Commercial and High Density residential.
- Zone Change located South of Taft Highway and Chevalier to allow for Commercial and Residential development.

Although some of the surrounding agricultural properties have filed a notice of non-renewal for the Williamson Act land use contract property, others have not. Implementation of this project would further encourage those properties who have already filed for non-renewal of their Williamson Act property to discontinue agricultural production on-site and may encourage the property directly north to abandon its agricultural use. Although the proposed industrial use is compatible with agricultural production and there are a number of similar uses scattered throughout the project vicinity, implementation of the project may result in changes to the environment which could result in conversion of additional farmland to nonagricultural use. As such, impacts are considered significant and unavoidable.

Mitigation Measures

Implement MM 4.2-1.

Level of Significance after Mitigation

Impacts are considered significant and unavoidable.

Impact 4.2-6: The Project Would Result in the Cancellation of an Open Space Contract Made Pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Contract for Any Parcel of 100 or More Acres (Section 1526(b)(3) Public Resources Code.

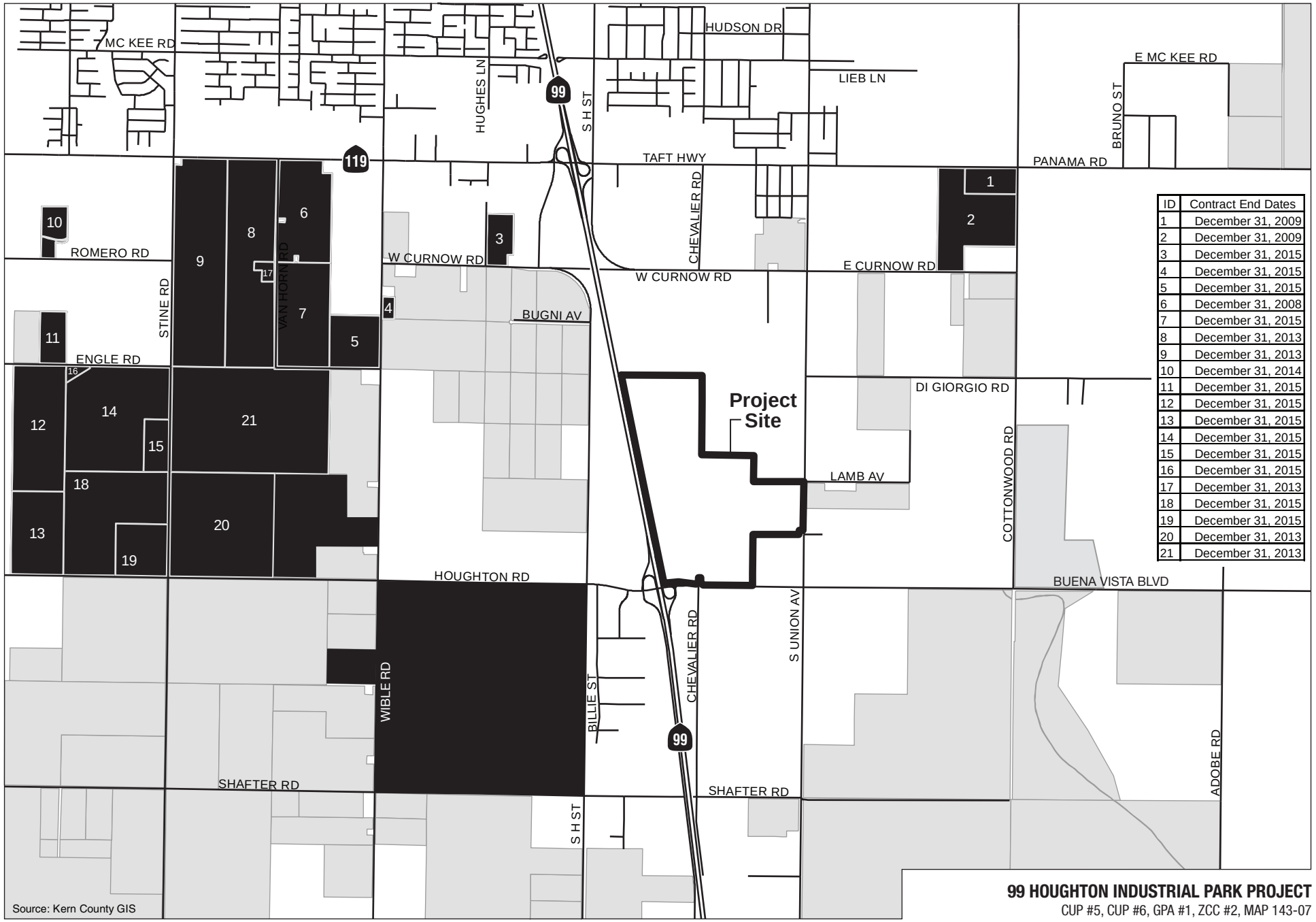
The proposed Project is not under a Williamson Act Land Use Contract. Many of the properties under existing Williamson Act Land Use Contracts (in the vicinity of the proposed Project) have already planned for the eventual urbanization of those lands by non-renewing their contracts. From 2009 to 2015, these properties were planning to end their Williamson Act Contracts (refer to Figure 4.2-1, *Williamson Act Contracts*). There are numerous properties to the east (including one parcel that is directly adjacent to the proposed Project) and west of the proposed Project site that are under Williamson Act Contracts.

Mitigation Measures

Implement MM 4.2-1.

Level of Significance after Mitigation

Impacts are considered less than significant.



ID	Contract End Dates
1	December 31, 2009
2	December 31, 2009
3	December 31, 2015
4	December 31, 2015
5	December 31, 2015
6	December 31, 2008
7	December 31, 2015
8	December 31, 2013
9	December 31, 2013
10	December 31, 2014
11	December 31, 2015
12	December 31, 2015
13	December 31, 2015
14	December 31, 2015
15	December 31, 2015
16	December 31, 2015
17	December 31, 2013
18	December 31, 2015
19	December 31, 2015
20	December 31, 2013
21	December 31, 2013

99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07

AGRICULTURAL PRESERVE #13 EXCLUSION

Williamson Act Contracts

Figure 4.2-1

Cumulative Impacts

Kern County has ranked among the leading counties in California for urbanization and net loss of farmland. For the years 2013-2014, the amount of important and interim farmland in Kern County decreased by 88,338 acres. About one-third of this decrease was due to urban-related changes, while two-thirds was associated with the idling of farmland.

The Metropolitan Bakersfield General Plan EIR also acknowledges that some of the Williamson Act contracted lands within the Metropolitan Bakersfield area will be lost to future development. The Farmland Conversion Study concluded that the proposed Project would not result in pressures to develop neighboring Williamson Act lands and is considered appropriate for the conversion as proposed.

As seen in Chapter 3, *Project Description*, Table 3-5, *Cumulative Projects List*, there are more than 100 proposed and/or pending Projects within a six-mile radius of the proposed Project. The conversion of approximately 314.30 acres of farmland within the Project site would increase the total acreage of urban uses. Additionally, the conversion of this property from agricultural use to commercial/industrial use is expected to create cumulative or growth-inducing impacts to other adjacent farmlands. The existing and planned land uses surrounding the proposed Project site, as previously discussed, illustrate that the proposed Project site is in an area that is experiencing some growth.

Although the Metropolitan Bakersfield General Plan has various land use policies that direct development to encourage site compatibility with surrounding uses, the cumulative loss of agricultural land results in a significant and unavoidable impact. Therefore, Project implementation, when combined with the potential loss of other agricultural lands within the Planning area, over time, would remain a significant and unavoidable impact.

Mitigation Measures

Implement MM 4.2-1.

Level of Significance after Mitigation

Impacts would be significant and unavoidable.

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Section 4.3

Air Quality

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Section 4.3
Air Quality

4.3.1 Introduction

This section of the RDEIR analyzes the potential air quality impacts associated with the proposed Project. The air quality section is divided into the following subsections: Environmental Setting, Regulatory Setting, and Impacts and Mitigation Measures. This section evaluates the short and long-term air quality impacts associated with the build out of the proposed Project site and discusses mitigation where required to avoid or lessen the project's impacts.

Insight Environmental Consultants completed an Air Quality Impact Analysis in June 2009 that evaluated the proposed Project's potential impacts on air quality. A second Air Quality Impact Analysis was prepared by Insight Environmental Consultants in July 2017. See Appendix C, Air Quality Impact Analysis, and Appendix N, Original Technical Studies. Information supporting this analysis is also contained in the San Joaquin Valley Air Pollution Control District (SJVAPCD) 2015 Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI) and Kern County's Guidelines for the Preparation of Air Quality Assessment for Environmental Impact Reports.

4.3.2 Environmental Setting

The California Air Resources Board (CARB) has divided California into regional air basins according to topographic drainage features. The proposed Project site is located in the western portion of Kern County, within the San Joaquin Valley Air Basin (SJVAB) and is under the jurisdiction of the SJVAPCD. The SJVAB, which is 250 miles long and 35 miles wide, is the second-largest air basin in the state.

Topography and Meteorology

Air pollution, especially the dispersion of air pollutants, is directly related to a region's topographic features, which also make up the SJVAB boundaries. The SJVAB lies in the central region of the State of California and is bounded to the east by the Sierra Nevada Mountain Range (8,000 to 14,000 feet in elevation), to the west by the Coast Mountain Range (averaging 3,000 feet in elevation), and to the south by the Tehachapi Mountain Range (6,000 to 8,000 feet in elevation). Between these boundaries is a relatively flat valley floor that opens to the sea at the Carquinez Strait where the San Joaquin-Sacramento Delta (Delta) empties into San Francisco Bay.

Localized air quality can be greatly affected by elevation and topography. For the majority of the San Joaquin Valley, air movement through and out of the SJVAB is restricted by the hills and the mountains surrounding it. Although marine air generally flows into the SJVAB from the San Joaquin–Sacramento Delta, the Coast Range hinders wind movement into the SJVAB from the west, the Tehachapi Mountains prevent the southerly passage of airflow, and the Sierra Nevada is a significant wind barrier to the east. These topographic features result in weak airflow into the valley, which

becomes vertically blocked by high barometric pressure over the SJVAB. As a result, the majority of the SJVAB is highly susceptible to pollutant accumulation over time. Furthermore, most of the surrounding mountains are above the normal height of the summer inversion layer.

Wind speed and direction play an important role in the dispersion and transport of air pollutants. Ozone (O_3) and inhalable particulates (particulate matter 10 microns or less in diameter [PM_{10}] and particulate matter 2.5 microns or less in diameter [$PM_{2.5}$]) are classified as regional pollutants because they can be transported away from the emission source before concentrations peak. In contrast, local pollutants, such as carbon monoxide (CO), tend to have their highest concentrations near the source of emissions and dissipate easily; therefore, their highest concentrations occur during low wind speeds.

Wind speed and direction data indicate that during the summer, winds usually originate at the north end of the SJVAB and flow in a south/southeasterly direction through the Tehachapi Pass and into the Southeast Desert Air Basin. During the winter, winds occasionally originate from the south end of the SJVAB and flow in a north/northwesterly direction. Also, during winter, the SJVAB experiences light, variable winds, typically less than 10 miles per hour. Low wind speeds, combined with low inversion layers in the winter, create a climate that is conducive to high CO and inhalable PM_{10} concentrations.

The vertical mixing of air pollutants is limited by the presence of persistent temperature inversions. Inversions may be either at ground level or elevated. Ground-level inversions occur frequently during fall and early winter (i.e., October through January). High concentrations of primary pollutants, which are those emitted directly into the atmosphere (e.g., CO), may be found during these times. Elevated inversions act as a lid over the basin and limit vertical mixing. Severe air stagnation occurs as a result of these inversions. Elevated inversions contribute to the occurrence of high levels of O_3 during the summer months.

The SJVAB enjoys an inland Mediterranean climate, averaging more than 260 sunny days per year. The valley floor is characterized by warm, dry summers and cooler winters. Average daily temperatures in the basin range from 41.7 degrees Fahrenheit (°F) in December to 98.7°F in July. Summer highs often exceed 100°F, averaging in the low 90s in the northern valley and high 90s to the south. Although the SJVAB enjoys a high percentage of sunshine, a reduction in sunshine occurs during December and January because of fog and intermittent stormy weather. Nearly 90 percent of the annual precipitation falls in the six months between October and May. Precipitation is low because the mountains to the west and south produce a rain shadow effect by intercepting prefrontal, moisture-laden western and southern winds. The southern valley receives precipitation primarily from cold, unstable, northwesterly flows that usually follow a frontal passage.

Sensitive Receptors

Some people are considered more sensitive to air pollutants than others, including those with pre-existing health problems, those who are close to an emissions source, or those who are exposed to air pollutants for long periods of time. The SJVAPCD GAMAQI defines sensitive receptors as those that are more susceptible to the effects of air pollution than the population at large and include "facilities that house or attract children, the elderly, and people with illnesses, hospitals, schools, convalescent

facilities, and residential areas are examples of sensitive receptors" (SJVAPCD, 2015). Land uses such as primary and secondary schools, hospitals, and convalescent homes are considered to be relatively sensitive because the very young, the old, and the infirm are more susceptible to respiratory infections and other air quality–related health problems than the general public. Residential areas are considered sensitive to poor air quality because people in residential areas are often at home for extended periods. Recreational land uses are moderately sensitive to air pollution because vigorous exercise associated with recreation places a high demand on the human respiratory function.

There are residential areas within one mile or less to the north, east, and south of the proposed Project, with the closest residential structures located within properties adjacent to the Project site, approximately 500 feet from the Project boundaries. There are four non-residential sensitive receptors within two miles of the proposed Project as follows:

- General Shafter Elementary School, 1.09 miles southwest;
- McKee Middle School, 1.35 miles northeast;
- Golden Valley High School, 1.76 miles north; and
- Horizon Elementary School, 2.00 miles north.

National and State Ambient Air Quality Standards

Both the State of California and the federal government have established ambient air quality standards for several different pollutants. A summary of state and national ambient air quality standards (CAAQS and NAAQS, respectively) is shown in Table 4.3-1, *National and California Ambient Air Quality Standards.* For some pollutants, separate standards have been set for different periods. Most standards have been set to protect public health. For other pollutants, standards have been based on other values (such as protection of crops, protection of materials, or avoidance of nuisance conditions).

Table 4.3-1. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	National Standards[a]	California Standards[b]
Ozone (O_3)	8 Hours	0.070 ppm (137 µg/m^3)[c]	0.070 ppm (137 µg/m^3)
	1 Hour	--[d]	0.09 ppm (180 µg/m^3)
Carbon Monoxide (CO)	8 Hours	9 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual Average	53 ppm (100 µg/m^3)	0.030 ppm (56 µg/m^3)
	1 Hour	100 ppb (188.68 µg/m^3)	0.18 ppm (338 µg/m^3)
Sulfur Dioxide (SO_2)	3 Hour	0.5 ppm (1,300 µg/m^3)	--
	24 Hours	0.14 ppm (365 µg/m^3)	0.04 ppm (105 µg/m^3)

Table 4.3-1. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	National Standards[a]	California Standards[b]
	1 Hour	75 ppb (196 µg/m^3)	0.25 ppm (655 µg/m^3)
Particulate Matter (PM_{10})	Annual Arithmetic Mean	--[e]	20 µg/m^3
	24 Hours	150 µg/m^3	50 µg/m^3
Particulate Matter—Fine ($PM_{2.5}$)	Annual Arithmetic Mean	12.0 µg/m^3	12 µg/m^3
	24 Hours	35 µg/m^3	--
Sulfates (SO_4)	24 Hours	--	25 µg/m^3
Lead[f] (Pb)	Rolling Three Month Average	0.15 µg/m^3	--
	30-day Average	--	1.5 µg/m^3
Hydrogen Sulfide (H_2S)	1 Hour	--	0.03 ppm (42 µg/m^3)
Vinyl Chloride (chloroethene)	24 Hours	--	0.01 ppm (26 µg/m^3)
Visibility-Reducing Particles (VRPs)	8 Hours (1000 to 1800 PST)	--	--[g]

ppm = parts per million; ppb = parts per billion; mg/m^3 = milligrams per cubic meter; µg/m^3= micrograms per cubic meter.
[a] 1-Hour O3 standard revoked effective June 15, 2005.
[b] Annual PM 10 standard revoked effective December 18, 2006.
[c] EPA finalized the revised (2008) 8-hour O3 standard of 0.075 ppm on March 27, 2008. The 1997 8-hour O3 standard of 0.08 ppm has not been revoked. In the January 19, 2010 Federal Register, EPA proposed to revise the 2008 O3 NAAQS of 0.075 ppm to a NAAQS in the range of 0.060 to 0.070 ppm. EPA expects to finalize the revised NAAQS, which will replace the 0.075 ppm NAAQS, by July 29, 2011.
[d] On October 15, 2008, EPA strengthened the Pb standard.
[e] Statewide Visibility Reducing Particle Standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.

Source: Insight Environmental Consultants, 2017.

Local Standards

CARB operates the local meteorological and air quality monitoring stations in the Project vicinity. Table 4.3-2, *San Joaquin Valley Air Bain Attainment Status*, lists the air quality attainment status for the SJVAB. Pursuant to the methodologies prescribed by the SJVAPCD's GAMAQI, the analysis within this section primarily models and analyzes reactive organic gases (ROG), nitrogen oxides (NO_X), carbon monoxide (CO), particulate matter 10 microns or less in diameter (PM_{10}), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$) and sulfur oxides (SO_X). In accordance with the January 2015 GAMAQI technical guidance document, the SJVAPCD no longer monitors lead in the ambient air of the SJVAB since the used of leaded fuel has been mostly phased out. Hydrogen sulfide (H_2S) is associated with geothermal activities, oil and gas production, refining, sewage treatment plants and confined animal feeding operations; however, CARB does not have a measuring method to accurately designate areas in the state (i.e., attainment or nonattainment). Sulfate data collected in the SJVAB demonstrated levels of sulfates significantly less than the health standards.

Areas can be classified as in attainment (air pollutant levels consistently below the standard) or as nonattainment (levels of air pollutant consistently violate the standard). Areas that do not meet the standards shown in Table 4.3-1 are classified as nonattainment areas. The determination of whether an area meets the State and National standards is based on air quality monitoring data. Some areas

are unclassified, which means that not enough data available to determine whether the standard is exceeded in an area. Unclassified areas are typically treated as being in attainment. Because the attainment/nonattainment designation is pollutant specific, an area may be classified as a nonattainment area for one pollutant and an attainment area for another. Similarly, because the State and National standards differ, an area could be classified as an attainment area for the National standards of a pollutant and as a nonattainment area for the state standards of the same pollutant. As presented in Table 4.3-2, the SJVAB is currently in severe nonattainment for the one-hour State standard for ozone (O_3), extreme nonattainment and nonattainment for the eight-hour federal and State standard for O_3, respectively, and nonattainment for State standard for PM_{10}. The area is also in nonattainment for the federal and State standards for particulate matter 2.5 microns or less in diameter ($PM_{2.5}$).

Table 4.3-2. San Joaquin Valley Air Quality Attainment Status

Pollutant	Federal Standards[1]	State Standards[2]
Ozone—1 hour	No federal standard[3]	Nonattainment - Severe
Ozone—8 hour	Nonattainment – Extreme[4]	Nonattainment
PM_{10}	Attainment[5]	Nonattainment
$PM_{2.5}$	Nonattainment[6]	Nonattainment
CO	Attainment /Unclassified	Attainment/Unclassified
Nitrogen dioxide	Attainment/Unclassified	Attainment
Sulfur dioxide	Attainment/Unclassified	Attainment
Lead (Particulate)	No designation/classification	Attainment
Hydrogen sulfide	No federal standards	Unclassified
Sulfates	No federal standards	Attainment
Visibility-reducing particulates	No federal standards	Unclassified
Vinyl Chloride	No federal standard	Attainment

[a] See 40 CFR Part 81

[b] See CCR Title 17 Sections 60200-60210

[c] On September 25, 2008, EPA redesignated the San Joaquin Valley to attainment for the PM_{10} National Ambient Air Quality Standard (NAAQS) and approved the PM10 Maintenance Plan.

[d] The Valley is designated nonattainment for the 1997 PM2.5 NAAQS. EPA designated the Valley as nonattainment for the 2006 $PM_{2.5}$ NAAQS on November 13, 2009 (effective December 14, 2009).

[e] Though the Valley was initially classified as serious nonattainment for the 1997 8-hour O_3 standard, EPA approved Valley reclassification to extreme nonattainment in the Federal Register on May 5, 2010 (effective June 4, 2010).

[f] Effective June 15, 2005, the EPA revoked the federal 1-hour O_3 standard, including associated designations and classifications. EPA had previously classified the SJVAB as extreme nonattainment for this standard. EPA approved the 2004 Extreme Ozone Attainment Demonstration Plan on March 8, 2010 (effective April 7, 2010). Many applicable requirements for extreme 1-hour O3 nonattainment areas continue to apply to the SJVAB.

Source: Insight Environmental Consultants, 2017.

In order to reach attainment for the State and National ambient air quality standards, the Extreme Ozone Attainment Demonstration Plan (Extreme OADP) was published by the SJVAPCD and approved by CARB and the United States Environmental Protection Agency (EPA). The Extreme OADP was prepared to fulfill the requirements of the Federal Clean Air Act (CAA) and attain the federal one-hour O_3 ambient air quality standards in the SJVAB by November 15, 2010. It identifies control measures needed to reduce emissions and projects future air quality impacts with implementation of those controls. The SJVAPCD and CARB implement control measures needed to

achieve emission reductions, with the SJVAPCD implementing some of the control measures as listed in the Extreme OADP as rules.

Regional Air Quality

The SJVAPCD is the regional agency responsible for the regulation and enforcement of federal, state, and local air pollution control regulations in the SJVAB. The SJVAPCD jurisdiction includes all of Merced, San Joaquin, Stanislaus, Madera, Fresno, Kings, and Tulare counties, and the San Joaquin Valley portion of Kern County. The SJVAPCD has identified quantitative emission thresholds for CO, nitrogen oxides (NO_X), ROGs, SO_x, PM_{10}, and $PM_{2.5}$ to determine whether the potential air quality impacts of a project may produce a significant impact. The air quality threshold for CO is 100 tons per year, NO_x and ROG is 10 tons per year, SO_x is 27 tons per year, and for PM_{10} and $PM_{2.5}$ is 15 tons per year, which establish the limit at which an impact to the SJVAB may occur.

Additionally, the SJVAPCD's GAMAQI considers construction emissions and operational emissions as separate and distinct in that construction emissions are considered short-term impacts and temporary in nature while operational and area source emissions are considered long-term.

The SJVAPCD has set up the Indirect Source Review (ISR) Program in order to address new development projects that have not yet gained discretionary approval from the applicable public agency. The ISR Program is based on SJVAPCD Rules 9510 and 3180, which provide a methodology for assessing the air quality impacts created by a new development; regulations to limit the emissions of pollutants during the construction process; and the option of onsite emissions reduction measures and offsite emission reduction through fees, which are used to fund offsite emission reduction projects, or some combination of both options; refer to Appendix C.

Local Air Quality

Under authority and oversight from the EPA pursuant to 40 CFR Part 58, the SJVAPCD and CARB maintain ambient air quality monitoring stations throughout the SJVAB, with ten sites in Kern County (Arvin-DiGiorgio, Bakersfield (four sites), Edison, Lebec, Maricopa, Oildale, and Shafter). Not all air pollutants are monitored at each station; thus, data from the closest representative station that monitors a specific pollutant are summarized.

Table 4.3-3, *Existing Air Quality Monitoring Data for 2013-2015,* shows the Kern County monitoring stations and the pollutants monitored. The locations of these stations were chosen to meet monitoring objectives. The monitoring objectives call for stations that monitor the highest pollutant concentrations, representative concentrations in areas of high population density, the impact of major pollution emissions sources, and general background concentration levels (Insight Environmental Consultants 2016).

The Air Quality Impact Analysis (Insight Environmental Consultants 2017) relied on data collected from 2013 to 2015 at the CARB monitoring stations that are located in the closest proximity to the proposed Project. Table 4.3-3, provides the background concentrations for O_3, PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2, and lead (Pb) as of November 2015 as well as the number of days that thresholds were exceeded. Information is provided for the Bakersfield-5558 California Avenue; Arvin-Di Giorgio,

Oildale – 3311 Manor Street; Bakersfield – 410 E. Planz Road; Bakersfield-Municipal Airport; Bakersfield – Golden State Highway; Edison, Shafter – Walker Street; Maricopa-Stanislaus Street; and Sacramento – Del Paso Manor monitoring stations for 2013 through 2015. No data are available for hydrogen sulfide, vinyl chloride, or other toxic air contaminants (TACs) in Kern County. Detailed air quality data are included in Appendix C, *Air Quality Impact Assessment*.

Table 4.3-3. Existing Air Quality Monitoring Data for 2013-2015

Pollutant and Monitoring Station Location	Maximum Concentration			Days Exceeding Standard		
	2013	2014	2015	2013	2014	2015
Ozone: Maximum 1-Hour (CAAQS 0.09 ppm)						
Bakersfield-5558 California Ave.	0.107	0.102	0.104	3	3	6
Bakersfield – Municipal Airport	0.109	0.108	0.118	6	10	23
Arvin-DiGiorgio	0.109	0.109	0.124	14	15	16
Edison	0.101	0.107	0.112	2	15	17
Maricopa - Stanislaus	0.089	0.090	0.094	0	0	0
Shafter- Walker Street	0.112	0.100	0.104	1	2	3
Oildale – 3311 Manor St.	0.099	0.093	0.099	1	0	2
Ozone: Maximum 8-Hour (CAAQS 0.07 ppm)						
Bakersfield-5558 California Ave.	0.099	0.093	0.097	47	39	54
Bakersfield – Municipal Airport	0.103	0.095	0.106	56	60	73
Arvin-DiGiorgio	0.095	0.092	0.101	68	69	55
Edison	0.086	0.092	0.099	21	55	45
Maricopa - Stanislaus	0.084	0.084	0.088	23	25	32
Shafter- Walker Street	0.097	0.087	0.091	19	28	34
Oildale – 3311 Manor St.	0.090	0.085	0.092	15	25	33
Ozone: Maximum 8-Hour (NAAQS 0.07 ppm)						
Bakersfield-5558 California Ave.	0.098	0.092	0.096	43	36	52
Bakersfield – Municipal Airport	0.102	0.095	0.106	55	58	69
Arvin-DiGiorgio	0.094	0.091	0.101	64	65	53
Edison	0.086	0.091	0.099	19	52	42
Maricopa - Stanislaus	0.083	0.083	0.087	23	24	32
Shafter- Walker Street	0.096	0.087	0.090	17	24	34
Oildale – 3311 Manor St.	0.090	0.085	0.092	13	24	33
PM_{10}: 24-Hour (CAAQS 50 µg/m^3)						
Bakersfield-5558 California Ave.	116.9	419.5	103.6	16	69	20
Bakersfield – Golden State Hwy.	*	*	94.6	0	0	16
Oildale – 3311 Manor Street	138.0	335.6	104.4	27	20	26
PM_{10}: 24-Hour (NAAQS 150 µg/m^3)						
Bakersfield-5558 California Ave.	120.07	430.1	104.7	0	1	0
Bakersfield – Golden State Hwy.	*	*	100.5	0	0	0
Oildale – 3311 Manor Street	134.3	336.4	98.5	0	3	0
$PM_{2.5}$: 24-Hour (NAAQS 35 µg/m^3)						
Bakersfield – 410 East Planz Road	167.3	91.0	83.2	15	15	13
Bakersfield – 5558 California Avenue	111.7	101.9	107.8	44	37	29
Bakersfield – Golden State Highway	*	107.2	91.1	*	2	9
CO: 8-hour (CAAQS & NAAQS 9.0 ppm)						
Fresno – 1st Street	n/a	n/a	n/a	n/a	n/a	n/a

Table 4.3-3. Existing Air Quality Monitoring Data for 2013-2015

Pollutant and Monitoring Station Location	Maximum Concentration			Days Exceeding Standard		
	2013	2014	2015	2013	2014	2015
NO_2: 1-Hour (CAAQS 0.18 ppm)						
Bakersfield – 5558 California Avenue	0.055	0.060	0.054	0	0	0
Shafter – Walker Street	0.058	0.058	0.045	0	0	0
Edison	0.047	0.035	0.046	0	0	0
Bakersfield – Municipal Airport	0.065	0.064	0.055	0	0	0
NO_2: 1-Hour (NAAQS 0.10 ppm)						
Bakersfield – 5558 California Avenue	0.055	0.061	0.055	0	0	0
Shafter – Walker Street	0.059	0.059	0.045	0	0	0
Edison	0.047	0.035	0.047	0	0	0
Bakersfield – Municipal Airport	0.065	0.064	0.055	0	0	0
SO_2: 24-Hour Concentration (CAAQS 0.04 ppm; NAAQS 0.14 ppm)[1]						
Sacramento – Del Paso Manor	n/a	n/a	n/a	n/a	n/a	n/a
Pb – Maximum 30-Day Concentration (CAAQS 1.5 µg/m^3)						
Bakersfield – 5558 California Avenue	0.0067	0.0140	0.0095	*	*	*

Notes: ppm= parts per million

* There was insufficient (or no) data available to determine the value.

[1] SJVAB did not have any monitoring stations that measured SO_2 during the years of 2012-2014.

Source: Insight Environmental Consultants 2017.

Common Air Pollutants

The following is a general description of the sources, and the physical and health effects, for air pollutants expected from this proposed Project.

Ozone

Ozone (O_3) occurs in two layers of the atmosphere. The layer surrounding the earth's surface is the troposphere. In the troposphere, ground level, or "bad," ozone is an air pollutant that damages human health, vegetation, and many common materials. It is a key ingredient of urban smog. The troposphere extends to a level about 10 miles up, where it meets the second layer, the stratosphere. The stratospheric, or "good," ozone layer extends upward from about 10 to 30 miles and protects life on earth from the sun's harmful ultraviolet rays.

"Bad" ozone is what is known as a photochemical pollutant. It needs ROG, NO_x, and sunlight. ROG and NO_x are emitted from various sources throughout Kern County. In order to reduce ozone concentrations, it is necessary to control the emissions of these ozone precursors. Significant ozone formation generally requires an adequate amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight. High ozone concentrations can form over large regions when emissions from motor vehicles and stationary sources are carried hundreds of miles from their origins.

O_3 is a regional air pollutant and the SJVAB has high concentrations of ozone. It is generated over a large area and transported and spread by the wind. As the primary constituent of smog, ozone is the most complex, difficult to control, and pervasive of the criteria pollutants. Ozone is a photochemical pollutant that is not emitted directly into the earth's lower atmosphere, but formed by a complex series

of chemical reactions between ROG, NO_X and sunlight. Ozone precursors (ROG and NO_X) can come from a variety of sources throughout the Valley including; automobiles, solvents, and fuel combustion; therefore, ozone is a regional pollutant because ozone precursors are transported and diffused by wind concurrently with the reaction process. The highest ozone concentrations are generally found downwind from emission sources, generally located in the metropolitan areas.

Health Effects

While ozone in the upper atmosphere protects the earth from harmful ultraviolet radiation, high concentrations of ground-level ozone can adversely affect the human respiratory system. Many respiratory ailments, as well as cardiovascular disease, are aggravated by exposure to high ozone levels. Ozone also damages natural ecosystems, such as forests and foothill communities; agricultural crops; and some man-made materials, such as rubber, paint, and plastic. High levels of ozone may negatively affect immune systems, making people more susceptible to respiratory illnesses, including bronchitis and pneumonia. Ozone accelerates aging and exacerbates pre-existing asthma and bronchitis and, in cases with high concentrations, can lead to the development of asthma in active children. Active people, both children and adults, appear to be more at risk from ozone exposure than those with a low level of activity. Additionally, the elderly and those with respiratory disease are also considered sensitive populations for ozone.

Ozone is a powerful oxidant; it can be compared to household bleach, which can kill living cells (such as germs or human skin cells) upon contact. Ozone can damage the respiratory tract, causing inflammation and irritation, and it can induce symptoms such as coughing, chest tightness, shortness of breath, and worsening of asthmatic symptoms. Ozone in sufficient doses increases the permeability of lung cells, rendering them more susceptible to toxins and microorganisms. Exposure to levels of ozone above the current ambient air quality standard leads to lung inflammation and lung tissue damage and a reduction in the amount of air inhaled into the lungs. Recent evidence has, for the first time, linked the onset of asthma to exposure to elevated ozone levels in exercising children. Elevated ozone concentrations also reduce crop and timber yields, damage native plants, and damage materials such as rubber, paints, fabric, and plastics.

Reactive Organic Gases (ROG) and Volatile Organic Compounds (VOC)

Hydrocarbons are organic gases that are formed solely of hydrogen and carbon. There are several subsets of organic gases, including volatile organic compounds (VOCs) and ROGs, which include all hydrocarbons except those exempted by CARB. Therefore, ROGs are a set of organic gases based on state rules and regulations. VOCs are similar to ROGs in that they include all organic gases except those exempted by Federal law. The list of compounds exempt from the definition of a VOC is presented in District Rule 1102.

Both VOCs and ROGs are emitted from incomplete combustion of hydrocarbons or other carbon-based fuels. Combustion engine exhaust, oil refineries, and oil-fueled power plants are the primary sources of hydrocarbons. Another source of hydrocarbons is evaporation from petroleum fuels, solvents, dry cleaning solutions, and paint.

Health Effects

The primary health effects of hydrocarbons result from the formation of ozone and its related health effects (see the ozone health effects discussion above). High levels of hydrocarbons in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen through displacement. There are no separate federal or California ambient air quality standards for ROG. Carcinogenic forms of ROG are considered TACs. An example is benzene, which is a carcinogen. The health effects of individual ROGs are described under the toxic air contaminants heading below.

Carbon Monoxide (CO)

Carbon monoxide (CO) is emitted by mobile and stationary sources as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. CO is an odorless, colorless, poisonous gas that is highly reactive.

CO is a byproduct of motor vehicle exhaust, which contributes more than two-thirds of all CO emissions nationwide. In cities, automobile exhaust can cause as much as 95 percent of all CO emissions. Vehicular emissions can result in high background concentrations of CO, particularly in local areas with heavy traffic congestion. Other sources of CO emissions include industrial processes and fuel combustion from sources such as boilers and incinerators. Despite an overall downward trend in concentrations and emissions of CO, some metropolitan areas still experience high levels of CO.

Health Effects

CO enters the bloodstream and binds more readily to hemoglobin than oxygen, reducing the oxygen-carrying capacity of blood and thus reducing oxygen delivery to organs and tissues. The health threat from CO is most serious for those who suffer from cardiovascular disease. Healthy individuals are also affected but only at higher levels of exposure. CO binds strongly to hemoglobin, the oxygen-carrying protein in blood, and thus reduces the blood's capacity for carrying oxygen to the heart, brain, and other parts of the body. Exposure to CO can cause chest pain in heart patients, headaches, and reduced mental alertness. At high concentrations, CO can cause heart difficulties in people with chronic diseases and can impair mental abilities. Exposure to elevated CO levels is associated with visual impairment, reduced work capacity, reduced manual dexterity, poor learning ability, difficulty performing complex tasks, and in prolonged, enclosed exposure, death.

The adverse health effects associated with exposure to ambient and indoor concentrations of CO are related to the concentration of carboxyhemoglobin (COHb) in the blood. Health effects observed may include an early onset of cardiovascular disease; behavioral impairment; decreased exercise performance of young, healthy men; reduced birth weight; sudden infant death syndrome (SIDS); and increased daily mortality rate (Fierro et al. 2001).

Most of the studies evaluating adverse health effects of CO on the central nervous system examine high-level poisoning. Such poisoning results in symptoms ranging from common flu and cold symptoms (shortness of breath on mild exertion, mild headaches, and nausea), to unconsciousness and death.

Oxides of Nitrogen (NO_x)

NO_X is a family of highly reactive gases that are primary precursors to the formation of ground-level ozone and react in the atmosphere to form acid rain. NO_X is emitted from the use of solvents and combustion processes in which fuel is burned at high temperatures, principally from motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. A brownish gas, NO_X is a strong oxidizing agent that reacts in the air to form corrosive nitric acid, as well as toxic organic nitrates. NO_x is an ozone precursor that combines with ROG to form ozone (see the discussion of ozone above).

Health Effects

NO_X is an ozone precursor that combines with ROG to form ozone. See the ozone section above for a discussion of the health effects of ozone.

Direct inhalation of NO_X can also cause a wide range of health effects. NO_X can irritate the lungs, cause lung damage, and lower resistance to respiratory infections such as influenza. Short-term exposures (e.g., less than three hours) to low levels of nitrogen dioxide (NO_2) may lead to changes in airway responsiveness and lung function in individuals with preexisting respiratory illnesses. These exposures may also increase respiratory illnesses in children. Long-term exposures to NO_2 may lead to increased susceptibility to respiratory infection and may cause irreversible alterations in lung structure. Other health effects associated with NO_X are an increase in the incidence of chronic bronchitis and lung irritation. Chronic exposure to NO_2 may lead to eye and mucus membrane aggravation, along with pulmonary dysfunction. NO_X can cause fading of textile dyes and additives, deterioration of cotton and nylon, and corrosion of metals due to production of particulate nitrates. Airborne NO_X can also impair visibility.

NO_X contributes to a wide range of environmental effects both directly and indirectly when combined with other precursors in acid rain and ozone. Increased nitrogen inputs to terrestrial and wetland systems can lead to changes in plant species composition and diversity. Similarly, direct nitrogen inputs to aquatic ecosystems such as those found in estuarine and coastal waters can lead to eutrophication (a condition that promotes excessive algae growth, which can lead to a severe depletion of dissolved oxygen and increased levels of toxins that are harmful to aquatic life). Nitrogen, alone or in acid rain, also can acidify soils and surface waters. Acidification of soils causes the loss of essential plant nutrients and increased levels of soluble aluminum, which is toxic to plants. Acidification of surface waters creates low pH conditions and levels of aluminum that are toxic to fish and other aquatic organisms.

Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles floating in the air. Some particles are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. Particulate matter is a mixture of materials that can include smoke, soot, dust, salt, acids, and metals. Particulate matter also forms when gases emitted from motor vehicles and industrial sources undergo chemical reactions in the atmosphere. PM_{10} refers to particles less than or equal to 10 microns in aerodynamic diameter. $PM_{2.5}$ refers to particles less than or equal to 2.5 microns in aerodynamic diameter and are a subset of PM_{10}.

In the western United States, there are sources of PM_{10} in both urban and rural areas. PM_{10} and $PM_{2.5}$ are emitted from stationary and mobile sources, including diesel trucks and other motor vehicles; power plants; industrial processes; wood-burning stoves and fireplaces; wildfires; dust from roads, construction, landfills, and agriculture; and fugitive windblown dust. Because particles originate from a variety of sources, their chemical and physical compositions vary widely.

Health Effects

PM_{10} and $PM_{2.5}$ particles are small enough to be inhaled and lodged in the deepest parts of the lung where they evade the respiratory system's natural defenses. Health problems begin as the body reacts to these foreign particles. Acute and chronic health effects associated with high particulate levels include the aggravation of chronic respiratory diseases; heart and lung disease; and coughing, bronchitis, and respiratory illnesses in children. Recent mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air. PM_{10} and $PM_{2.5}$ can aggravate respiratory disease and cause lung damage, cancer, and premature death. Sensitive populations, including children, the elderly, exercising adults, and those suffering from chronic lung disease such as asthma or bronchitis are especially vulnerable to the effect of PM_{10}. Non-health-related effects include reduced visibility and soiling of buildings.

Attaining the California particulate matter standards would annually prevent about 6,500 premature deaths, or 3 percent of all deaths. These premature deaths shorten lives by an average of 14 years. This is roughly equivalent to the same number of deaths (4,200 to 7,400) linked to secondhand smoke in 2000. In comparison, motor vehicle crashes caused 3,200 deaths, and 2,000 deaths resulted from homicide. Attaining the California particulate matter and O_3 standards would annually prevent 4,000 hospital admissions for respiratory disease, 3,000 hospital admissions for cardiovascular disease, and 2,000 asthma-related emergency room visits. Exposure to diesel particulate matter causes about 250 excess cancer cases per year in California (CARB and American Lung Association of California, 2007).

A recent study provides evidence that exposure to particulate air pollution is associated with lung cancer. This study found that residents who live in an area that is severely affected by particulate air pollution are at risk of lung cancer at a rate comparable to nonsmokers exposed to secondhand smoke. This study also found an approximately 16 percent excess risk of dying from lung cancer due to fine-particulate air pollution (Pope et al., 2002). Another study shows that individuals with existing cardiac disease can be in a potentially life-threatening situation when exposed to high levels of ultrafine air pollution. Fine particles can penetrate the lungs, cause the heart to beat irregularly, or cause inflammation, which could lead to a heart attack (Peters et al., 2001). Currently, 57 percent of California's population lives in areas that exceed the National $PM_{2.5}$ air standard, while 90 percent lives in areas that exceed California's $PM_{2.5}$ air standard (CARB and American Lung Association of California, 2007).

Sulfur Dioxide (SO_2)

SO_2 is a colorless, irritating gas with a "rotten egg" smell formed primarily by the combustion of sulfur-containing fossil fuels. Historically, SO_2 was a pollutant of concern in Kern County, but with the successful application of regulations, the levels have been reduced significantly.

Health Effects

High concentrations of SO_2 can result in temporary breathing impairment for asthmatic children and adults who are active outdoors. Short-term exposures of asthmatic individuals to elevated SO_2 levels during moderate activity may result in breathing difficulties that can be accompanied by symptoms such as wheezing, chest tightness, or shortness of breath. Other effects that have been associated with longer term exposures to high concentrations of SO_2 in conjunction with high levels of particulate matter include aggravation of existing cardiovascular disease, respiratory illness, and alterations in the lungs' defenses. SO_2 also is a major precursor to $PM_{2.5}$, which is a significant health concern and a main contributor to poor visibility. (See also the discussion of the health effects of particulate matter above.)

SO_2 not only has a bad odor, it can irritate the respiratory system. Exposure to high concentrations for short periods of time can constrict the bronchi and increase mucous flow, making breathing difficult. SO_2 can also irritate the lung and throat at concentrations greater than 6 ppm in many people, impair the respiratory system's defenses against foreign particles and bacteria when exposed to concentrations less than 6 ppm for longer time periods, and enhance the harmful effects of O_3 (combinations of the two gases at concentrations occasionally found in the ambient air appear to increase airway resistance to breathing).

SO_2 tends to have more toxic effects when acidic pollutants, liquid or solid aerosols, and particulates are also present. Effects are more pronounced among "mouth breathers" (e.g., people who are exercising or who have head colds). SO_2 easily injures many plant species and varieties, both native and cultivated. Some of the most sensitive plants include various commercially valuable pines, legumes, red and black oaks, white ash, alfalfa, and blackberry. Increases in SO_2 concentrations accelerate the corrosion of metals, probably through the formation of acids. SO_2 is a major precursor to acidic deposition. Sulfur oxides may also damage stone and masonry, paint, various fibers, paper, leather, and electrical components. Increased SO_2 also contributes to impaired visibility. Particulate sulfate, much of which is derived from SO_2 emissions, is a major component of the complex total suspended particulate mixture.

Other Pollutants

Sulfates

Sulfates (SO_x) are particulate products from combustion of sulfur-containing fossil fuels. When sulfur monoxide or SO_2 is exposed to oxygen, it precipitates out into sulfates (SO_3 or SO_4). Data collected in Kern County identify levels of sulfates that are significantly less than the applicable health standards.

Sulfates are the fully oxidized ionic form of sulfur. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates takes place comparatively rapidly and completely in urban areas of California because of regional meteorological features.

Health Effects

CARB's sulfates standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels above the standard include a decrease in oxygen intake, aggravation of asthmatic symptoms, and an increased risk of cardio-pulmonary disease. Sulfates are particularly effective in degrading visibility and, because they are usually acidic, can harm ecosystems, and damage materials and property (CARB 2009).

Lead (Pb)

Lead is a metal that is a natural constituent of air, water, and the biosphere. Lead is neither created nor destroyed in the environment, so it essentially persists forever. Historically, lead was used to increase the octane rating in automobile fuel. However, because gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels and that use has been mostly phased out, the ambient concentrations of lead have dropped dramatically. Kern County no longer monitors lead in the ambient air of the SJVAB.

Health Effects

Exposure to lead occurs mainly through inhalation of air and ingestion of lead in food, water, soil, or dust. It accumulates in the blood, bones, and soft tissues and can adversely affect the kidneys, liver, nervous system, and other organs. Excessive exposure to lead may cause neurological impairments such as seizures, mental retardation, and behavioral disorders. Even at low doses, lead exposure is associated with damage to the nervous systems of fetuses and young children, resulting in learning deficits and lowered IQ. Recent studies also show that lead may be a factor in high blood pressure and subsequent heart disease. Lead can also be deposited on the leaves of plants, presenting a hazard to grazing animals and humans through ingestion (USEPA 2011).

Hydrogen Sulfide (H_2S)

Hydrogen sulfide (H_2S) emissions are associated with geothermal activity, oil and gas production, refining, sewage treatment plants, and confined animal feeding operations.

Health Effects

Exposure to low concentrations of H_2S may cause irritation to the eyes, nose, or throat. It may also cause difficulty in breathing for some asthmatics. Exposure to higher concentrations (above 100 ppm) can cause olfactory fatigue, respiratory paralysis, and death. Brief exposures to high concentrations of H_2S (greater than 500 ppm) can cause a loss of consciousness. In most cases, the person appears to regain consciousness without any other effects. However, in many individuals, there may be permanent or long-term effects such as headaches, poor attention span, poor memory, and poor motor function. No health effects have been found in humans exposed to typical environmental concentrations of H_2S (0.00011–0.00033 ppm). Deaths due to breathing in large amounts of H_2S have been reported in a variety of different work settings, including sewers, animal processing plants, waste dumps, sludge plants, oil and gas well drilling sites, and tanks and cesspools.

Visibility-Reducing Particles

The CAAQS for visibility-reducing particles (VRPs), as shown in Table 4.3-1, is a measure or visibility. CARB does not have a measuring method with enough accuracy or precision to designate areas in the state as attainment or nonattainmnent areas with respect to visibility. The entire state is labeled as unclassified.

Vinyl Chloride

Vinyl chloride monomer is a sweet-smelling, colorless gas at ambient temperature. Landfills, publicly owned treatment works, and polyvinyl chloride (PVC) production are the major identified sources of vinyl chloride emissions in California. PVC can be fabricated into several products, such as PVC pipes, pipe fittings, and plastics. In humans, epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of a rare cancer, liver angiosarcoma, and have suggested a relationship between exposure and lung and brain cancers. There are currently no adopted ambient air standards for vinyl chloride.

Health Effects

Short-term exposure to vinyl chloride has been linked with the following acute health effects (Agency for Toxic Substances and Disease Registry 2010; U.S. Department of Health and Human Services 2006):

- Acute exposure of humans to high levels of vinyl chloride via inhalation in humans has resulted in effects on the central nervous system, such as dizziness, drowsiness, headaches, and giddiness.

- Vinyl chloride is reported to be slightly irritating to the eyes and respiratory tract in humans. Acute exposure to extremely high levels of vinyl chloride has caused loss of consciousness, lung and kidney irritation, and inhibition of blood clotting in humans, and cardiac arrhythmias in animals.

- Tests involving acute exposure of mice have shown vinyl chloride to have high acute toxicity from inhalation exposure.

Long-term exposure to vinyl chloride concentrations has been linked with the following chronic health effects (Agency for Toxic Substances and Disease Registry 2010; U.S. Department of Health and Human Services 2006; U.S. Environmental Protection Agency [USEPA] 2000a):

- Liver damage may result in humans from chronic exposure to vinyl chloride, through both inhalation and oral exposure.

- A small percentage of individuals occupationally exposed to high levels of vinyl chloride in air have developed a set of symptoms termed “vinyl chloride disease,” which is characterized by Raynaud’s phenomenon (fingers blanch and numbness and discomfort are experienced upon exposure to the cold), changes in the bones at the end of the fingers, joint and muscle pain, and scleroderma-like skin changes (thickening of the skin, decreased elasticity, and slight edema).

- Central nervous system effects (including dizziness, drowsiness, fatigue, headache, visual and/or hearing disturbances, memory loss, and sleep disturbances) as well as peripheral nervous system symptoms (peripheral neuropathy, tingling, numbness, weakness, and pain in fingers) have also been reported in workers exposed to vinyl chloride.

Several reproductive/developmental health effects from vinyl chloride exposure have been identified (Agency for Toxic Substances and Disease Registry 2010; U.S. Department of Health and Human Services 2006):

- Several case reports suggest that male sexual performance may be affected by vinyl chloride. However, these studies are limited by lack of quantitative exposure information and possible co-occurring exposure to other chemicals.

- Several epidemiological studies have reported an association between vinyl chloride exposure in pregnant women and an increased incidence of birth defects, while other studies have not reported similar findings.

- Epidemiological studies have suggested an association between men occupationally exposed to vinyl chloride and miscarriages during their wives' pregnancies, although other studies have not supported these findings.

Long-term exposure to vinyl chloride has also been identified as a cancer risk (Agency for Toxic Substances and Disease Registry 2010; U.S. Department of Health and Human Services 2006; U.S. EPA 2000a)

- Inhaled vinyl chloride has been shown to increase the risk of a rare form of liver cancer (angiosarcoma of the liver) in humans.

- Animal studies have shown that vinyl chloride, via inhalation, increases the incidence of angiosarcoma of the liver and cancer of the liver.

Toxic Air Contaminants (TACs)

Hazardous air pollutants (HAPs) is a term used by the federal Clean Air Act (CAA) that includes a variety of pollutants generated or emitted by industrial production activities. Called TACs under the California Clean Air Act of 1988 (CCAA), ten have been identified through ambient air quality data as being the most substantial health risk in California. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to the brain and nervous system, and respiratory disorders.

TACs do not have ambient air quality standards. Since no safe levels of TACs can be determined, there are no air quality standards for TACs. Instead, TAC impacts are evaluated by calculating the health risks associated with a given exposure. The requirements of the Air Toxic "Hot Spots" Information and Assessment Act apply to facilities that use, produce, or emit toxic chemicals. Facilities that are subject to the toxic emission inventory requirements of the act must prepare and submit toxic emission inventory plans and reports and periodically update those reports.

Acetaldehyde

Acetaldehyde is both directly emitted into the atmosphere and formed in the atmosphere from photochemical oxidation. Sources include combustion processes such as exhaust from mobile sources and fuel combustion from stationary internal combustion engines, boilers, and process heaters. Approximately 76 percent of acetaldehyde emissions are from mobile sources, with area sources such as residential wood combustion accounting for approximately 17 percent of total emissions.

Health Effects

Acetaldehyde is classified as a Federal HAP and as a California TAC. Acetaldehyde is a carcinogen that also causes chronic non-cancer toxicity in the respiratory system. The primary acute effect of inhalation exposure to acetaldehyde is irritation of the eyes, skin, and respiratory tract in humans. At higher exposure levels, erythema, coughing, pulmonary edema, and necrosis may also occur (USEPA 2017a).

Benzene

Benzene is highly carcinogenic and occurs throughout California. Approximately 84 percent of the benzene emitted in California comes from motor vehicles, including evaporative leakage and unburned fuel exhaust; currently, the benzene content of gasoline is less than one percent.

Health Effects

Benzene also has non-cancer health effects. Brief inhalation exposure to high concentrations can cause central nervous system depression. Acute effects include central nervous system symptoms of nausea, tremors, drowsiness, dizziness, headache, intoxication, and unconsciousness (USEPA 20017b). Exposure to liquid and vapor may irritate the skin, eyes, and upper respiratory tract in humans. Redness and blisters may result from dermal exposure.

1,3–Butadiene

The majority of 1,3-butadiene emissions comes from incomplete combustion of gasoline and diesel fuels. Mobile sources account for 83 percent of total statewide emissions. Area-wide sources such as agricultural waste burning and open burning contribute to approximately 13 percent of statewide emissions. Approximately 67 percent of 1,3-butadiene emissions are from mobile sources.

Health Effects

In California, 1,3-butadiene has been identified as a carcinogen. Butadiene vapors cause neurological effects at very high levels such as blurred vision, fatigue, headache, and vertigo. Dermal exposure of humans to 1,3-butadiene causes a sensation of cold, followed by a burning sensation, which may lead to frostbite (USEPA 2017c).

Carbon Tetrachloride

The primary sources of carbon tetrachloride in California include chemical and allied product manufacturers and petroleum refineries.

Health Effects

In California, carbon tetrachloride has been identified as a carcinogen. Carbon tetrachloride is also a central nervous system depressant and mild eye and respiratory tract irritant. EPA has classified carbon tetrachloride as a Group B2 probable human carcinogen (USEPA 2017d).

Chromium, Hexavalent

Chromium plating and other metal finishing processes are the primary sources of hexavalent chromium emissions in California. Approximately 65 percent of hexavalent chromium emissions are from stationary sources, such as electrical generation facilities, aircraft and parts manufacturing plants, and fabricated-metal manufacturing facilities.

Health Effects

In California, hexavalent chromium has been identified as a carcinogen. There is epidemiological evidence that exposure to inhaled hexavalent chromium may result in lung cancer. The principal acute effects are renal toxicity, gastrointestinal hemorrhage, and intravascular hemolysis (USEPA 2017e).

Para-Dichlorobenzene

The primary sources of para-dichlorobenzene include consumer products such as non-aerosol insect repellents and solid/gel air fresheners. These sources contribute 99 percent of the statewide para-dichlorobenzene emissions.

Health Effects

In California, para-dichlorobenzene has been identified as a carcinogen. Acute exposure to 1,4-dichlorobenzene via inhalation results in irritation to the eyes, skin, and throat in humans. In addition, long-term inhalation exposure may affect the liver, skin, and central nervous system in humans (e.g., cerebellar ataxia, dysarthria, weakness in limbs, and hyporeflexia) (USEPA 2017f).

Formaldehyde

Formaldehyde is both emitted into the atmosphere directly and formed in the atmosphere as a result of photochemical oxidation. Formaldehyde is a product of incomplete combustion. One of the primary sources of formaldehyde is vehicular exhaust. Formaldehyde is also used in resins, many consumer products (as an antimicrobial agent), and fumigants and soil disinfectants. Approximately 68 percent of formaldehyde emissions in the SJVAB are from mobile sources.

Health Effects

The major toxic effects caused by acute formaldehyde exposure via inhalation are eye, nose, and throat irritation and effects on the nasal cavity. Other effects seen from exposure to high levels of formaldehyde in humans are coughing, wheezing, chest pains, and bronchitis. In California, formaldehyde has been identified as a carcinogen (USEPA, 2017g).

Methylene Chloride

Methylene chloride is used as a solvent, a blowing and cleaning agent in the manufacture of polyurethane foam and plastic, and a solvent in paint-stripping operations. Paint removers account for the largest use of methylene chloride in California (approximately 82 percent).

Health Effects

Case studies of methylene chloride poisoning during paint-stripping operations have demonstrated that inhalation exposure to extremely high levels can be fatal to humans. Acute inhalation exposure to high levels has resulted in effects on the central nervous system, including decreased visual, auditory, and psychomotor functions, but these effects are reversible once exposure ceases. The major effects from chronic inhalation exposure are effects on the central nervous system, such as headaches, dizziness, nausea, and memory loss. California considers methylene chloride to be carcinogenic (USEPA, 2017h).

Perchloroethylene

Perchloroethylene is used as a solvent, primarily in dry cleaning operations; it is also used in degreasing operations, paints and coatings, adhesives, aerosols, specialty chemical production, printing inks, silicones, rug shampoos, and laboratory solvents.

Health Effects

In California, perchloroethylene has been identified as a carcinogen. Perchloroethylene vapors are irritating to the eyes and respiratory tract. Following chronic exposure, workers have shown signs of liver toxicity as well as kidney dysfunction and neurological disorders.

Diesel Particulate Matter

Diesel particulate matter is emitted from both mobile and stationary sources. In California, onroad diesel-fueled engines contribute approximately 24 percent of the statewide total, with an additional 71 percent attributed to other mobile sources such as construction and mining equipment, agricultural equipment, and transport refrigeration units. Stationary sources contribute about 5 percent of total diesel particulate matter.

Health Effects

Diesel exhaust and many individual substances contained in it (including arsenic, benzene, formaldehyde, and nickel) have the potential to contribute to mutations in cells that can lead to cancer. Long-term exposure to diesel exhaust particles poses the highest cancer risk of any TAC evaluated by the California Office of Environmental Health Hazard Assessment (OEHHA). CARB estimates that about 70 percent of the cancer risk that the average Californian faces from breathing toxic air pollutants stems from diesel exhaust particles.

Diesel engines are a major source of fine-particle pollution. The elderly and people with emphysema, asthma, and chronic heart and lung disease are especially sensitive to fine-particle pollution. Numerous studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems. Because children's lungs and respiratory systems are still developing, they are also more susceptible than healthy adults to fine particles. Exposure to fine particles is associated with increased frequency of childhood illnesses and can also reduce lung function in children. In California, diesel exhaust particles have been identified as a carcinogen (California OEHHA and the American Lung Association, 2005; CARB, 2008).

Airborne Fungus (Valley Fever)

Valley Fever, or coccidioidomycosis, is caused by the microscopic fungus coccidioides immitis (*C. immitis*), which grows in arid soil in parts of Kern County and other parts of America. Infection occurs when the spores of the fungus become airborne and are inhaled. The fungal spores become airborne when contaminated soil is disturbed by human activities, such as construction and agricultural activities, and by natural phenomenon, such as wind storms, dust storms, and earthquakes.

Health Effects

Approximately 60 percent of infected persons have no symptoms. The remainder develop flu-like symptoms that can last for a month and tiredness that can sometimes last for several weeks. A small percentage of infected persons (less than one percent) can develop disseminated disease that spreads outside the lungs to the brain, bone, and skin. Without proper treatment, Valley Fever can lead to severe pneumonia, meningitis, and even death. Symptoms may appear between one and four weeks after exposure (County of Los Angeles 2004).

A diagnosis of Valley Fever is made through a sample of blood or other body fluid or biopsy of the affected tissue. It is treatable with anti-fungal medicines and is not contagious. Once recovered from the disease, the individual is protected against further infection. Persons at highest risk from exposure are those with compromised immune systems, such as those with HIV, and those with chronic pulmonary disease. Farmers, construction workers, and others who engage in activities that disturb the soil are at highest risk for Valley Fever. Infants, pregnant women, diabetics, people of African, Asian, Latino, or Filipino descent, and the elderly may be at increased risk for disseminated disease. Historically, people at risk for infection are individuals not already immune to the disease and whose jobs involve extensive contact with soil dust, such as construction or agricultural workers and

archeologists (County of Los Angeles 2004). The disease also has been known to infect animals. Infections occur most often in summer.

It is thought that during drought years the number of organisms competing with *C. immitis* decreases, and the *C. immitis* remains alive but dormant. When rain finally occurs, the arthrocondia germinate and multiply more than usual because of a decreased number of other competing organisms. Later, the soil dries out in the summer and fall, and the fungi can become airborne and potentially infectious (Kirkland and Fierer 1996).

Persons at risk for Valley Fever should avoid exposure to dust and dry soil in areas where Valley Fever is common. Areas with high Valley Fever rates are called hyper-endemic. Approximately 10–50 percent of people living in endemic disease regions are seropositive and considered immune. In any given year, about 3 percent of people who live in an area where coccidiodomycosis is common will develop an infection (County of Los Angeles 2004). The areas of Kern County that have the most incidents of Valley Fever exposure are northeast Bakersfield, Lamont-Arvin, Taft, and Edwards Air Force Base. The Valley Fever fungus has been identified in soil samples taken near the California State University, Bakersfield campus.

Asbestos

Ultramafic serpentinized rock is closely associated with asbestos and composed of the following minerals:

- Antigorite: (Mg, Fe)3Si2O5(OH)4;
- Clinochrysotile: Mg3Si2O5(OH)4;
- Lizardite: Mg3Si2O5(OH)4;
- Orthrochrysotile: Mg3Si2O5(OH)4; and
- Parachrysotile: (Mg, Fe)3Si2O5(OH)4.

Chrysotile minerals are more likely to form serpentinite asbestos; however, serpentinite is uncommon to sedimentary soil found in the project area. Asbestos occurs in certain geologic environments, none of which are common in the project area.

Health Effects

Asbestos can adversely affect humans only in its fibrous form, and these fibers must be broken and dispersed into the air and then inhaled. During geological processes, the asbestos mineral can be crushed, causing it to become airborne. It also enters the air or water from the breakdown of natural deposits. Constant exposure to asbestos at high levels on a regular basis may cause cancer in humans. The two most common forms of cancer are lung cancer and mesothelioma, a rare cancer of the lining that covers the lungs and stomach.

4.3.3 Regulatory Setting

In California, air quality is regulated by several agencies, including USEPA, CARB, and local air districts such as the SJVAPCD. Each of these agencies develops rules and/or regulations to attain the goals or directives imposed upon them through legislation. Although USEPA regulations may not be superseded, some state and local regulations may be more stringent than Federal regulations. The project site is located in the SJVAB and is under the jurisdiction of the SJVAPCD.

Federal

U.S. Environmental Protection Agency (EPA)

The 1977 Federal CAA and 1990 revisions required EPA to identify National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare (see Table 4.3-1). In June of 1997, EPA adopted new PM_{10} National standards and an additional standard for suspended particulate matter at or below PM_{10} to $PM_{2.5}$.

On March 12, 2008, EPA implemented an 8-hour standard for O_3. On October 1, 2015, the EPA Administrator signed the notice for the final rule to revise the primary and secondary NAAQS for O_3 of both primary and secondary standards from 0.075 ppm to 0.070 ppm, and retaining their indicators (O_3), forms (fourth-highest daily maximum, averaged across three consecutive years) and averaging times (eight hours). On April 12, 2010, EPA implemented a 1-hour standard for NO_2 of 100 parts per billion (ppb).

Pursuant to the 1990 CAA Amendments (CAAA), EPA classified air basins (or portions thereof) as either attainment or nonattainment areas for each criteria air pollutant based on whether or not the NAAQS have been achieved. The CAA also required each state to prepare an air quality control plan (State Implementation Plan [SIP]). The 1990 amendments additionally required states containing areas that violate NAAQS to revise their SIPs to incorporate additional control measures to reduce air pollution. EPA has the responsibility to review all SIPs to determine if they conform to the mandates of the CAAA and will achieve air quality goals when implemented.

Regulation of TACs (HAPs under Federal regulations) is achieved through Federal and state controls on individual sources. Federal law defines HAPs as non-criteria air pollutants with short-term (acute) and/or long-term (chronic or carcinogenic) adverse human health effects. The 1977 CAA required EPA to identify National Emission Standards for Hazardous Air Pollutants (NESHAPs) to protect public health and welfare.

The 1990 CAAA offer a technology-based approach to reducing air toxics. Since the CAAA were approved, 188 chemicals have been designated as HAPs and are regulated under a two-phase strategy. The first phase involves requiring facilities to install Maximum Achievable Control Technology (MACT), which includes measures, methods, and techniques—such as material substitutions, work practices, and operational improvements—aimed at reducing toxic air emissions. MACT is the lowest emission rate, or highest level of control demonstrated, on average by the top performing companies (top 12 percent) in the source category. MACT standards already exist for the 174 source categories: 166 major sources and eight area sources. Under the air toxics program, facilities having similar

operating processes are grouped into categories. These MACTs were promulgated in four "bins" of years: 1992, 1994 (39 categories), 1997 (62 categories), and 2000 (67 categories). MACT standards for municipal solid waste landfills were promulgated on May 23, 2002. As of August 2003, MACT standards have been made for 174 source categories and their subcategories.

State

California Air Resources Board (CARB)

CARB, a department of the California Environmental Protection Agency (CalEPA), oversees air quality planning and control throughout California by administering the SIP. Its primary responsibility lies in ensuring implementation of the 1989 amendments to the California Clean Air Act (CCAA), as well as responding to the Federal CAA requirements and regulating emissions from motor vehicles sold in California. It also sets fuel specifications to further reduce vehicular emissions.

The amendments to the CCAA establish the CAAQS and a legal mandate to achieve these standards by the earliest practical date. These standards apply to the same criteria pollutants as the Federal CAA, and also include sulfate, VRPs, hydrogen sulfide and vinyl chloride (refer to Table 4.3-1). They are also more stringent than the Federal standards. The SJVAB is designated as nonattainment for the State ozone and PM_{10} standards. Concentrations of all other pollutants meet state standards.

CARB is also responsible for regulations pertaining to TACs. The Air Toxics "Hot Spots" Information and Assessment Act (Assembly Bill [AB] 2588, 1987, Connelly) was enacted in 1987 as a means to establish a formal air toxics emission inventory risk quantification program. AB 2588, as amended, establishes a process that requires stationary sources to report information regarding the type and quantities of certain substances their facilities routinely release into the SJVAB. Each air pollution control district ranks the data into high, intermediate and low priority categories. When considering the ranking, the potency, toxicity, quantity, volume and proximity of the facility to receptors are given consideration by an air district.

CARB also has on- and off-road engine emission-reduction programs that would indirectly affect the project's emissions through the phasing in of cleaner on- and off-road engines. In addition, CARB has a Portable Equipment Registration Program that allows owners or operators of portable engines and associated equipment to register their units under a statewide program, with specified emission requirements, without having to obtain individual permits from local air districts.

The state recently enacted a new regulation for the reduction of diesel particulate matter and criteria pollutant emissions from in-use off-road diesel-fueled vehicles (13 CCR Article 4.8, Chapter 9, Section 2449). This regulation provides target emission rates for particulate matter and NO_X emissions for owners of fleets of diesel-fueled off-road vehicles. It applies to equipment fleets of three specific sizes, and the target emission rates are reduced over time.

Title V and Extreme Designation

Title V of the CAA, as amended in 1990, creates an operating permits program for certain defined sources. In general, owner/operators of defined stationary sources that emit more than 25 tons per

year of NO_X and ROG must possess a Title V permit. Title V is a federally enforceable state operating permit that is required under 40 CFR, Part 70. The Title V programs are developed at the state or local level, as outlined in 40 CFR 70.

Under the extreme definition, the definition of a major source subject to Title V permitting changes from 25 to 10 tons per year, which results in more businesses having to comply with Title V permitting requirements under the extreme nonattainment designation.

Title V does not impose any new air pollution standards, require installation of any new controls on the affected facilities, or require reductions in emissions. Title V does enhance public and EPA participation in the permitting process and requires additional recordkeeping and reporting by businesses, which results in significant administrative requirements.

Within the entire SJVAB, which includes eight counties, the SJVAPCD estimated that the reclassification to extreme nonattainment, added 150 businesses (excluding agricultural facilities) for a total of 420 facilities currently subject to Title V. These numbers compare to a total of approximately 7,000 facilities that are under permit with the SJVAPCD basin-wide.

Local

Metropolitan Bakersfield General Plan (MBGP)

The Metropolitan Bakersfield General Plan (MBGP) cites policies to provide decision-makers with long-range guidance affecting the future character of the Metropolitan Bakersfield planning area. The elements within the MBGP provide goals, policies, and implementation measures in order to reduce impacts of projects on air quality. Applicable goals relative to the proposed Project site within these elements are listed in Table 4.3-4, *Metropolitan Bakersfield General Plan Goals and Policies for Air Quality*.

Table 4.3-4. Metropolitan Bakersfield General Plan Goals and Policies for Air Quality

Goals and Policies: Conservation/Air Quality Element
Conservation/Air Quality Goal #1: "Promote air quality that is compatible with health, well being, and enjoyment of life by controlling point sources and minimizing vehicular trips to reduce air pollutants."
Conservation/Air Quality Goal #2: Continue working toward attainment of Federal, State and Local standards as enforced by the San Joaquin Valley Air Pollution Control District."
Conservation/Air Quality Goal #3: "Reduce the amount of vehicular emissions in the planning area."
Conservation/Air Quality Element Policies
Conservation/Air Quality Policy #1: "Comply with and promote San Joaquin Valley Unified Air Pollution Control District (SJVAPCD) control measures regarding Reactive Organic Gases (ROG). Such measures are focused on: (a) steam driven well vents, (b) Pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test stations, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance."
Conservation/Air Quality Policy #2: "Encourage land uses and land use practices which do not contribute significantly to air quality degradation."

Table 4.3-4. Metropolitan Bakersfield General Plan Goals and Policies for Air Quality

Goals and Policies: Conservation/Air Quality Element
Conservation/Air Quality Policy #3: "Require dust abatement measures during significant grading and construction operations."
Conservation/Air Quality Policy #4: Consider air pollution impacts when evaluating discretionary permits for land use proposals. Considerations should include: a) Alternative access routes to reduce traffic congestion, b) Development phasing to match road capacities, c) Buffers including increase vegetation to increase emission dispersion and reduce impacts of gaseous or particulate matter on sensitive uses."
Conservation/Air Quality Policy #11: "Improve the capacity of the existing road system through improved signalization and traffic control systems."
Conservation/Air Quality Policy #12: "Encourage the use of mass transit, carpooling and other transportation options to reduce vehicle miles traveled."
Conservation/Air Quality Policy #13: "Consider establishing priority parking areas for carpoolers in projects with relatively large numbers of employees to reduce vehicle miles traveled and improve air quality."
Conservation/Air Quality Policy #14: "Establish park and ride facilities to encourage car pooling and the use of mass transit."
Conservation/Air Quality Policy #16: "Cooperate with Golden Empire Transit [GET] and Kern Regional Transit to provide a comprehensive mass transit system for Bakersfield; require large-scale new development to provide related improvements, such as bus stop shelters and turnouts."
Conservation/Air Quality Policy #18: "Encourage walking for short distance trips through the creation of pedestrian friendly sidewalks and street crossings."
Conservation/Air Quality Policy #19: "Promote a pattern of land uses which locates residential uses in close proximity to employment and commercial services to minimize vehicular travel."

San Joaquin Valley Air Pollution Control District (SJVAPCD)

The Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI) is an advisory document that provides lead agencies, consultants, and project applicants with analysis guidance and uniform procedures for addressing air quality in environmental documents. Local jurisdictions are not required to use the methodology outlined therein. The GAMAQI describes the criteria that the SJVAPCD uses when reviewing and commenting on the adequacy of environmental documents. It recommends thresholds for determining whether projects would have significant adverse environmental impacts, identifies methods for predicting project emissions and impacts, and identifies measures that can be used to avoid or reduce air quality impacts. The GAMAQI includes guidance for analysis for criteria pollutants, particulates, HAPs, and odors for both construction and operations of a project. An update to the GAMAQI was approved on March 19, 2015, and was used as a guidance document for this analysis (SJVAPCD 2015).

There are currently multiple different attainment plans for the SJVAB. These are described in the sections that follow.

1-HOUR EXTREME OZONE ATTAINMENT DEMONSTRATION PLAN

In 2013, the SJVAB had zero violations of the 1-hour O_3 standard established by EPA under the CAA. The SJVAB now meets the 1-hour O_3 standard based on the most recent three-year period air monitoring data (2011-2013). On May 6, 2014, the SJVAPCD submitted a formal request that the EPA determine that the SJVAB has attained the federal 1-hour O_3 standard. In accordance with federal requirements, the SJVAPCD's submittal includes a clean data finding and a finding that attainment is due to permanent and enforceable emissions reductions.

The SJVAPCD developed a 2013 Plan for the Revoked 1-Hour O_3 Standard, which it adopted in September 2013. The modeling confirms that the SJVAB will attain the revoked 1-hour O_3 standard by 2017.

8-HOUR OZONE ATTAINMENT DEMONSTRATION PLAN

The SJVAB is designated as an extreme O3 nonattainment area for the EPA 2008 8-hour O3 standard of 75 parts per billion (ppb). The SJVAPCD is currently in the process of developing an O3 plan to address EPA's 2008 8-hour O3 standard, with attainment required by 2032. Because the SJVAB naturally has high background O3 levels and O3 transport, SJVAPVD faces a regulatory challenge to meet the 2008 8-hour O3 standard.

SJVAPCD adopted the 2007 8-Hour Ozone Plan in April 2007. This plan addresses EPA's 8-hour O3 standard of 84 ppb, which was established by EPA in 1997.

2009 RACT SIP

On April 16, 2009, the Governing Board adopted the Reasonably Available Control Technology Demonstration for Ozone State Implementation Plans (2009 RACT SIP) (SJVAPCD 2009a). In part, the 2009 RACT SIP satisfied the commitment by the SJVAPCD for a new RACT analysis for the 1-hour O3 plan (see discussion of the EPA withdrawal of approval in the Extreme 1-Hour Ozone Attainment Demonstration Plan summary above) and was intended to prevent all sanctions that could be imposed by EPA for failure to submit a required SIP revision for the 1-hour O3 standard. With respect to the 8-hour standard, the plan also assesses the SJVAPCD's rules based on the adjusted major source definition of 10 tons per year (due to the SJVAB's designation as an extreme O3 nonattainment area), evaluates SJVAPCD rules against new Control Techniques Guidelines promulgated since August 2006, and reviews additional rules and rule amendments that had been adopted by the Governing Board since August 17, 2006, for RACT consistency.

2013 PLAN FOR THE REVOKED 1-HOUR OZONE STANDARD

The SJVAPCD developed a plan for EPA's revoked 1-hour O3 standard after the EPA withdrew its approval of the 2004 Extreme 1-Hour Ozone Attainment Demonstration Plan as a result of litigation. As a result of the litigation, the EPA reinstated previously revoked requirements for 1 hour O3 attainment plans. The 2013 plan addresses those requirements, including a demonstration of implementation of Reasonably Available Control Measures and a demonstration of a rate of progress averaging 3 percent annual reductions of ROG or NOX emissions every 3 years. The 2013 Plan for the Revoked 1-Hour Ozone Standard was approved by the Governing Board on September 19, 2013 (SJVAPCD 2013a). Based on implementation of the ongoing control measures, preliminary modeling indicates that the SJVAB will attain the 1-hour O3 standard by 2017, before the final attainment year of 2022 and without relying on long-term measures under CAA Section 182(e)(5) ("black box reductions").

2014 RACT SIP

On June 19, 2014, the SJVAPCD adopted the 2014 Reasonably Available Control Technology Demonstration for the 8-Hour Ozone State Implementation Plan (2014 RACT SIP) (SJVAPCD 2014b). This RACT SIP includes a demonstration that the SJVAPCD rules implement RACT. The plan reviews each of the NOx reduction rules and concludes that they satisfy requirements for stringency, applicability, and enforceability and meet or exceed RACT. The plan's analysis of further ROG reductions through modeling and technical analyses demonstrates that added ROG reductions will not advance SJVAB's O3 attainment. Each ROG rule evaluated in the 2009 RACT SIP, however, has been subsequently approved by the EPA as meeting RACT within the last 2 years. The O3 attainment strategy, therefore, focuses on further NOx reductions.

PM_{10} ATTAINMENT DEMONSTRATION PLAN

A PM10 plan has been adopted and submitted to EPA for review. The 2006 PM10 Plan is a continuation of the SJVAPCD's strategy for achieving the NAAQS for PM10. It is the SIP revision required as a condition of EPA approval of the 2003 PM10 Plan, which became effective June 25, 2004. The SJVAB was recently designated as an attainment area for PM10 under the NAAQS.

On May 19, 2005, the SJVAPCD adopted amendments to the plan to update schedules and emission reductions and align the contingency measure discussion with National requirements. In addition to meeting the requirements of the CAA and containing measures needed to attain the NAAQS at the earliest possible date, this SIP revision is to include an evaluation of the modeling from the California Regional Particulate Air Quality Study and the latest technical information, including inventory and monitoring data.

In September 2007, the SJVAPCD approved a request to redesignate the SJVAB to attainment of the PM10 NAAQS and approve the 2007 PM10 Maintenance Plan. The

maintenance plan and request for redesignation was approved by CARB on October 27, 2007, and submitted to EPA for approval. EPA redesignated the SJVAB to attainment of the PM10 NAAQS and approved the 2007 PM10 Maintenance Plan on September 19, 2008.

$PM_{2.5}$ ATTAINMENT PLANNING

Based on the health studies conducted, PM2.5 is considered to be more adverse to human health than other pollutants. In July 1997, EPA set two PM2.5 standards: a 24-hour standard set at 65 µg/m3 to protect against short-term health impacts and a 12-month (annual) standard set at 15 µg/m3 to protect against longer term impacts. The SJVAB has been designated a nonattainment area for the PM2.5 standards.

The SJVAPCD Governing Board adopted the 2008 PM2.5 Plan on April 30, 2008. This plan is designed to assist the SJVAB in attaining all PM2.5 standards, including the 1997 federal standards, the 2006 federal standards, and the state standard, as soon as possible. On July 13, 2011, the EPA issued a rule partially approving and disapproving the 2008 PM2.5 Plan. Subsequently, on November 9, 2011, the EPA issued a final rule approving most of the plan with an effective date of January 9, 2012. However, the EPA disapproved the plan's contingency measures because they would not provide sufficient emission reductions.

Approved by the Governing Board on December 20, 2012, the 2012 PM2.5 Plan addresses attainment of EPA's 24-hour PM2.5 standard of 35 micrograms per cubic meter (µg/m³) established in 2006. In addition to reducing direct emissions of PM2.5, this plan focuses on reducing emissions of NOX, which is a predominant pollutant in the formation of PM2.5 in the SJVAB. The plan relies on a multilevel approach to reducing emissions through SJVAPCD efforts (industry, the general public, employers, and small businesses) and state/federal efforts (passenger vehicles, heavy-duty trucks, and off-road sources), as well as SJVAPCD and state/federal incentive programs to accelerate replacement of on- and off-road vehicles and equipment. Through compliance with this attainment plan, the SJVAB would achieve attainment of the federal PM2.5 standard by the attainment deadline of 2019, with the majority of the SJVAB actually experiencing attainment well before the deadline. The EPA lowered the PM2.5 standard again in 2012 and is in the process of completing attainment designations.

The Governing Board adopted the 2015 Plan for the 1997 PM2.5 Standard on April 16, 2015. This plan addresses the EPA's annual PM2.5 standard of 15 micrograms per cubic meter (µg/m3) and 24-hour PM2.5 standard of 65 µg/m3 established in 1997. While nearly achieving the 1997 standards, the SJVAB experienced higher $PM_{2.5}$ levels in winter 2013–2014 due to the extreme drought, stagnation, strong inversions, and historically dry conditions; thus, the SJVAPCD was unable to meet the attainment date of December 31, 2015. Accordingly, this plan also contains a request for a one-time extension of the attainment deadline for the 24-hour standard to 2018 and the annual standard to 2020. The plan builds on past development and implementation of effective control strategies. Consistent with EPA regulations for $PM_{2.5}$ plans to achieve the 1997 standards, the plan

contains Most Stringent Measures, Best Available Control Measures, additional enforceable commitments for further reductions in emissions, and ensures expeditious attainment of the 1997 standard.

APPLICABLE NON-STATIONARY SOURCE REGULATIONS

The SJVAPCD's primary means of implementing air quality plans are by adopting and enforcing rules and regulations. Stationary sources within the jurisdiction are regulated by the SJVAPCD's permit authority over such sources and through its review and planning activities. Unlike stationary source projects, which encompass very specific types of equipment, process parameters, throughputs, and controls, air emissions sources from land use development projects such as Grapevine are mainly mobile sources (traffic) and area sources (small dispersed stationary and other non-mobile sources), including exempt (i.e., no permit required) sources such as consumer products, landscaping equipment, furnaces, and water heaters. Mixed-use land development projects may include nonexempt sources including devices such as charbroilers, small to large boilers, stationary internal combustion engines, gas stations, or asphalt batch plants.

Notwithstanding nonexempt stationary sources, which would be permitted on a case-by-case basis, SJVAPCD Regulations VIII and IX generally apply to land use development projects and are described below:

SJVAPCD REGULATION VIII—FUGITIVE PM10 PROHIBITIONS.

Rules 8011–8081 are designed to reduce PM10 emissions (predominantly dust/dirt) generated by human activity, including construction and demolition, road construction, bulk materials storage, use of paved and unpaved roads, and carryout and trackout. Among the Regulation VIII rules applicable to the project are the following:

Rule 8011—General Requirements;

Rule 8021—Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities;

Rule 8031—Bulk Materials;

Rule 8041—Carryout and Trackout;

Rule 8051—Open Areas;

Rule 8061—Paved and Unpaved Roads; and

Rule 8071—Unpaved Vehicle/Equipment Traffic Areas.

REGULATION IX – MOBILE AND INDIRECT SOURCES

Rule 9110 General Conformity

Rule 9120 Transportation Conformity

Rule 9410 Employer Based Trip Reduction

Rule 9510 Indirect Source Review (ISR)

RULE 9510 (INDIRECT SOURCE REVIEW, ADOPTED DECEMBER 15, 2005)

The purpose of the Indirect Source Review (ISR) is to reduce emissions of NOX and PM10 from new development projects. Rule 9510 places application and emission-reduction requirements on certain development projects to reduce emissions through on-site mitigation, off-site SJVAPCD-administered projects, or a combination of the two. Each project proponent is required to submit an air impact assessment application concurrent with the last discretionary approval by the County pursuant to Rule 9510's requirements.

Although compliance with Rule 9510 is separate from the CEQA process, control measures used to comply with the Rule 9510 are considered mitigation to a less-than-significant impact under CEQA.

INDIRECT SOURCE MITIGATION FEE

Indirect sources are land uses that attract or generate motor vehicles trips. Indirect source emissions contain many pollutants, principally PM10, ROG, and NOX. The SJVAPCD included a requirement in the adopted 2003 PM10 Plan to develop and implement an ISR rule by July 2004, with implementation to begin in 2005. The ISR rule went into effect in March 2006. SB 709 required the SJVAPCD to adopt by regulation a schedule of fees to be assessed on area-wide and indirect sources of emissions. After public hearings, the district adopted Rule 9510 on December 15, 2005.

The purpose of Rule 9510 is to reduce emissions of NOX and PM10 from new development projects. The rule applies to development projects that, upon full buildout, seek to gain discretionary approval for any one of the following: 50 residential units, 2,000 square feet of commercial space, 25,000 square feet of light industrial space, 20,000 square feet of medical or recreational space, 39,000 square feet of general office space, 100,000 square feet of heavy industrial space, 9,000 square feet of educational space, 10,000 square feet of government space, or 9,000 square feet of any land use not identified above. Several sources are exempt from the rule, including transportation projects and transit projects (exempt only from Rule 9510 Section 6.2 and Section 7.1.2), reconstruction projects that result from a natural disaster, and development projects whose primary sources of emissions are subject to SJVAPCD Rules 2201 and 2010, which address stationary sources. Any development project that has a mitigated baseline of less than 2 tons per year for NOX

and PM10 is also exempted from the mitigation requirements of the rule. Developers are encouraged to reduce as much air pollution as possible through on-site mitigation or the incorporation of air-friendly designs and practices into the project. Some examples include bike paths and sidewalks; traditional street design; medium- to high-density residential developments; locating near bus stops and bike paths; locating near different land use zones, such as commercial; and increasing energy efficiency. If these practices do not completely meet the required reductions (under the rule), new development projects are required to mitigate the remainder of their emissions by contributing to a mitigation fund that would be used to pay for the most cost-effective projects to reduce emissions. Examples include projects to retire or crush polluting cars, replace older diesel engines, and replace gas-powered lawnmowers with electric lawnmowers.

The ISR requires developers to reduce 20 percent of construction-exhaust NOX, 45 percent of construction-exhaust PM10; 33 percent of operational NOX over 10 years; and 50 percent of operational PM10 over 10 years. The SJVAPCD estimates that the potential reductions from this program in 2010 will be 11.5 tons per day (4,197.5 tons per year) of PM10 and 4.1 tons per day (1,496.5 tons per year) of NOX.

DEVELOPMENT MITIGATION CONTRACT (DMC) AGREEMENTS

A development mitigation contract (DMC) is an air quality mitigation measure by which a developer enters into a contractual agreement with the district to reduce a development project's impact on air quality beyond that achieved by compliance with District Rule 9510. Implementation of the DMC is comparable to implementation of the ISR; project emissions are characterized, funds are paid to the district, and the district administers the funds to secure the required emission-reduction projects. For projects subject to Rule 9510, the DMC must exceed the air quality benefits from compliance with the ISR. Therefore, applicants that enter into a DMC are considered in compliance with District Rule 9510. Examples of emission-reduction projects include projects to retire or crush polluting cars, replace older diesel engines, and replace gas-powered lawnmowers with electric lawnmowers. The SJVAPCD's 2008 annual report on the district's ISR program (June 19, 2008) includes the projects and reductions attributable to Rule 9510, including DMC agreements for combined on- and off-site emission reductions, totaling 2,078 tons of NOX and 1,087 tons of PM10.

LOCAL CONTROL MEASURES

The SJVAPCD requires all local governments within its eight-county jurisdiction to adopt resolutions as part of the Extreme OADP that must be approved by EPA. The resolutions describe the reasonably available control measures that each jurisdiction will implement to reduce O3-causing emissions into the air from transportation sources. Local jurisdictions are also required to adopt best available control technology (BACT) measures to reduce particle emissions as part of the PM10 Area Attainment Demonstration Plan. This process is coordinated and assisted by regional transportation planning agencies, such as the Kern Council of Governments (Kern COG).

The Kern County Board of Supervisors adopted a resolution on March 12, 2002, that committed the County to implementing several measures to reduce O3-causing emissions. Among the measures are cost incentives for road contractors to minimize land closures, transit-oriented land use planning, and measures to encourage County employees and other motorists to restrict driving on days with high O3 levels as well as continuing efforts to convert County vehicles to low-emission compressed natural gas and gasoline/electric hybrid engines. Many of these measures have been incorporated as general plan update policies.

The Kern County Board of Supervisors adopted a resolution on January 7, 2003, that committed the County to implementing several measures aimed at reducing PM10 emissions from County roadways. Among the measures are plans to determine the feasibility of paving the County's unpaved roads, which are lightly traveled, paving the shoulders of the most heavily traveled paved County roads as funding allows, and purchasing two PM10-compliant street sweepers as funding allows. The resolution also committed the County to imposing tougher rules for cancelling road improvements on large rural parcels; requiring public and private access roads for new commercial and industrial development to be paved; evaluating the adverse air quality impacts of new development and, where appropriate, requiring mitigation measures; implementing policies that require developers to control and abate dust during grading and construction operations; and, to receive a permit for expansion or a significantly altered use, requiring unpaved parking and storage areas of commercial and agricultural operations in County areas to be paved.

APPLICABLE STATIONARY SOURCE REGULATIONS

The SJVAPCD has primary responsibility for regulating stationary sources of air pollution situated within its jurisdictional boundaries. To this end, the SJVAPCD implements air quality programs required by state and Federal mandates, enforces rules and regulations based on air pollution laws, and educates businesses and residents about its role in protecting air quality. The SJVAPCD is also responsible for managing and permitting existing, new, and modified sources of air emissions within the SJVAB and establishing the following rules and regulations to ensure compliance with local, state, and National air quality regulations.

RULE 2010 (PERMITS REQUIRED)

Rule 2010 requires that an Authority to Construct permit (a new source review permit) and a Permit to Operate be obtained prior to constructing, altering, replacing, or operating any device that emits or may emit air contaminants.

RULE 2020 (EXEMPTIONS)

Rule 2020 specifies criteria that emission units must meet to be exempt from SJVAPCD permit requirements. The rule also specifies the recordkeeping requirements to verify the

exemption and outlines the compliance schedule for emission units that lose the exemption after installation. Rule 2020 applies to any source that emits or may emit air contaminants.

RULE 2070 (EXEMPTIONS)

Rule 2070 sets forth the standards that must be met for a permit to be issued by the SJVAPCD. The rule applies to any activity required to obtain a permit according to Rule 2010 (Permits Required).

RULE 2201 (NEW AND MODIFIED STATIONARY SOURCE REVIEW RULE)

The stated purpose of Rule 2201 is to provide for the review of new and modified stationary sources of air pollution and to provide mechanisms, including emission trade-offs, by which authority to construct such sources may be granted without interfering with the attainment or maintenance of ambient air quality standards. The SJVAPCD new source review rule applies to all new stationary sources and all modifications to existing stationary sources that are subject to SJVAPCD permit requirements. The rule generally requires that new or modified equipment include BACT and that emission increases above specified thresholds be offset.

RULE 2520 (TITLE V FEDERALLY MANDATED OPERATING PERMITS)

Rule 2520 serves as the SJVAPCD's mechanism for issuing, renewing, revising, revoking, and terminating operating permits for sources of air contaminants in accordance with the requirements of Title 40, Part 70, of the Code of Federal Regulations (CFR). This rule defines the sources that require federally mandated operating permits, as well as the content of these permits. Federally mandated operating permits are required for all major sources of air pollutants, as well as other sources listed in Section 2.0 of the rule. Generally, the federally mandated operating permits include emission limitations and standards for federal criteria pollutants (ROG, NOx, CO, SOx, PM10, PM2.5, and lead), new source performance standards, and recordkeeping and reporting requirements. This rule requires that the SJVAPCD combine all federal and state applicable standards into one permit for each facility, and that the permit indicate where state standards exceed federal standards.

SJVAPCD Rule 2520 applies to major stationary sources of air contaminants and to major sources of HAPs. Major sources of air contaminants are generally considered to be sources that emit 100 tons per year of a regulated air pollutant, without considering fugitive emissions. To be considered major for HAPs, a source must emit 10 tons per year or more of a single HAP or 25 tons per year or more of HAPs in aggregate.

RULE 2530 (FEDERALLY ENFORCEABLE POTENTIAL TO EMIT)

The purpose of Rule 2530 is to restrict a stationary source's potential to emit so that a source may be exempt from the requirements of Rule 2520 (Federally Mandated Operating Permits). This rule applies to any stationary source that is a major source of regulated air pollutants or of hazardous air pollutants but with limitations would be exempt from Rule 2520. This exemption provides stationary sources in the SJVAPCD with a separate option to comply with air quality restrictions. Rule 2530 also includes recordkeeping and reporting requirements. Rule 2530 allows facilities to be excluded from the Title V program (see Rule 2520) by taking limits or keeping records to demonstrate that their emissions are below the applicable thresholds. This process is also referred to as a "synthetic minor."

RULE 2550 (FEDERALLY MANDATED PRECONSTRUCTION REVIEW FOR MAJOR SOURCES OF AIR TOXICS)

Rule 2550 provides an administrative mechanism for applying the requirements of 40 CFR 63.40–63.44 at major sources of hazardous air pollutants that have Authority to Construct permits for new construction or reconstruction. Rule 2550 requires that new or reconstructed sources use Toxic Best Available Control Technology, with some exceptions.

RULE 4001 (NEW SOURCE PERFORMANCE STANDARDS)

Rule 4001 codifies the SJVAPCD's adoption and incorporation of the New Source Performance Standards as set forth in 40 CFR 60. New Source Performance Standards apply to a variety of different types of stationary sources, including asphalt plants. The regulation imposes emissions standards for certain pollutants and requires that specified emission control equipment and monitoring devices be installed at all new, modified, or reconstructed facilities to limit emissions. The regulation also includes test methods and procedures, as well as monitoring, notification, and recordkeeping requirements.

RULE 4002 (NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS)

Rule 4002 incorporates the National Emission Standards for Hazardous Air Pollutants (NESHAPs) as set forth in 40 CFR 61, and the NESHAPs for source categories as set forth in 40 CFR 63. 40 CFR 61 includes emission standards for several known toxic air pollutants, such as beryllium, mercury, and vinyl chloride. 40 CFR 63 regulates the NESHAP by source categories. Both regulations also include test methods and procedures, as well as monitoring, notification, and recordkeeping requirements.

RULE 4101 (VISIBLE EMISSIONS)

Rule 4101 prohibits the emissions of visible air contaminants to the atmosphere. The rule applies to any source operation that emits or may emit air contaminants.

RULE 4102 (PUBLIC NUISANCE)

The purpose of Rule 4102 is to protect the health and safety of the public. The rule applies to any source operation that emits or may emit air contaminants or other materials and prohibits from any source whatsoever the discharge emissions of air contaminants or other materials that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or that endanger the comfort, repose, health, or safety of any such person or the public or that cause or have a natural tendency to cause injury or damage to business or property.

RULE 4201 (PARTICULATE MATTER CONCENTRATION)

Rule 4201 establishes a particulate matter emission standard and applies to any source operation that emits or may emit dust, fumes, or total suspended particulate matter. The rule prohibits the release or discharge into the atmosphere from any single source operation, dust, fumes, or total suspended particulate matter emissions in excess of 0.1 grain per cubic foot of gas at dry standard conditions.

RULE 4801 (SULFUR COMPOUNDS)

Rule 4801 limits the emission of sulfur compounds and applies to any discharge to the atmosphere of sulfur compounds that would exist as a liquid or a gas at standard conditions. The rule prohibits the discharge of sulfur compounds into the atmosphere in concentrations greater than 2,000 parts per million by volume (ppmv) as SO2 on a dry basis averaged over 15 consecutive minutes.

Air Quality Conformity Determination for Transportation Plans and Programs

The federal CAA amendments of 1990 require a finding be made that any project, program, or plan subject to approval by a metropolitan planning organization conforms to air plans for attainment of air quality standards. Kern COG is designated the Regional Transportation Planning Agency and a Metropolitan Planning Organization for Kern County. In that capacity, Kern COG models air quality projections based on population projections in conjunction with current general plan designations and estimated vehicle miles in conjunction with the current Regional Transportation Plan (RTP) and the Federal Transportation Plan (FTP) for Kern County. These results are compared to pollutant budgets for each basin approved by EPA in the 1999 base year. Kern County is contained within two air basins: SJVAB and the Mojave Desert Air Basin. Each air basin has its own plans and pollutant budgets. Kern COG makes conformity findings for each air basin.

Kern County recently prepared a draft 8-Hour Ozone Air Quality Conformity Analysis to analyze Kern County's federally approved Federal Transportation Improvement Program (FTIP) and the Destination 2030 RTP. Changes to the NAAQS for ozone from a one-hour measurement to an eight-hour measurement have triggered the need for this analysis. The FTIP for the Kern County region is a six-year schedule of multimodal transportation improvements, and the RTP is a long-range, 26-year transportation plan. The conformity findings conclude that the FTIP and RTP result in emissions that are less than the emission budgets of baseline emissions for CO, VOC, NO_x, and PM_{10} (Kern Council of Governments [Kern COG] 2005).

4.3.4 Impacts and Mitigation Measures

This section describes the air quality significance thresholds, the air quality methodology used to evaluate whether the proposed Project would exceed the thresholds, and an evaluation of the proposed Project's impacts.

Methodology

The Air Quality Impact Analysis was prepared pursuant to the GAMAQI (SJVAPCD 2015) and the Kern County Air Quality Assessment Preparation Guidelines of the Kern County CEQA Implementation Document (December 2006). The County guidance was developed by the Kern County Planning and Natural Resources Department to assist with the preparation of the air quality assessments for use as a technical document in EIRs. This County guidance, called the "Guidelines for Preparing Air Quality Assessments for Use in EIRs" is intended to ensure that the assumptions and methodology used in the County's environmental documents are uniform from one project to the next to facilitate the comparison of air quality environmental effects. The County guidance states that the most recent air quality guidance documents from the SJVAPCD, such as the GAMAQI, must be used and referenced in the preparation of an air quality assessment and that the latest version of all models must be used for the appropriate application. It also notes that where the Kern County Planning and Natural Resources Department guidelines require quantification and the SJVAPCD does not; therefore, for purposes of CEQA, the Kern County Planning and Natural Resources Department guidelines must be followed.

Kern County guidance states that an air quality assessment should include estimates of short-term construction emissions in tons per year. The estimates must include site grading and building construction emissions, with comparison to the adopted County CEQA thresholds and the applicable air district (SJVAPCD for western Kern County) thresholds. Per the County's guidance, all assumptions should be clearly presented, including length of each construction phase, equipment that will be used during each phase, and the amount of soil disturbance, including any import or export of soil. The emission factors used to estimate emissions should be clearly documented, and the model output should be included in the report.

The SJVAPCD guidance, GAMAQI, states that the latest SJVAPCD-approved models should be used to conduct an air quality analysis. The current recommended model to estimate potential project-generated criteria air pollutant emissions from construction is the California Emissions Estimator Model (CalEEMod), Version 2013.2.2 (available on-line at www.caleemod.com). CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government

agencies, land use planners, and environmental professionals to quantify potential criteria air pollutant emissions from a variety of land use projects.

The GAMAQI identifies thresholds that separate a project's short-term and long-term emissions. The CalEEMod standard defaults were applied for the emissions estimates except for the following (Insight Environmental Consultants 2016):

- Land use size and lot acreage was adjusted to match the project description;
- Construction schedule was estimated for each construction phase;
- Average daily traffic numbers were adjusted based on data from the Traffic Study (July 2017); and
- Demolition construction phase was removed.

Short-term, emissions are primarily from the construction phase a project and are recognized to be short in duration and without lasting impacts on air quality.

The Air Quality Impact Assessment applied the default CalEEMod equipment list, many variables are factored into the calculation of construction emissions such as length of the construction period, number of each type of equipment, site characteristics, area climate, and construction personnel activities. All equipment was assumed to be in use for the proposed Project specified hours per day and load SJVAPCD's required measures for all project include: (1) water exposed area three times per day; and (2) reduce vehicle speed to less than 15 miles per hour.

Thresholds of Significance

The Kern County California Environmental Quality Act (CEQA) Implementation Document and Kern County Environmental Checklist state that a project could potentially have a significant effect if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard as adopted in (c) i or (c) ii, or as established by EPA or an air district, or contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable National or State ambient air quality standard (including emissions that exceed quantitative thresholds for ozone precursors). Specifically, would implementation of the project exceed any of the thresholds outlined in Table 4.3-5, *Proposed Project Air Quality Thresholds of Significance by Air Basin*?

Table 4.3-5. Proposed Project Air Quality Thresholds of Significance by Air Basin

Air Basin	Criteria Pollutant					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$

SJVAB[1]						
Construction Sources (tons/year)	10	10	100	27	15	15
Operations Sources (tons/year)	10	10	100	27	15	15
MDAB[2]						
Operations Daily Mobile Sources (lbs/day)	137	137	--	--	--	--
Operations Sources (tons/year)	25	25	NA	27	15	15

NA = not applicable.
Sources: 1) SJVAPCD, 2015a.
2) EKAPCD, 1999.

- Expose sensitive receptors to substantial pollutant concentrations.
- Cause the creation of objectionable odors, affecting a substantial number of people.

Kern County has adopted the SJVAPCD's quantitative emission thresholds for NO_X and ROG to determine whether the potential air quality impacts of a project may produce a significant impact. The air quality threshold for ROG and NO_X is 10 tpy. For PM_{10}, the County has adopted a threshold of significance that is consistent with the SJVAPCD's fugitive dust control rules (Regulation VIII). For CO, no regional emission thresholds have been established.

Project Impacts

Impact 4.3-1: The Project Would Not Be Consistent with the Air Quality Attainment Plan.

Air quality impacts from proposed projects within Kern County are controlled through policies and provisions of the SJVAPCD, KCGP, and MBGP (Insight Environmental Consultants 2017). Each project should also demonstrate consistency with the SJVAPCD's adopted Air Quality Attainment Plans (AQAP) for ozone and PM_{10}. The SJVAPCD is required to submit a "Rate of Progress" document to the CARB that demonstrates past and planned progress toward reaching attainment for all criteria pollutants. The CCAA requires air pollution control districts with severe or extreme air quality problems to provide for a five percent reduction in nonattainment emissions per year. The AQAP prepared for the San Joaquin Valley by the SJVAPCD complies with this requirement. The CARB reviews, approves, or amends the document and forwards the plan to the EPA for final review and approval within the State Implementation Plan (SIP).

Air pollution sources associated with stationary sources are regulated through the permitting authority of the SJVAPCD under the "New and Modified Stationary Source" rule (SJVAPCD Rule 2201). Owners of any new or modified equipment that emits, reduces, or controls air contaminants, except those specifically exempted by the SJVAPCD, are required to apply for an Authority to Construct and Permit to Operate (SJVAPCD Rule 2010). Additionally, best available control technology (BACT) is required on specific types of stationary equipment and are required to offset both stationary source emission increases along with increases in cargo carrier emissions if the specified threshold levels are exceeded (SJVAPCD Rule 2201, 4.7.1). Through this mechanism, the SJVAPCD ensures that all stationary sources within the proposed Project area would be subject to the standards of the SJVAPCD and that new developments do not result in net increases in stationary sources of criteria air pollutants.

Required Evaluation Guidelines

CEQA Guidelines and the Federal CAA (Sections 176 and 316) contain specific references on the need to evaluate consistencies between the proposed Project and the applicable AQAP for the proposed Project site. To accomplish this, the CARB has developed a three-step approach to determine proposed Project conformity with the applicable AQAP:

1. Determination that an AQAP is being implemented in the area where the project is being proposed. The SJVAPCD has implemented the current, modified, AQAP as approved by the CARB. The current AQAP is under review by the EPA.

2. The proposed Project must be consistent with the growth assumptions of the applicable AQAP. The proposed Project is included within the employment increases projected in the KCGP and MBGP.

3. The proposed Project must contain in its design all reasonably available and feasible air quality control measures. The proposed Project incorporates various policy and rule-required implementation measures that will reduce related emissions.

The CCAA and AQAP identify transportation control measures as methods to further reduce emissions from mobile sources. Strategies identified to reduce vehicular emissions, such as reductions in vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, and traffic congestion in order to reduce vehicular emissions, can be implemented as control measures under the CCAA as well. Additional measures may also be implemented through the building process, such as providing electrical outlets on exterior walls of structures to encourage use of electrical landscape maintenance equipment or measures such as electrical outlets for electrical systems on diesel trucks to reduce or eliminate idling time.

Since the growth represented by the proposed Project was anticipated by the KCGP and MBGP and incorporated into the AQAP, conclusions may be drawn from the following criteria:

- The findings of the analysis conducted using Traffic Analysis Zones show that sufficient employment increases are planned for the proposed Project area;

- That, by definition, the emissions from the proposed Project are below the SJVAPCD's established emissions impact thresholds; and

- That the primary source of emissions from the proposed Project would be on-road trucks that are licensed through the State of California and whose emissions are already incorporated into the CARB's San Joaquin Valley Emissions Inventory.

Based on these factors, the proposed Project is consistent with the AQAP.

Consistency with Kern Council of Government's Regional Conformity Analysis

The Kern COG Regional Conformity Analysis Determination demonstrates that the regional transportation expenditure plans (Destination 2030 Regional Transportation Plan and Federal

Transportation Improvement Program) in the Kern County portion of the San Joaquin Valley air quality attainment areas would not hinder the efforts set out in the CARB's SIP for each area's nonattainment pollutants (CO, ozone, and PM_{10}). The analysis uses an adopted regional growth forecast governed by both the adopted Kern COG Policy and Procedure Manual and a Memorandum of Understanding between Kern County and Kern COG (representing itself and outlying municipal member agencies).

The Kern COG Regional Conformity Analysis considers general plan amendments (GPAs) and zone changes (ZCCs) that were enacted at the time of the analysis as projected growth within the area based on land use designations incorporated within the KCGP and MBGP. Land use designations that are altered based on subsequent GPAs that were not included in the regional conformity analysis were not incorporated into the Kern COG analysis. Consequently, if a proposed project is not included in the regional growth forecast using the latest planning assumptions, it may not be said to conform to the regional growth forecast. Under the current Kern County zoning, the proposed Project site is designated as A (Exclusive Agriculture) and would be included in the regional growth forecast.

> Item 2 under Section 3 of the Model Maintenance Procedure of the Kern COG Regional Transportation Modeling Policy and Procedure Manual, states:
>
> Land Use Data - General Plan land capacity data or "Build-out capacity" is used to distribute the forecasted County totals, and may be updated as new information becomes available, and is revised in regular consultation with local planning departments.

Under current policies, only after a GPA is approved can housing and employment assumptions be updated to reflect capacity changes. Since the proposed Project requires a GPA from R-IA (Resource-Intensive Agriculture) to LI (Light Industrial), SI (Service Industrial), GC (General Commercial), and HC (Highway Commercial). The existing growth forecast would eventually be modified to reflect these changes.

In addition, a review of the Kern COG regional forecast was prepared to evaluate if the proposed Project area growth forecast would be sufficient for the proposed Project's projected employment increase. The adopted growth forecasts are assigned to Traffic Analysis Zones (TAZs). A review of the growth forecast for a six-mile radius from the proposed Project was conducted (Insight Environmental Consultants 2017). Table 4.3-6, *TAZ Analysis Area Projected Growth Analysis*, shows the TAZ growth forecast data for the proposed Project's six-mile radius. Table 4.3-7 *Percent Increase/Decrease on TAZ Analysis Area* shows the percent increase or decrease for the six-mile radius regarding population, households and employment.

Table 4.3-6. TAZ Analysis Area Projected Growth Analysis

	Years		
	2015	2020	2030
Population	128,388	136,471	164,550
Households	37,429	40,811	49,703

Table 4.3-6. TAZ Analysis Area Projected Growth Analysis			
	Years		
	2015	2020	2030
Employment	27,895	29,744	33,690
Source: Insight Environmental Consultants 2017.			

Table 4.3-7. Percent Increase/Decrease on TAZ Analysis Area			
Years	Percent Increase / Decrease		
	Population	Households	Employment
2015*	0	0	0
2020	6	9	7
2030	28	33	21
Source: Insight Environmental Consultants 2017.			

The proposed Project is consistent with the existing land use designation and is currently located within an existing TAZ. There is sufficient employment growth forecast to account for employment growth by 2030. The proposed Project would be considered consistent with the adopted growth forecast and, therefore, consistent with the regional air quality conformity.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.3-2: The Project Would Violate Any Air Quality Standard as Adopted or Established by EPA or Air District or Contribute Substantially to an Existing or Projected Air Quality Violation.

Short-Term (Construction) Emissions

Generally short-term impacts refer to those impacts that occur during the construction phase of the proposed Project are temporary in nature without lasting impacts on air quality. Primarily this phase results in particulate emissions from the construction related activities including fugitive dust and other particulate matter, as well as exhaust emissions generated by earthmoving activities and operation of grading equipment during site preparation. Construction emissions are caused by on-site or off-site activities. On-site emissions principally consist of exhaust emissions (NO_x, SO_x, CO, ROG, PM_{10}, and $PM_{2.5}$) from heavy-duty construction equipment, motor vehicle operation, and fugitive dust

(mainly PM_{10}) from disturbed soil. Off-site emissions are caused by motor vehicle exhaust from delivery vehicles, as well as worker traffic, but also include road dust (PM_{10}). Major construction-related activities include the following:

- Grading/clearing, including the excavation;
- Excavation and earth moving for infrastructure construction of the utilities, both on and off-site, and dwelling unit foundations and footings;
- Building construction;
- Asphalt paving of access roads throughout the development; and
- Application of architectural coatings on surfaces such as dwelling stucco and interior painting.

Construction equipment such as scrapers, bulldozers, forklifts, backhoes, water trucks, and industrial saws are expected to be used on the proposed Project site and would result in exhaust emissions consisting of CO, NO_x, ROG, SO_x, PM_{10}, and $PM_{2.5}$. During the finishing phase, paving operations and application of architectural coatings would release ROG emissions. Construction emission can vary substantially from day to day, depending on the level of activity, the specific type of operation, and prevailing weather conditions.

Kern County requires that PM_{10} emissions from construction activities be included with the operational impacts of the proposed Project.

Regulation VIII Control Measures (From Table 6-2 of the SJVAPCD GAMAQI):

- All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/ suppressant, covered with a tarp or other suitable cover or vegetative ground cover.
- All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.
- All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by presoaking.
- With the demolition of buildings up to six stories in height, all exterior surfaces of the building shall be wetted during demolition.
- When materials are transported off-site, all material shall be covered, or effectively wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container shall be maintained.

- All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. (The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions.) (Use of blower devices is expressly forbidden.)

- Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.

- Within urban areas, an owner/operator shall prevent carryout and trackout, or immediately remove carryout and trackout when it extends 50 feet or more from the nearest unpaved surface exit point of the site.

- Any construction site with 150 or more vehicle trips per day shall prevent carryout and track-out.

Enhanced and Additional Control Measures for Construction Emissions of PM_{10}:

Enhanced Control Measures - Measures to be implemented at construction sites when required to mitigate significant PM_{10} impacts:

- Limit traffic speeds on unpaved roads to 15 miles per hour;

- Shut down equipment when not in use for extended periods;

- Construction equipment shall operate no longer than eight (8) cumulative hours per day; and

- Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.

Additional Control Measures - Measures that are encouraged at large construction sites located near sensitive receptors, or for projects requiring additional emissions reductions:

- Track out will be prevented by one of the following:

    - A Grizzly with rails, pipes or grates to dislodge debris off exiting vehicles;

    - A layer of washed gravel at one inch or larger in diameter, three inches deep;

    - Extension of paved road at least 100 feet from publicly maintained road; or

    - Installation of a wheel washer.

- Install wind breaks at windward side(s) of construction areas;

- Suspend excavation and grading activity when winds exceed 20 mph (Regardless of wind speed, an owner/operator must comply with Regulation VIII's 20 percent opacity limitation); and

- Limit area subject to excavation, grading, and other construction activity at any one time.

The precise construction details for the proposed Project were unknown at the time of the Air Quality Impact Analysis (Insight Environmental Consultants 2016; refer to Appendix C). The Air Quality Impact Analysis assumed default construction equipment list. All equipment was assumed to be in use for the proposed Project specified hours per day and load factors. SJVAPCD's required measures for all projects include: (1) water exposed area three-times per day; and (2) reduce vehicle speed to less than 15 miles per hour. Refer Appendix C for CalEEMod results.

Table 4.3-8, *Construction Emissions*, presents the proposed Project's unmitigated and mitigated short-term emissions based on the expected full buildout period for the proposed Project.

Table 4.3-8. Construction Emissions

Emissions Source	Pollutant (tons/year)					
	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Unmitigated						
Year 2016	0.20	1.84	1.50	0.002	0.30	0.18
Year 2017	3.71	3.35	3.56	0.006	0.39	0.23
Year 2018	3.82	4.47	4.72	0.009	0.64	0.36
Year 2019	0.26	2.26	2.37	0.004	0.39	0.21
Year 2020	3.47	1.61	2.06	0.004	0.22	0.11
Year 2021	3.67	3.25	4.19	0.009	0.56	0.29
Year 2022	0.20	1.61	2.12	0.004	0.35	0.18
Year 2023	3.43	1.17	1.90	0.004	0.19	0.09
Year 2024	3.60	2.49	3.90	0.009	0.51	0.24
Mitigated						
Year 2016	0.20	1.84	1.50	0.002	0.20	0.13
Year 2017	3.71	3.35	3.56	0.006	0.39	0.23
Year 2018	3.82	4.47	4.72	0.009	0.54	0.32
Year 2019	0.26	2.26	2.37	0.004	0.29	0.17
Year 2020	3.47	1.61	2.06	0.004	0.22	0.11
Year 2021	3.67	3.25	4.19	0.009	0.46	0.24
Year 2022	0.20	1.61	2.12	0.004	0.25	0.13
Year 2023	3.43	1.17	1.90	0.004	0.19	0.09
Year 2024	3.60	2.49	3.90	0.009	0.41	0.19
SJVAPCD Threshold	10	10	100	27	15	15
Is Threshold Exceeded After Mitigation?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Source: Insight Environmental Consultants, 2017.

As calculated by CalEEMod using the default equipment list (refer to Appendix C), the short-term emissions for each year of construction are predicted to be below the SJVAPCD threshold levels and less than significant. Even though emissions would be below the threshold of significance, the Air Quality Impact Assessment also analyzed the emission levels with the incorporation of mitigation measures. The mitigated short-term emissions from the proposed Project (as calculated by CalEEMod) using the default equipment listing, would not exceed the SJVAPCD significance levels and the levels would be the same except for PM_{10} and $PM_{2.5}$; however, mitigation would further

reduce emission levels for PM_{10} and $PM_{2.5}$. With the implementation of mitigation measures, impacts would be less than significant in this regard.

Long-Term (Operational) Impacts

Long-term (operational) emissions are caused by operational mobile, area and energy sources. Table 4.3-9 *Operational Emissions* presents operational emissions for post-project conditions, approximately year 2025. The table depicts operational emissions with and without mitigation.

Table 4.3-9. Operational Emissions

Emissions Source	Pollutant (tons per year)*					
	ROG	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Unmitigated Emissions						
Area Source Emissions	12.96	0.0002	0.03	0.00	0.0001	0.0001
Energy Source Emissions	0.30	2.74	2.30	0.002	0.21	0.21
Mobile Source Emissions	22.40	70.27	288.17	0.67	33.51	10.02
Total Unmitigated Long-Term Emissions	**35.65**	**73.01**	**290.50**	**0.69**	**33.72**	**10.23**
SJVAPCD and Kern County Annual Threshold	**10**	**10**	**100**	**27**	**15**	**15**
Is the Threshold Exceeded Before Mitigation?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**
Mitigated Emissions						
Area Source Emissions	11.79	0.0002	0.03	0.00	0.0001	0.0001
Energy Sources Emissions	0.30	2.74	2.30	0.02	0.21	0.21
Mobile Source Emissions	21.46	63.92	275.48	0.59	29.15	8.72
Rule 9510 – ISR Compliance Reduction	-	(17.96)	-	-	(12.50)	-
Total Mitigated Long-Term Emissions	**33.55**	**48.70**	**277.80**	**0.61**	**16.86**	**8.93**
SJVAPCD and Kern County Annual Threshold	**10**	**10**	**100**	**27**	**15**	**15**
Is the Threshold Exceeded After Mitigation?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**No**

Notes:
* 0.00 may represent zero or emissions less than 0.005.

Source: Insight Environmental Consultants 2017.

As calculated by the CalEEMod, operational emissions would exceed the SJVAPCD threshold levels for ROG, NO_x, CO, and PM_{10}. Even with the incorporation of Mitigation Measures, long-term air quality operational impacts would be significant and unavoidable.

Fugitive Dust Emissions

Operations of the Project site at full buildout is not expected to present a significant source of fugitive dust (PM_{10}) emissions. The main source of PM_{10} emissions would be from project-related vehicular traffic from employees and consumers driving to and from the proposed Project site. PM_{10} on its own as well as in combination with other pollutants creates a health hazard. The SJVAPCD's Regulation VIII establishes required controls to reduce and minimize fugitive dust emissions. The following SJVAPCD Rules and Regulations apply to the proposed Project (as discussed above in Section 4.3.3, *Regulatory Setting*).

- Rule 4102 – Nuisance

- Regulation VIII – Fugitive PM_{10} Prohibitions
- Rule 8011 – General Requirements
- Rule 8021 – Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities
- Rule 8041 – Carryout and Trackout
- Rule 8051 – Open Areas

The proposed Project would comply with applicable SJVAPCD Rules and Regulations, the Kern County Zoning Ordinance. In addition, Mitigation Measures MM 4.3-1 through MM 4.3-3 would reduce operational fugitive dust emissions; however, as shown in Table 4.3-9 above, impacts would be significant and unavoidable.

Ambient Air Quality

An ambient air quality analyses were performed to determine if the project's construction and operations have the potential to impact ambient air quality through a violation of the ambient air quality standards or a substantial contribution to an existing or projected air quality standard. The basis for the analysis is dispersion modeling applied to the project as described. Maximum daily emissions were used as the basis for determining the proposed Project's potential impact on ambient air quality. Additional information on the ambient air quality modeling methods and assumptions are presented in Appendix C (Insight Environmental Consultants 2017).

The maximum off-site ground level concentration of each pollutant for the 1-hour, 3-hour, 8-hour, 24-hour and annual periods was predicted using the most recent version of EPA's AMS/EPA Regulatory Model (AERMOD) dispersion software under the Lakes Environmental ISC-AERMOD View interface. SJVAPCD-approved, AERMET-processed U Star meteorological datasets for calendar years 2010 through 2014 was input to AERMOD (Insight Environmental Consultants 2017). This was the most recent available dataset available at the time the modeling runs were conducted. All of the regulatory default AERMOD model keyword parameters were employed. Rural dispersion parameters were used for this project, which differs from the urban setting used in the CalEEMod model. The CalEEMod selection criteria is based on trip distances to the project site while the AERMOD selection criteria is based on the majority of the land use surrounding the facility. The majority of the land surrounding the project site is considered "rural" under the Auer land use classification method (Insight Environmental Consultants 2017).

Emissions were evaluated for each pollutant on a short-term (correlating to pollutant averaging period) and long-term (annual) basis, with the exception of CO that was evaluated only for short-term exposures since there are no long-term significance thresholds for CO. Emissions were modeled as an area source with a release height of 1.0 meters.

The majority of mobile emissions predicted by CalEEMod will occur beyond the project boundary because of vehicle trips. In order to determine the on-site vehicle emissions, the following

methodology was discussed and approved by the SJVAPCD (Insight Environmental Consultants 2016). An estimated on-site trip distance was determined by calculating the diagonal distance from the center of the project to the furthest corner. The on-site estimated trip distance was determined to be 0.75 miles. The on-site estimated trip distance was then divided by the average trip length used by CalEEMod, 8.09 miles, in order to determine the on-site to off-site mobile emissions ratio, 9.27 percent. The total mobile emissions calculated by CalEEMod were then reduced by 90.73 percent to estimate the mobile on-site emissions used for ambient air quality modeling.

A fenceline coordinate grid of receptor points was constructed. The grid consisted of a 25-meter fenceline spacing and 25-meter tier spacing extending a distance of 100 meters with initial receptors starting 25 meters from the facility boundary. Elevated terrain options were employed even though there is not a complex terrain in the proposed Project area.

For each pollutant and averaging period modeled, a "total" concentration was estimated by adding the maximum measured background air concentration to the maximum predicted Project impacts. The maximum measured background air concentrations used in this analysis were calculated from measured concentrations at the nearest monitoring stations.

The results of the air dispersion modeling are presented in Table 4.3-10 *Predicted Ambient Air Quality Impacts* and demonstrate that the maximum impacts attributable to the proposed Project, when considered in addition to the existing background concentrations, are below the applicable ambient air quality standard for NO_x, SO_x, and CO. Refer to Appendix C for details regarding the model outputs.

Table 4.3-10. Predicted Ambient Air Quality Impacts

Pollutants	Averaging Period	Background	Project	Project + Background	NAAQS	CAAQS
NO_2	1-hour	59.76	44.04	103.80	188.68	338
	Annual	24.57	3.08	27.65	100	56
SO_2	1-hour	30.50	0.36	30.86	196	655
	3-hour	27.450	0.15	27.60	1,300	---
	24-hour	6.770	0.08	6.85	365	105
	Annual	1.440	0.03	1.47	---	---
CO	1-hour	1480.00	141.70	1621.70	40,000	23,000
	8-hour	617.00	51.64	668.64	10,000	10,000
PM_{10}	24-hour	104.00	3.26	107.26	150	50
	Annual	56.42	1.04	57.45	---	20
$PM_{2.5}$	24-hour	83.20	1.14	84.34	35	---
	Annual	17.90	0.36	18.26	12	12

Source: Insight Environmental Consultants 2017.

Pre-Project concentrations of PM_{10} and $PM_{2.5}$ exceed their respective ambient air quality standards. PM_{10} and $PM_{2.5}$ are evaluated in accordance with the SJVAPCD recommended significant impact level for fugitive PM_{10} and $PM_{2.5}$ emissions. It is the SJVAPCD's policy to use significant impact levels to determine whether a proposed new or modified source will cause or contribute significantly

to an AAQS violation. If a project's maximum impacts are below the SJVAPCD's significance thresholds, the project is judged to not cause or contribute significantly to an AAQS or PSD increment violation. A comparison of the proposed impact from the Project to the District SIL values is provided in Table 4.3-11 *Modeled Project Levels Compared to Significance Threshold*.

Table 4.3-11. Modeled Project Levels Compared to Significance Thresholds

Pollutant	Averaging Period	Predicted Concentration	Significance Level
PM_{10}	24-hour	3.26	10.4
	Annual	1.04	2.08
$PM_{2.5}$	24-Hour	1.14	2.5
	Annual	0.36	0.63

Source: Insight Environmental Consultants 2017.

Because the Project's modelled PM_{10} and $PM_{2.5}$ are below the SJVAPCD's significance levels for 24-hour and annual concentrations, the Project's contribution to potential violations of ambient air quality standards would be less-than-significant.

Mitigation Measures

MM 4.3-1: **Air Quality**. To minimize personnel and public exposure to potential Valley Fever–containing dust both on- and off-site, the following additional control measures shall be included in the DCP to be prepared for this project:

a. Equipment, vehicles, and other items shall be thoroughly cleaned of dust before they are moved offsite to other work locations.

b. Wherever possible, grading and trenching work shall be phased so that earth-moving equipment is working well ahead or down-wind of workers on the ground.

c. The area immediately behind grading or trenching equipment shall be sprayed with water before ground workers move into the area.

d. In the event that a water truck runs out of water before dust is sufficiently dampened, ground workers being exposed to dust are to leave the area until a full truck resumes water spraying.

e. All heavy-duty earth-moving vehicles shall be closed-cab and equipped with a HEP-filtered air system.

f. Workers shall receive training to recognize the symptoms of Valley Fever, and shall be instructed to promptly report suspected symptoms of work-related Valley Fever to a supervisor. Evidence of training shall be provided to the Kern

County Planning and Natural Resources Department within 24 hours of the training session.

g. Valley Fever informational handout shall be provided to all on-site construction personnel. The handout shall, at a minimum, provide information regarding the symptoms, health effects, preventative measures, and treatment. Additional information and handouts can be obtained by contacting the Kern County Public Health Services Department.

MM 4.3-2: **Valley Fever Training**. Onsite personnel shall be trained on the proper use of personal protective equipment, including respiratory equipment. National Institute for Occupational Safety and Health (NIOSH)-approved respirators shall be provided to onsite personal, upon request. Evidence of training shall be provided to the Kern County Planning and Natural Resources Department within 24 hours of the training session.

MM 4.3-3: **Valley Fever Education Fees.** One-time payment of $3,200.00 shall be made to the Kern County Public Works: Public Health Department for the specific purposes of continued Valley Fever education and outreach.

MM 4.3-4: All required landscaping along major and arterial roadways will be designed with native drought-resistant species (plants, trees, and bushes) to reduce demand for gas-powered landscape maintenance equipment.

MM 4.3-5: Prior to issuance of building permit, the applicant shall submit evidence, verified by the Air District, that the development has total Project construction and operations mitigated baseline below 2 tons per year for NO_x (total Project construction and operations) and mitigated baseline below 2 tons per year for PM_{10} emissions (total Project constructions and operations). Required reductions can be achieved from any combination of Project design, compliance with the Indirect Source Review (ISR) and/or a Development Mitigation Contract. If a Development Mitigation Contract is utilized a copy of the executed agreement and implementing reports will be provided to the Planning Department to substantiate compliance. As there still would be unmitigated emissions of ROG participation in any air mitigation program adopted by Kern County that provides equal or more effective mitigation than this mitigation measure can be utilized as a replacement for the requirements of this mitigation measure.

Level of Significance after Mitigation

Less than significant for construction related impacts and operational SO_x PM_{10}, and $PM_{2.5}$. Significant and Unavoidable Impact of ROG, NO_x, and CO operational emissions.

Impact 4.3-3: The Project Would Violate Standards for CO Concentrations.

CO Hot Spots Analysis

Localized high concentrations of CO along a congested roadway or intersection may expose nearby sensitive receptors, e.g. children, the elderly, hospital patients, etc., even when it is not being recorded high at the monitoring sites. These areas of high CO concentrations are known as CO Hot Spots. The SJVAPCD GAMAQI contains criteria for determining whether an analysis is warranted for a particular project. If the following two criteria are met by the proposed Project then further CO analysis is warranted:

- The traffic study indicates that the Project would cause one or more streets or at one or more intersections within the general Project area would be reduced to a Level of Service (LOS) E or F;

- Signalized and/or channelization is added to an intersection and vicinity, and sensitive receptors such as residences, schools, hospitals, etc. are located in the vicinity of the affected intersection or signalization.

A traffic study was prepared for this proposed Project. The traffic study indicated that potentially impacted intersections and roadway segments would operate at a level of service (LOS) C or better and this is within the GAMAQI significance criteria. Based upon the results of the traffic study, a CO Hot Spot analysis was not prepared for this proposed Project. No concentrated excessive CO emissions are expected to be caused once the proposed Project is completed. The proposed Project would not violate CO standards and would therefore have a less than significant impact on air quality.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.3-4: The Project Would Result In A Cumulatively Considerable Net Increase of Any Criteria Pollutant For Which The Project Region Is Nonattainment Under an Applicable Federal Or State Ambient Air Quality Standard.

As noted in Table 4.3-2, the SJVAB is a nonattainment area for the State 1-hour ozone, 8-hour ozone, PM_{10}, and $PM_{2.5}$ standards and is a nonattainment area for National 8-hour ozone and $PM_{2.5}$ standards. As shown above in Table 4.3-8, project construction emissions of these pollutants would be below SJVAPCD annual thresholds. The proposed Project would create ozone, NO_X, PM_{10}, and $PM_{2.5}$ emissions during construction, which would contribute to the current nonattainment status of these pollutants within the SJVAB. As noted in Impact 4.3-2, the proposed Project's emissions during temporary construction activities would not exceed thresholds and would have a less than significant impact. Operation of the proposed Project would also create additional criteria pollutants, particularly

as a result of increased mobile emissions in the project area. As shown in Table 4.3-9, above, project operation emissions of these pollutants would exceed the SJVAPCD thresholds and result in a significant and unavoidable impact. (Refer to Impact 4.3-2, above, for further discussion.)

CEQA and SJVAPCD's Rule 9510 require that all feasible and reasonable mitigation be applied to the proposed Project to reduce air quality impacts from construction and operations, whether the emissions would exceed the thresholds or not.

Rule 9510 states that development projects with emissions above 2.0 tons per year of NO_X and/or PM_{10} are subject to the mitigation requirements of the rule. Rule 9510 allows these reductions to be accomplished through project design changes such as using a higher insulation value in construction that could result in no additional costs for fees to the SJVAPCD. The proposed Project would be required to adhere to any determination of this rule by SJVAPCD. In addition, the proposed Project would implement Mitigation Measures MM 4.3-1 through MM 4.3-5, which would further reduce construction and operation emissions. Even with implementation of these mitigation measures, however, the proposed Project would still contribute the non-attainment status in the SJVAB regarding these pollutants.

Based on these considerations, the proposed Project's potential to result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard would be potentially significant.

Mitigation Measures

Implement Mitigation Measures MM 4.3-1 through MM 4.3-5.

Level of Significance after Mitigation

Impacts would be significant and unavoidable.

Impact 4.3-5: The Project Would Expose Sensitive Receptors to Substantial Pollutant Concentrations.

Sensitive receptors are defined as facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of these sensitive receptors are residences, schools, hospitals and daycare centers. CARB has identified the following groups of individuals as the most likely to be affected by air pollution: persons over 65 years of age, children under the age 14, athletes and persons with cardiovascular and chronic respiratory disease such as asthma, emphysema, and bronchitis.

There were four schools identified that are within a two-mile radius of the Project site. As identified in Table 4.3-8, above, construction emissions would be below SJVAPCD thresholds and would be less than significant. However, as shown in Table 4.3-9, above, operation Project emissions would exceed SJVAPCD thresholds for ROG, NO_x, CO, and PM_{10}. Thus, surrounding sensitive receptors could potentially be exposed to substantial pollutant concentrations from the proposed Project. Implementation of Mitigation Measure MM 4.3-1 through MM 4.3-5 would help to reduce impacts

to sensitive receptors; however, impacts to ROG, NO_x, and CO from operation of the proposed Project cannot be reduced to less than significant impacts. Therefore, sensitive receptors would potentially be exposed to adverse quantities of long-term emissions. The proposed Project would result in significant and unavoidable impacts to sensitive receptors.

Mitigation Measures

Implement mitigation measures MM 4.3-1 through MM 4.3-5.

Level of Significance After Mitigation

Significant and Unavoidable impact of ROG, NO_x, and CO operation emissions. Less than significant after mitigation for Project contribution of all other emissions. Less than significant for construction emissions.

Impact 4.3-6: The Project Would Create Odor Impacts.

Because offensive odors rarely cause any physical harm and no requirements for their control are included in State or federal air quality regulations, the SJVAPCD has no rules or standards related to odor emissions, other than its Nuisance Rule 22. According to the GAMAQI, analysis of potential odor impacts should be conducted for the following two situations:

- Generators – projects that would potentially generate odorous emissions proposed to locate near existing sensitive receptors or other land uses where people may congregate, and

- Receivers – residential or other sensitive receptor projects or other projects built for the intent of attracting people locating near existing odor sources.

The purpose of the proposed M-1 PD (Light Industrial, Precise Development Combining) Zone District it to designate areas for wholesale commercial, storage, trucking, assembly-type manufacturing, other similar industrial uses. According to the Kern County Zoning Ordinance Chapter 19.36, uses within the M-1 Zone District may not exceed six (6) stories or seventy-five (75) feet and may not produce fumes, odor, dust, smoke, gas, or vibrations extending beyond zoning district boundaries. The purpose of the proposed M-2 PD (Medium Industrial Precise Development Combining) Zone District is to designate areas for general manufacturing, processing, and assembly activities. According to the Kern County Zoning Ordinance Chapter 19.38, uses within the M-2 Zone District may not produce fumes, odor, dust, smoke, gas, or vibrations extending beyond zoning district boundaries. In addition to the proposed M-1 and M-2 Zone Districts, the proposed Project includes the Precise Development (PD) Combining Districts. Implementation of the proposed PD Combining Districts would ensure that although a specific use of the site is not proposed at this time any future proposed development would be required to prepare a PD Plan, which would ensure that any specific use would not produce any objectionable odors offsite.

The purpose of the proposed CH PD (Highway Commercial, Precise Development Combining) Zone District is to designate areas for gas stations, restaurants, and motels uses while the purpose of the proposed C-2 PD (General Commercial, Precise Development Combining) Zone District is to

designate areas for shopping centers and heavy commercial uses. According to the Kern County Zoning Ordinance Chapters 19.34 and 19.32, respectively, there is no specific odor restriction; however, according to Kern County Health and Safety Ordinance Chapter 8.2, any person in possess, charge or control of any structure, property or other premises shall keep it free and clear of all accumulations of solid waste which may produce odor, attract or harbor insects or rodents or provide a breeding place for them, be offensive to the senses, or become a hazard to health, safety and welfare of the public.

Because the proposed Project is a mixed use industrial and commercial project, any industrial activities triggering air permits would be under the regulation of the SJVAPCD and commercial activities do not typically allow tenants that create objectionable odors, the proposed Project is not considered a source of objectionable odors or odorous compounds. In addition, the proposed Project would not exceed any screening trigger levels to be considered a source of objectionable odors or odorous compounds based on the SJVAPCD's GAMAQI provisions (Insight Environmental Consultants 2017). Therefore, the proposed Project is not expected to be a source of any odorous compounds nor would it likely be impacted by any odorous source. Impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

This cumulative impact analysis uses a tiered approach to provide the reader with a thorough understanding of local, regional, and valley-wide air quality conditions and the proposed Project's contribution to cumulative air quality impacts. The cumulative project list is provided in Table 3-5, *Cumulative Projects List for Kern County*, in Section 3.0, *Cumulative Projects*. This geographic scope of analysis is appropriate because of influence of the area with wildfires, as well as the localized nature of hazardous materials impacts and other hazards discussed in this section.

The Kern County Planning and Natural Resources Department's Guide for Preparing an Air Quality Assessment for Use in Environmental Impact Reports has determined that a cumulative analysis must be prepared for a proposed development when the project is required to prepare an EIR. The cumulative analysis is used to consider localized impacts, determine consistency with existing air quality plans, and provide a comparison of the project's impacts to the SJVAB emissions.

The air quality analysis conducted for this Project, which is included as Appendix C to this Recirculated Draft EIR, indicates that, with mitigation, Project impacts would be individually significant. The air quality impact analysis, however, also considered impacts of the proposed Project in conjunction with the impacts of other past, present, and reasonably foreseeable projects in the air basin. The following cumulative impacts were considered.

- Cumulative Ozone Impacts (ROG and NOx) from numerous sources within the region, including transport from outside the region. Ozone is in chemical reactions produced by ROG, NOx, and sunlight.

- Cumulative CO Impacts produced primarily by vehicular emissions.

- Cumulative PM_{10} Impacts within the region and locally from the various projects. Such projects may cumulatively produce a significant amount of PM_{10} if several projects conduct grading or earthmoving activities at the same time.

- HAP Impacts on sensitive receptors within the SJVAPCD-recommended screening radius of one mile.

Total Cumulative Project Emissions

A cumulative impact analysis considers the proposed Project along with the anticipated growth of the area. According to CEQA (§15355) cumulative impacts are defined "as two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts."

There are 104 planned development projects within a six-mile radius of the proposed Project. These projects are identified in Table 3-5, *Cumulative Projects List for Kern County*, as well as provided in Appendix C. Projects that are planned but have not been submitted for review or approved by the County or City were not included because there is no way to determine what the projects may entail.

Table 4.3-12, *Cumulative Projects Emissions,* provides the cumulative projects emissions for construction and operation phases of the cumulative environment. The emissions estimated presented in the Air Quality Impact Analysis were modeled using the CalEEMod computer model to predict cumulative impacts. Emissions for the construction and operational phase of each project were based on total number of lots or square footage for maximum project buildout. No mitigation measures were applied to any of the projects as it is not known which, if any, would be required by the City of Bakersfield or Kern County, or which may be voluntarily proposed by the individual developer or required by code or regulation. Additionally, no cumulative significance thresholds are shown because no cumulative thresholds have been established by SJVAPCD, CARB, or other regulatory authority. These projects represent all known and reasonably foreseeable projects in the area at this time. As these projects are either currently under construction or approved by the City of Bakersfield or Kern County for consistency with applicable regulations, it is assumed that they are in conformance with the regional AQAP. The model outputs for the cumulative impacts analysis have been included in Appendix C.

Table 4.3-12. Cumulative Projects Emissions

Six-Mile Radius Project Types	Pollutant (tons/year)							
	ROG	NO_x	CO	SO_x	Fugitive PM_{10}	Exhaust PM_{10}	PM_{10}	$PM_{2.5}$
Construction[1]								
Tentative Tracts Subtotal	204.88	114.95	345.67	1.23	131.95	3.77	135.73	36.91
Tentative Parcel Maps Subtotal	3.43	13.51	11.21	0.02	0.77	0.77	1.54	1.05
Site Plan Review Subtotal	8.17	9.41	11.09	0.02	0.95	0.45	1.41	0.73
Total Cumulative Six-Mile Projects	216.48	137.87	367.97	1.27	133.67	4.99	138.68	38.69
This Project	*22.36*	*22.05*	*26.32*	*0.051*	*1.85*	*1.10*	*2.95*	*1.61*
Total Cumulative Projects	**238.84**	**159.92**	**394.29**	**1.32**	**135.52**	**6.09**	**141.63**	**40.30**
Operations								
City of Bakersfield and Kern County (Combined)								
Tentative Tracts Subtotal	162.77	272.39	941.99	3.22	152.26	8.83	161.09	49.3
Tentative Parcel Maps Subtotal	1.68	2.42	9.19	0.03	1.25	0.08	1.32	0.41
Site Plan Review Subtotal	22.9	53.82	243.12	0.55	24.67	2.33	27.00	8.89
Total Cumulative Six-Mile Projects	**187.35**	**328.63**	**1,194.30**	**3.80**	**178.18**	**11.24**	**189.41**	**58.60**
This Project	*33.55*	*66.66*	*277.80*	*0.61*	*27.82*	*1.54*	*29.36*	*8.93*
Total Cumulative Projects	**220.9**	**395.29**	**1,472.10**	**4.41**	**206.00**	**12.78**	**218.77**	**67.53**

Source: Insight Environmental Consultants 2017.

[1] These emissions are overestimated and include all years of construction not just a single year, as they are discretionary projects that are subject to various mitigation measures that have not yet been determined nor their impacts reduced herein.

The most recent certified SJVAB Emission Inventory data available from the CARB is based on data gathered for the 2012 annual inventory. This data will be used to assist the SJVAPCD in demonstrating attainment of Federal eight-hour ozone standards and contained 218,964 tons/year VOC (ROG) and 119,282 tons/year NO_x from all sources (Insight Environmental Consultants 2016). On a regional basis, the proposed Project represents approximately 0.016 percent of the ROG and 0.038 percent NO_x emissions in the SJVAB. The SJVAB emissions would essentially stay the same regardless of whether or not the proposed Project is built (Insight Environmental Consultants 2017). However, the proposed Project by itself is considered significant. The proposed Project in conjunction with other past, present and foreseeable future projects would result in cumulative long-term impacts to air quality. The SJVAB's cumulative air quality impacts would remain significant without this project since the air basin is currently considered to be in nonattainment for certain criteria pollutants. The proposed Project's incremental contribution to these impacts is significant and unavoidable.

Mitigation Measures

Implement Mitigation Measures MM 4.3-1 through MM 4.3-5.

Level of Significance after Mitigation

Cumulative Impacts are considered significant and unavoidable.

Hazardous Air Pollutants

The GAMAQI states that, when evaluating potential impacts related to HAPs, "impacts of local pollutants (CO, HAPs) are cumulatively significant when modeling shows that the combined emissions from the proposed Project and other existing and planned projects will exceed air quality standards." Dispersion modeling showed that the proposed Project would not exceed any NAAQS, CAAQS, or other health risk standards (Insight Environmental Consultants 2017 refer to Appendix C); thus, the proposed Project would not be a significant source of HAPs. Therefore, the proposed Project would not pose a significant cumulative CO or HAPs impact.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Section 4.4

Biological Resources

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Section 4.4
Biological Resources

4.4.1 Introduction

The purpose of this section is to identify existing biological resources on-site and in the vicinity of the proposed Project, analyze potential Project-related impacts on these resources (including special-status species and habitats), and recommend mitigation measures to reduce the significance of impacts. The analysis provided in this section is based on the findings of the Biota Report. A Biota report was prepared by McIntosh and Associates in June 2009. Due to the time between the technical study and this Recirculated Draft Environmental Impact Report (RDEIR), a second Biota Report was prepared by McCormick Biological, Inc. in July 2017. See Appendix D, Biota Report, and Appendix N, Original Technical Studies.

This section describes the biological character of the proposed Project site in terms of vegetation, flora, wildlife, and wildlife habitats, and analyzes the biological significance of the site in accordance with Federal, State and local laws and policies. General plant and wildlife surveys of the proposed Project site were conducted on October 31, November 1, and December 5, 2006, and again on March 10, 2016 (McIntosh & Associates 2009; McCormick Biological 2017). These surveys were conducted to evaluate the biological character of the proposed Project and to determine if special-status species have the potential to occur within the proposed Project site. Survey methodology in 2006 included meandering pedestrian transects through all present habitat types. In 2016, all perimeter and interior roads were slowly driven, stopping to inspect and evaluate representative habitat features and noting observations of identified plant and wildlife species observed. Supporting documentation regarding species findings included direct observations and/or significant species signs (e.g., scat, tracks, feather/fur, prey remains, nests/burrows or any other indication of wildlife presence) and literature reviews from the California Natural Diversity Database (CNBB), United States Fish and Wildlife Service (USFWS), California Fish and Wildlife Service (CDFW), the California Native Plant Society (CNPS), and Western Bat Working Group (WBWG). Botanical survey techniques followed the CNPS recommended guidelines. Photographs taken during field surveys are included in Appendix D, *Biota Report*, and Appendix N, *Original Technical Studies*.

4.4.2 Environmental Setting

The proposed Project is situated in the southern San Joaquin Valley in Kern County, California. The Project site consists of approximately 314.30 acres, generally located north of Houghton Road, east of State Route (SR) 99, west of South Union Avenue (SR-204), and south of DiGiorgio Road, approximately 1.10 miles southeast of the City of Bakersfield, and within the unincorporated area of Kern County, California.

The 314.30-acre Project site is mostly vacant; however, the site does contain a steel storage building associated with agricultural activities, one plugged and abandoned oil well, two active, diesel-powered irrigation wells, and one domestic well. Between the various fields are dirt roads, irrigation ditches, and an equipment/materials storage area. No undisturbed native habitat exists on the Project

site or adjacent properties. The surrounding land includes vacant land and agricultural lands, with a cluster of single-family residential to the east and an automobile wrecking yard to the south. Photographs record conditions that were observed on the project site (Appendix D and Appendix N).

The proposed Project site is located along the southwestern edge of the San Joaquin Valley; a broad, treeless plain in the rain shadow of the Inner Coast Ranges. The San Joaquin Valley is characterized by relatively low rainfall, averaging less than 10 inches per year, mostly between January and March. The west side of the Valley, near the coastal range receives an average of around 4 inches (10 centimeters) per year and the east side averages about 6 inches (15 centimeters) per year. Approximately 90 percent of the rainfall in the region occurs between November 1 and April 1. Drought cycles occur periodically, becoming severe enough that plant and animal populations can experience large fluctuations.

The Valley Region's climate can be characterized as Mediterranean; with hot, dry summers and cool, moist winters. Summer high temperatures typically exceed 100 °Fahrenheit (°F); with an average of 110 days per year over 90 °F. Winter temperatures in the San Joaquin Valley are mild, with an average of only 16 days per year with frost. The vegetation communities in the San Joaquin Valley are distinguishable due to tule fog, higher humidity, and isolation from continental climatic influences by mountain ranges.

The Kern County General Plan (KCGP) describes the Valley Region as "the southern San Joaquin Valley below an elevation of 1,000 feet [mean sea level] msl" within Kern County. The proposed Project area is located at elevations between 330 and 340 feet above msl.

Vegetation and General Botanical Surveys

Surveys of the Project site were conducted on October 31, November 1, and December 5, 2006 and again on March 10, 2016 (McIntosh & Associates 2009; McCormick Biological 2017). The Project site has been under agricultural production and currently consists entirely of land either currently under row crop agriculture or between crops.

At the time of the 2009 Biota Report, sheep were actively grazing on the areas that were fallow or previously alfalfa fields and the eastern portion of the site was active grain crops which had been recently tilled (McIntosh and Associates 2009). Ruderal habitats were identified along the paved perimeter roadways, dirt access roads, the fallowed and old alfalfa fields, and the banks of the irrigation ditches. No sensitive habitat types were identified within the Project site during the 2006 or the 2017 surveys. No federally-listed, or proposed, or state-listed plant species were identified within the proposed Project site during the 2006 or the 2017 surveys.

One agricultural sump at the southern boundary contained a few wetland-indicative plant species; however, due to regular maintenance activities and clearing, it is not considered a wetland-riparian habitat. A second agricultural sump, located in the eastern portion of the property, appeared to no longer function as an agricultural sump and was filled with non-native grasses and forbs, and discarded debris. It did not contain wetland plant species and is not considered a sensitive vegetative community. Lined and unlined irrigation ditches occur at various locations throughout the Project site; however, they do not provide sensitive habitat because of regular maintenance and clearing.

Other than these sites, potential wetland, riparian, or other aquatic habitat was not identified within the Project site. Table 4.4-1 *Special Status Plants Known to Occur in the Vicinity of the Project* lists sensitive plants, below.

Table 4.4-1. Special Status Plants Known to Occur in Vicinity of Project Site

Scientific Name Common Name	Status Fed/State/ CNPS	Survey Results/Regional or Nearest Occurrence*
Astragalus hornii var. *hornii* Horn's milk vetch	S/-/1B.1	No suitable soil or habitat is present on the project site. No impacts are anticipated.
Atriplex cordulata var. cordulata Heartscale	S/-/1B.2	No suitable soil or habitat is present on the project site. No impacts are anticipated
Atriplex coronate var. vallicola *Lost Hills crownscale*	S/-/1B.2	No suitable soil or habitat is present on the project site. No impacts are anticipated
Atriplex tularensis Bakersfield smallscale	-/E/1A	No suitable soil or habitat is present on the project site. No impacts are anticipated.
California macrophylla Round-leaved filaree	S/-/1B.1	No suitable soil or habitat is present on the project site. No impacts are anticipated.
Calochortus striatus Alkali mariposa lily	S/-/1B.2	No suitable soil or habitat is present on the project site. No impacts are anticipated.
Caulanthus californicus California jewelflower	E/E/1B.1	This species is believed extirpated from Kern County. This species is highly sensitive to disturbance. Although suitable soil is present of the project, the species is highly unlikely to occur given previous site disturbance and proximity to isolated, known occurrences. No impacts are anticipated.
Caulanthus lemmonii Lemmon's jewelflower	S/-/1B.2	No suitable soil or habitat is present on the project site. No impacts are anticipated
Chloropyron molle ssp. *hispidum* Hispid bird's-beak	S/-/1B.1	No suitable soil or habitat is present on the project site. No impacts are anticipated.
Delphinium recurvatum Recurved larkspur	S/-/1B.2	No suitable soil or habitat is present on the project site. No impacts are anticipated.
Eremalche parryi ssp. *kernensis* Kern mallow	E/-/1B.1	Suitable soils are present on the project site. Historic disturbance from row crop farming and subsequent discing for vegetation control would greatly reduce the potential for presence. No impacts are anticipated.
Eriastrum hooveri Hoover's woolly star	D/-/4.2	No suitable habitat is present on the project site. No impacts are anticipated.
Eschscholzia lemmonii ssp. *kernensis* Tejon poppy	-/-/1B.1	No suitable habitat is present on the project site. No impacts are anticipated
Imperata brevifolia California satintail	-/-/2.1	No suitable soil or habitat is present on the project site. No impacts are anticipated.
Lasthenia glabrata ssp. *coulteri* Coulter's goldfields	S/-/1B.1	No suitable habitat is present on the project site. No impacts are anticipated
Layia leucopappa Comanche Point layia	S/-/1B.1	No suitable habitat is present on the project site. No impacts are anticipated.
Monolopia congdonii San Joaquin woolly-threads	E/-/1B.2	No suitable habitat is present on the project site. No impacts are anticipated.
Navarretia setiloba Piute Mountains navarretia	S/-/1B.1	No suitable habitat is present on the project site. No impacts are anticipated.
Opuntia basilaris var. *treleasei* Bakersfield cactus	E/E/1B.1	No suitable habitat is present on the project site. No impacts are anticipated.

Table 4.4-1. Special Status Plants Known to Occur in Vicinity of Project Site

Scientific Name Common Name	Status Fed/State/ CNPS	Survey Results/Regional or Nearest Occurrence*
Puccinellia simplex California alkali grass	-/-/1B.1	No suitable habitat is present on the project site. No impacts are anticipated
Stylocline masonii Mason's neststraw	S/-/1B.1	No suitable habitat is present on the project site. No impacts are anticipated.

STATUS:
Federal and State Listing Code:
C = Candidate for Listing; D = Delisted; E = Federally or State-listed Endangered; S = BLM Sensitive Species;
T = Federally or State-listed Threatened

Additional State Listing Code:
CSC = California Species of Concern; SFP = State Fully Protected; WL = Watch List

CNPS Listing Codes
1A Plants presumed extirpated in California, and either rare or extinct elsewhere
1B.1 Plants considered rare, threatened, or endangered in California and elsewhere; seriously threatened in California
1B.2 Plants considered rare, threatened, or endangered in California and elsewhere; fairly threatened in California
1B.3 Plants considered rare, threatened, or endangered in California and elsewhere, not very threatened in California
2A Plants presumed extirpated in California, but more common elsewhere
2B.1 Plants considered rare, threatened, or endangered in California, but more common elsewhere; seriously threatened in California
2B.2 Plants considered rare, threatened, or endangered in California, but more common elsewhere; fairly threatened in California
2B.3 Plants considered rare, threatened, or endangered in California, but more common elsewhere; not very threatened in California
3 Plants about which more information is needed
3.1 Plants about which more information is needed; seriously threatened in California
3.2 Plants about which more information is needed; fairly threatened in California
3.3 Plants about which more information is needed; not very threatened in California
4.1 Plants of limited distribution in California; seriously threatened in California
4.2 Plants of limited distribution in California; fairly threatened in California
4.3 Plants of limited distribution in California; not very threatened in California
Source: McIntosh & Associates 2009; McCormick Biological 2017.

Wildlife Surveys

During the 2017 biological survey, small mammal burrows were noted during the surveys along the periphery of the Project site and dirt roads (McCormick Biological 2017). Direct and indirect evidence of several special-status wildlife species was noted during the surveys conducted on the Project site and buffer. Three special-status wildlife species (birds) were observed within the Project site during the 2006 biological surveys.

Amphibians

No special status amphibian species or signs of their inhabitance were observed on the proposed Project site. In addition, because of the sequential disturbance created by continued agricultural activities, special status species would not be expected to occur, particularly as no habitat is present. Bullfrogs were observed, and California toad scat was observed within the study area in 2006. No amphibians or signs of amphibians were observed during the 2017 survey.

Reptiles

The common side-blotched lizard was observed within the proposed Project boundaries, but this species is not a listed special status species. No special status species were observed within the proposed Project site and suitable on-site habitat for most of these species is absent. One special-status reptile, the silvery legless lizard has the potential to occur within the Project site.

Silvery legless lizard

Habitat for this species includes lightly vegetated areas of beach dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with sycamores, cottonwoods, or oaks. They prefer warm, loose soil that is somewhat moist, and can often be found under leaf litter, rocks, boards, driftwood, and logs.

The silvery legless lizard is considered a California species of special concern and its range extends from Antioch in Contra Costa County, south through the Coastal, Transverse, and Peninsular Ranges, along the western edge of the Sierra Nevada Mountains, and parts of the San Joaquin Valley and Mojave Desert to El Consuelo in Baja California. Its elevation range extends from near sea level on the Monterey Peninsula to approximately 5,900 feet above sea level in the Sierra Nevada foothills.

Silvery legless lizard has been divided into five species, with four new species being described. The four new species have no status; however, each has a very restricted known range. The majority of the soils on the Project site are suitable for this species. Legless lizards are extremely difficult to detect and may be present in low numbers in the limited habitat on the project site.

Birds

Migratory bird special status species, such as the Grasshopper sparrow, Golden Eagle, Burrowing owl, and Loggerhead shrike, may occur in the proposed Project areas. The sharp-shinned hawk, burrowing owl, and northern harrier were observed during the 2006 surveys but were not identified during the 2017 surveys. Other raptors and birds of prey (barn owls, great horned owls and red-tailed hawks) may forage over agriculture fields. There are no trees suitable for nesting raptors within the Project boundary.

Grasshopper Sparrow

The grasshopper sparrow is a California species of special concern that is also protected under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code. The grasshopper sparrow is considered a rare summer resident of California from March to September, and little is known of its wintering status. The species is found in a variety of habitats within its known range, but its preference within California seems to include moderately open grasslands with short to moderate vegetation height and scattered shrubs such as California sagebrush (*Artemisia californica*). The bird's typical diet consists of grasshoppers and seeds. Seeds the grasshopper sparrow is known to eat come from knotweed (*Polygonum* spp.), campion (*Lychnis* spp.), oats (*Avena* spp.), and pigweed. The grasshopper sparrow's naturally patchy range in California has become even more fragmented due to agricultural and urban development

The grasshopper sparrow was not observed during any of the surveys. No potential nesting habitat is present on the Project site; however, the site does present potential foraging habitat and is within the range of the species.

Sharp-shinned Hawk

The sharp-shinned hawk prefers to nest on a horizontal branch against the main trunk of the tree in dense forest or riparian areas, typically on north facing slopes. They normally return to the same nesting area every year, but do not use the same nest. Sharp-shinned hawks hunt from perches or by rapid flapping flight. Approximately 90 percent of their diet consists of birds, specifically song birds. They are also known to occasionally take large insects, frogs, lizards, and small mammals.

The sharp-shinned hawk is a California species of special concern. The breeding population in California has experienced a decline, which the migrating populations appear to have rebounded from declines of the 1950s and early 1960s. Threats to the species include the falconry trade and logging.

An adult male sharp-shinned hawk was observed foraging after small passerine flocks throughout the Project site during all days of the biological surveys. The make sharp-shinned hawk was also observed perching in the trees lining South Union Avenue (SR-204) on the eastern boundary of the proposed Project.

Burrowing Owl

The burrowing owl is a California species of special concern, and documented population declines have occurred in the state since at least the 1970s. It has no federal listing but is protected by the MBTA.

Burrowing owls are diurnal, and during active periods of the year may be observed above ground in the vicinity of their burrows, roosting on the ground or nearby high spots such as berms, fence posts, or shrubs. They have a varied diet that includes insects, small rodents, birds, amphibians, reptiles, and carrion, and there is some evidence that population sizes of California vole (*Microtus californicus*) influence their survival and reproductive success. In California, the species is typically found in close association with California ground squirrels (*Otospermophilus beecheyi*). The squirrels create burrows that are used by burrowing owls as year-round shelter and seasonal nesting habitat; however, burrowing owls may also use human-made structures such as culverts, corrugated metal pipes, debris piles, or openings beneath pavement as shelter and nesting habitat.

Within California, it is found throughout the Central Valley, in the San Francisco Bay Area, Carrizo Plain, and Imperial Valley. The Central Valley population is a year-round resident in annual and perennial grasslands or other vegetation communities that support little to no tree or shrub cover. California is considered an important wintering ground for migrants, whose burrowing owl population is augmented during the winter season.

Burrowing owl primarily occur in open grasslands and desert habitats throughout California. Burrowing owl prey varies with availability, season, and location. Primary prey includes insects, small mammals and birds, reptiles and amphibians, and carrion. They utilize burrows abandoned by

mammals such as ground squirrels or badgers. In soft soil, they have been known to excavate their own burrows.

The burrowing owl is a federal and state species of concern. Burrowing owl populations have been declining over the past 60 years, with a rapid decline in the last five years. The initial reduction in numbers has been attributed to the conversion of grasslands to agriculture. The recent accelerated loss is believed to be due to increased habitat loss from residential and commercial development.

Three adult burrowing owls and one active burrow were identified in the central and eastern portion of the proposed Project site during the 2006 biological surveys. The burrow was located on the bank of an unlined irrigation ditch in association with a ground squirrel colony. The owls occurred in a recently tilled area used for row crops and the adjacent unlined irrigation ditch.

No burrowing owls were observed during the 2017 survey. No evidence of burrowing owl presence, such as feathers, tracks or pellets, was observed. The habitat observed along the road edges and other lightly disturbed areas including ground squirrel burrows on the project site, has potential for this species. Both nesting and foraging habitat was present and the species could occupy in the future.

Golden Eagle

In the western U.S., this species occurs primarily in open mountainous areas, rolling foothills, canyons, and plains. Nesting occurs in trees and on cliff faces, and their diet consists primarily of small mammals, birds, snakes, and carrion. The golden eagle is an uncommon permanent resident and migrant throughout California, except for the center of the Central Valley, and range from sea level up to 11,500 feet (3,505 meters). The species is fully protected in the state of California.

The golden eagle was not observed during any of the biological surveys. Golden eagles are expected to forage in the western foothills and occasionally on the Valley floor in the vicinity of the proposed Project site. No nesting habitat is present for this species within the Project site.

Northern Harrier

The northern harrier occurs from annual grassland to lodgepole pine forests and alpine meadows. The species frequents meadows, open rangelands, grasslands, desert sinks, prairies, fresh and saltwater emergent wetlands, and some types of croplands. They occur throughout the year within the Central Valley in suitable habitat but are more abundant during the winter months. Northern harriers fly low over open habitats in search of prey consisting primarily of voles, but including mice, birds, frogs, small reptiles, and invertebrates. Nests are built on the ground in shrubby vegetation.

The northern harrier is a California species of special concern. Habitat degradation appears to be a major reason for decline of the species in California. Destruction or disturbance of wetlands and mashes, as well as the burning, disking and plowing of grasslands during the breeding season has had a negative affect on the species.

One male northern harrier was observed on all days of the 2006 biological surveys. The northern harrier was foraging throughout the proposed Project boundaries. No northern harrier were observed

on-site during the 2017 survey. No nesting habitat was identified on-site during any of the biological surveys.

Loggerhead Shrike

The loggerhead shrike is considered a species of special concern in California. It is a robin-sized bird about nine inches in length with a raptor-like, hooked bill. Lacking talons, the shrike impales its prey to facilitate feeding, or to store it for future consumption. Its diet includes a variety of insects and spiders, small reptiles, rodents, and small birds. Nests are built on stable branches in densely-foliaged shrubs or trees, usually well-concealed.

This species prefers open habitats such as savannas and deserts, with scattered shrubs, trees, posts, fences, utility lines, or other perches. In California, the loggerhead shrike occurs as a resident over most of the state, being absent from high mountain regions.

Loggerhead shrike were not observed during any of the biological surveys. No suitable nesting substrate for this species occurs on the Project site; however, the species is known to occur across Kern County and the Project site and vicinity provide suitable foraging habitat.

Swainson's Hawk

Swainson's hawks prefer open areas including grasslands with scattered trees or shrubs for perching, irrigated meadows, and ecotones. Agricultural areas, particularly alfalfa fields, riparian areas, juniper-sage flats, and oak savannas are desired by the Swainson's hawk in California. During winter months and migration, the hawks primarily eat insects, but are known to consume birds, small mammals, reptiles, and amphibians during summer months. They are found to take advantage of certain agricultural practices, such as tilling, by following behind the tractor and capturing prey as it is disturbed by equipment. They are known to nest in trees, shrubs, and utility poles between four feet and 100 feet in height. In the Central Valley, they nest in riparian habitats as well.

The Swainson's hawk is a California threatened and a federal species of concern. Swainson's hawk population has declined by 90 percent since the 1940s due to the loss of nesting habitat.

Swainson's hawks were not observed during any of the biological surveys; however, perching locations and foraging habitat was identified. The large trees and utility poles adjacent to the proposed Project provide suitable perching locations. The Project site also contains suitable foraging habitat for the species. No nesting habitat occurs on-site.

Ground and Low Shrub Nesting Birds

Several common and special-status ground and low shrub bird species may forage in the vicinity of the proposed Project site. Some have a potential to nest on the site. In addition, many of the common species of birds protected by the MBTA could nest on the proposed project site during the next breeding/nesting season. No bird nests were observed during any of the biological survey on the Project site.

Mammals

The proposed Project site contains denning and foraging habitat for some mammal species. According to the Biota Report no special status animal species were observed on the proposed Project site. Five species, the Pallid bat, Tipton kangaroo rat, Western mastiff bat, Tulare grasshopper mouse, and San Joaquin kit fox, have the potential to occur in the Project area.

Tulare Grasshopper Mouse

The Tulare grasshopper mouse is considered a California species of special concern. Though the Tulare grasshopper mouse prefers to feed on small mammals and insects, its diet also includes other invertebrates and seeds.

Historically, the species ranged from western Merced and eastern San Benito Counties east to Madera County and south to the Tehachapi Mountains. Currently, they are known to occur along the western margin of the Tulare Basin including western Kern County; within the Carrizo Plain Natural Area; along the Cuyama Valley side of the Caliente Mountains in San Luis Obispo County; and the Ciervo-Panoche Region in Fresno and San Benito Counties.

Small mammal burrows suitable for use by Tulare grasshopper mouse were observed on the Project site during the 2017 survey. In addition, this species could be present along the project periphery.

Western Mastiff-Bat

Western mastiff bats are primarily cliff dwelling bats which roost under exfoliating rock slabs but have been found in tall buildings as well. Roosts are typically found more than 10 feet above the ground, allowing for a clear vertical drop below the entrance for flight. Though acoustic records in California document foraging or commuting at up to 10,000 feet in the southern Sierra Nevada, the species regularly forage at 100 to 200 feet and may forage in flocks. Bats may travel relatively far from roosting sites to forage, in one case being heard in open desert 15 miles from the nearest possible roosting site. The foraging habitat of the western mastiff bat includes dry desert washes, flood plains, chaparral, oak woodland, open Ponderosa pine forest, grassland, and agricultural areas. In California, it is most frequently encountered in broad open areas, with a diet primarily consisting of moths, beetles, crickets, and katydids.

Unlike most bats in this area, western mastiffs do not mate in the fall. This species breeds in late winter and births around July. Migrations are limited to small changes in roost locations and hibernation only occurs in short periods resulting in year-round activity.

The western mastiff bat is considered threatened by broad, excessive pesticide use which is thought to lower their prey base, loss of clean water sources, and public hysteria resulting in colony eradications. They are considered a California species of species concern.

No potential day roost habitat is present on or near the proposed Project site for this species. This species may forage in the vicinity of the Project site.

Pallid Bat

The pallid bat is currently considered a California species of special concern. They forage over open shrub-steppe grasslands, oak savannah grasslands, open Ponderosa pine forests, talus slopes, gravel roads, lava flows, fruit orchards, and vineyards, but diet and forage area preference is known to vary with population. This species breeds from October through February and birth from April through July. These bats are not migratory but may move around seasonally.

Pallid bats roost in a variety of natural and man-made structures such as rock outcrops or buildings, as well as under concrete slabs or other semi-solid to solid materials on the ground. The species may roost alone, in small groups of 2 to 20 bats, or in a group with hundreds of individuals. This species is susceptible to losses from disturbance of roosts, especially hibernation sites or where hundreds roost together, and pesticide use which lowers their prey base.

Minimal potential roosting habitat is present; however, the project site represents potential foraging habitat for the species.

San Joaquin Kit Fox

The San Joaquin kit fox (SJKF) is currently a federally-listed endangered and state-listed threatened species and is the largest subspecies of kit fox. SJKF occur in a variety of open grassland, oak savannah, and shrub vegetation types/habitats as well as agricultural and urban areas in Kern County. In the southern San Joaquin Valley portion of the range, SJKF are generally found in sparse, annual grassland and scrub communities (e.g., valley sink scrub, saltbush scrub). San Joaquin kit fox historically inhabited such native San Joaquin Valley plant communities as valley saltbush scrub, annual grassland, and valley sink scrub. The species occupied much of the San Joaquin Valley, from Contra Costa County to southern Kern County. Home ranges for the taxon have been reported by several authors to range from 1 to 12 square miles. Numerous anthropogenic factors, such as habitat loss, fragmentation and degradation, predation, road kills, suffocation, trapping, and electrocution, have contributed to the decline of the species within its historical range.

As these communities have diminished, the species have been found to occupy grasslands and scrublands of varying degrees of modification or disturbance. Kit fox have been observed within areas modified by oil extraction equipment, agricultural crop production, and cattle grazing. Kit fox utilize one to several underground dens throughout the year, which they require for temperature regulation and protection from predators and weather.

SJKF do not typically excavate their own dens, but rather enlarge the burrows of other species, such as California ground squirrels, and change dens on a regular basis. California ground squirrel, black-tailed jackrabbits, and white-footed mice are common prey species. They are also known to consume kangaroo rats, pocket mice, cottontails, San Joaquin antelope squirrels, ground-nesting birds, insects, and grasses.

Although, no SJKF dens were observed on the Project site during the biological surveys (2006 and 2017), the entire Project site represents potential denning and foraging habitat for this species along the periphery and margins of the Project. SJKF are known to occur throughout Kern County in similar habitat. During the 2006 survey San Joaquin kit fox tracks were identified in several locations

throughout the Project site and scat was observed in the southern portion of the site. During the 2017 survey, dens were identified during the biological survey. Several partially collapsed culverts within the proposed Project site provide suitable kit fox denning habitat, although none of the collapsed culverts showed signs of past or present occupation. The Project site also provides suitable kit fox foraging habitat. A culvert near the north boundary of the proposed Project passes under SR-99, connecting the proposed Project site with suitable habitat west of SR-99. In addition, the proposed Project is within the current mapped distribution of the San Joaquin kit fox. There are several known documented occurrences of the species approximately three miles north of the proposed Project. Table 4.4-2 *Special Status Wildlife That May Occur in the Vicinity of the Project Site* lists sensitive animals, below.

Table 4.4-2. Special Status Wildlife That May Occur in Vicinity of Project Site

Scientific Name Common Name	Status Federal/State	Survey Results/Regional or Nearest Occurrence*
Invertebrates		
Branchinecta lynchi Vernal pool fairy shrimp	T/-	No vernal pools are present on the project site. No impacts are anticipated.
Desmocerus californicus dimorphus Valley elderberry longhorn beetle	T/-	No host plant species are present on the project site or vicinity. No impacts are anticipated.
Fish		
Hypomesus transpacificus Delta smelt	T/T	The project site is beyond the range of the species. No suitable habitat is present and no downstream effects
Amphibians		
Lithobates pipiens *Northern leopard frog*	-/CSC	No suitable habitat is present on the project site. No impacts are anticipated
Rana draytonii California red-legged frog	T/-	The project site is beyond the published range of the species. No suitable habitat is present on the project site. No impacts are anticipated.
Spea hammondii Western spadefoot toad	-/ CSC	No suitable habitat is present on the project site. No impacts are anticipated
Reptiles		
Anniella pulchra pulchra Silvery legless lizard	-/CSC	Suitable soils for this species exist on the project site. Although individual silvery legless lizards may be impacted, the number is likely to be extremely limited based on discing conducted over four consecutive years and no previously known occurrences on the site or in the vicinity. Consequently, impacts to this species are considered less than significant.
Emys marmorata *Western pond turtle*	-/CSC	No suitable habitat is present on the project site. No impacts are anticipated
Gambelia sila Blunt-nosed leopard lizard (BNLL)	E/E,SFP	The undisturbed habitat of the site is appropriate and the project is within the range of the species. As communicated by SJRC personnel, the site has been disced annually for at least four years prior to 2015. No impacts are anticipated.
Masticophis flagellum ruddocki San Joaquin coachwhip	-/CSC	Project site does not represent suitable habitat for this species due to discing, and isolated location relative to suitable habitat. No impacts are anticipated.

Table 4.4-2. Special Status Wildlife That May Occur in Vicinity of Project Site

Scientific Name Common Name	Status Federal/State	Survey Results/Regional or Nearest Occurrence*
Phrynosoma blainvillii Coast horned lizard	-/CSC	Suitable soils are present on the project site. Although individual Coast horned lizards may be impacted, the number is likely to be extremely limited based on discing conducted over four consecutive years and no previously known occurrences on the site or in the vicinity. Consequently, impacts to this species are considered less than significant.
Thamnophis gigas Giant garter snake	T/-	This species is likely extirpated from Kern County. Project site does not represent suitable habitat for this species. No impacts are anticipated
Birds		
Agelaius tricolor Tricolored blackbird	S/CSC	No suitable nesting or foraging habitat is present on the project site. No impacts are anticipated.
Aquila chrysaetos Golden eagle	-/SFP	No suitable nesting habitat is present on the project site. No impacts are anticipated.
Athene cunicularia Burrowing owl	-/CSC	Species not observed during fieldwork. No owl burrows identified. The project site represents suitable foraging and nesting habitat for the species based on the presence of California ground squirrel burrows.
Buteo swainsoni Swainson's hawk	-/T	No trees suitable for raptor nesting exist in the vicinity of the project. No stick nests observed. No impacts are anticipated.
Circus cyaneus Northern harrier	-/CSC	No trees suitable for raptor nesting exist in the vicinity of the project. No stick nests observed. No impacts are anticipated.
Elanus leucurus *White tailed kite*	-/SFP	No trees suitable for nesting exist on the project. The site represents marginal foraging habitat. No impacts are anticipated.
Eremophila alpestris actia California horned lark	-/WL	The site is within the range of the species and represents suitable nesting and foraging habitat. None were observed.
Falco mexicanus Prairie falcon	-/WL	A prairie falcon was observed soaring during the field survey. No suitable nesting sites exits on the project. The site represents marginal foraging habitat for the species. No impacts anticipated given the project size relative to surrounding, similar habitat suitable for foraging.
Gymnogyps californianus California condor	E/E, SFP	No suitable nesting or foraging habitat exists on the project site. No impacts are anticipated.
Lanius ludovicianus Loggerhead shrike	-/CSC	No loggerhead shrike was observed during the field survey. No suitable nesting sites exits on the project. The site represents marginal foraging habitat for the species. No impacts anticipated given the project size relative to surrounding, similar habitat suitable for foraging.
Mammals		
Ammospermophilus nelsoni San Joaquin antelope squirrel	-/T	The project site is beyond the current published range of the species. The survey was conducted under suitable conditions for observation of the species and no individuals were recorded. No impacts are anticipated

Table 4.4-2. Special Status Wildlife That May Occur in Vicinity of Project Site

Scientific Name Common Name	Status Federal/State	Survey Results/Regional or Nearest Occurrence*
Antrozous pallidus Pallid bat	-/CSC	No suitable roosting habitat exists on the project site. The site represents marginal foraging habitat for the species. No impacts anticipated given the project size relative to surrounding, similar habitat suitable for foraging
Dipodomys ingens Giant kangaroo rat	E/E	Historic row-crop farming precludes occupation although individuals have been known to persist on the periphery of agriculture. No burrows typical of Dipodomys sp. were observed during the field survey. No impacts are anticipated.
Dipodomys nitratoides nitratoides Tipton kangaroo rat	E/E	The project site is within the range of the species. Historic row-crop farming and subsequent discing would generally preclude occupation although individuals have been known to persist on the periphery of agriculture. No burrows typical of *Dipodomys* sp. were observed during the field survey. No impacts are anticipated.
Eumops perotis californicus Greater western mastiff bat	-/CSC	No suitable roosting habitat exists on the project site. The site represents marginal foraging habitat for the species. No impacts anticipated given the project size relative to surrounding, similar habitat suitable for foraging.
Onychomys torridus tularensis Tulare grasshopper mouse	-/CSC	Suitable habitat is present on the project site. Although individual Tulare grasshopper mice may be impacted, the number is likely to be extremely limited based on discing conducted over four consecutive years and no previously known occurrences on the site or in the vicinity. Consequently, impacts to this species are considered less than significant.
Perognathus inornatus inornatus	S/-	Suitable habitat is present on the project site. Although individual San Joaquin pocket mice may be impacted, the number is likely to be extremely limited based on discing conducted over four consecutive years and no previously known occurrences on the site or in the vicinity. Consequently, impacts to this species are considered less than significant.
Sorex ornatus relictus Buena Vista Lake shrew	E/-	No suitable habitat is present on the project site. No impacts are anticipated.
Taxidea taxus American badger	-/CSC	No suitable habitat is present on the project site. No impacts are anticipated. See additional discussion
Vulpes macrotis mutica San Joaquin kit fox (SJKF)	E/T	The site represents suitable habitat for the species. SJKF dens were identified during fieldwork.

Federal		State	
S	Listed as BLM Sensitive Species	CSC	California Department of Fish and Wildlife Designated Species of Special Concern
D	Delisted	D	Delisted
E	Listed as Endangered	E	Listed as Endangered
PT	Proposed as Threatened	SFP	California Department of Fish and Wildlife Designated Fully Protected
T	Listed as Threatened	T	Listed as Threatened

Wetlands and Jurisdictional Waters of the United States

No riparian habitat is present on the Project site. A search of the USFWS National Wetlands Inventory resulted in no wetlands mapped within the project site vicinity (McIntosh & Associates 2009; McCormick Biological 2017). These results are consistent with the observed conditions within the survey area.

4.4.3 Regulatory Setting

The CDFG and USFWS lists Threatened and Endangered taxa (e.g., species, subspecies or variety) in the proposed Project area. The electronic Inventory of Rare and Endangered Vascular Plants of California of the California Native Plant Society's (CNPS 2006) and the California Natural Diversity Database (CNDDB) (McIntosh & Associates 2009; McCormick Biological 2017) identify special-status plants, wildlife, and habitats known to occur in the vicinity of the Project site.

Federal

The Federal Endangered Species Act (FESA)

The FESA of 1973 (50 SFR 17) provides legislation to protect plant and animal taxa considered at risk of extinction and classified as either threatened or endangered. Section 9 of the FESA prohibits any person or entity from the "taking" of any endangered fish or wildlife species. Impacts to listed species resulting from project implementation would require the responsible agency or individual to consult the USFWS. Formal consultations must take place with the USFWS pursuant to Sections 7 and 10 of the FESA, with the USFWS then making a determination as to the extent of impact to a particular species. If the USFWS determines that impacts to a species would likely occur, then alternatives and measures to avoid or reduce impacts must be identified.

Section 4 requires Federal agencies to, among other things, prepare recovery plans for newly listed species unless USFWS determines such a plan would not promote the conservation of the species.

Section 7 requires Federal agencies, in consultation with, and with the assistance of the Secretary of the Interior or the Secretary of Commerce, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. The USFWS and National Marine Fisheries Service (NMFS) share responsibilities for administering FESA. Regulations governing interagency cooperation under Section 7 are found at 50 CFR Part 402. The opinion issued at the conclusion of consultation will include a statement authorizing a take that may occur incidental to an otherwise legal activity.

Section 9 lists those actions that are prohibited under FESA. Take of a species listed in accordance with FESA is prohibited. Section 9 of FESA prohibits take (i.e., to harass, harm, pursue, hunt, wound, kill, etc.) of listed species of fish, wildlife, and plants without special exemption. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or shelter. "Harass" is further defined as actions that create the likelihood of injury to listed species to an extent

as significantly disrupt normal behavior patterns which include, but not limited to, breeding, feeding, and shelter.

Section 10 provides a means whereby a non-Federal action with a potential to result in the take of a listed species could be allowed under an incidental take permit. Application procedures are found at 50 CFR Parts 13 and 17 for species under the jurisdiction of USFWS and 50 CFR Parts 217, 220, and 222 for species under the jurisdiction of NMFS.

San Joaquin Valley Upland Species Recovery Plan

The San Joaquin Valley Upland Species Recovery Plan (Upland Species Recovery Plan) covers 34 species of plants and animals that occur in the San Joaquin Valley. The plan's 11 listed species comprise the following.

Five plant species are listed as endangered under FESA:

- California jewelflower (Caulanthus californicus),
- Palmate-bracted bird's-beak (Cordylanthus palmatus),
- Kern mallow (Eremalche parryi ssp. kernensis),
- San Joaquin woolly-threads (Lembertia congdonii), and
- Bakersfield cactus (Opuntia basilaris var. treleasei);

Five animal species are listed as endangered:

- Giant kangaroo rat (*Dipodomys ingens*),
- Fresno kangaroo rat (*Dipodomys nitratoides exilis*),
- Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*),
- Blunt-nosed leopard lizard (*Gambelia silus*), and
- San Joaquin kit fox (*Vulpes macrotis mutica*).

One plant species is listed as threatened:

- Hoover's wooly-star (*Eriastrum hooveri*); and

Twenty-three plant and animal species are listed as candidates or species of concern are as follows:

- Lesser saltscale (*Atriplex minuscula*),
- Bakersfield smallscale (*Atriplex tularensis*),

- Lost Hills saltbush (*Atriplex vallicola*),
- Vasek's clarkia (*Clarkia tembloriensis Vasek* ssp. *calientensis*),
- Temblor buckwheat (*Eriogonum temblorense*),
- Tejon poppy (*Eschscholzia lemmonii* ssp. *kernensis*),
- Diamond-petaled California poppy (*Eschscholzia rhombipetala*),
- Comanche Point layia (*Layia leucopappa*),
- Munz's tidy-tips (*Layia munzii*),
- Jared's peppergrass (*Lepidium jaredii*),
- Merced monardella (*Monardella leucocephala*),
- Merced phacelia (*Phacelia ciliata* var. *opaca*), and
- Oil neststraw (*Stylocline citroleum*).
- Ciervo aegialian scarab beetle (*Aegialia concinna*),
- San Joaquin dune beetle (*Coelus gracilis*),
- Doyen's dune weevil (*Trigonoscuta* sp.),
- San Joaquin antelope squirrel (*Ammospermophilus nelsoni*),
- Short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*),
- Riparian woodrat (*Neotoma fuscipes riparia*),
- Tulare grasshopper mouse (*Onychomys torridus tularensis*),
- Buena Vista Lake shrew (*Sorex ornatus relictus*),
- Riparian brush rabbit (*Sylvilagus bachmani riparius*), and
- San Joaquin Le Conte's thrasher (*Toxostoma lecontei lecontei*).

The ultimate goal of this recovery plan is to delist the 11 endangered and threatened species and ensure the long-term conservation of the 23 candidates and species of concern. An interim goal is to reclassify the endangered species to threatened status. USFWS is responsible for implementation of the Upland Species Recovery Plan.

Migratory Bird Treaty Act

With the presence of certain habitats present within, and adjacent to, the proposed Project site, the potential exists for migratory birds, including raptors to utilize the vegetation for nesting. The Migratory Bird Treaty Act (MBTA) is a law that fully protects all migratory birds and their respective parts (i.e., eggs, nests and feathers). The MBTA protects migratory birds through conventions that are common to Canada, Japan, Mexico, Russia, and the United States.

Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668, enacted by 54 Stat. 250)

The Bald and Golden Eagle Protection Act (BGEPA) of 1940 protects bald and golden eagles by prohibiting the taking, possession, and commerce of such birds and establishes civil penalties for violation of this Act. Take of bald and golden eagles is defined as follows: "disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or, (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior'' (72 FR 31132; 50 CFR 22.3).

On November 10, 2009, USFWS implemented new rules (74 FR 46835) governing the "take" of golden and bald eagles. The rules were released under the existing BGEPA which has been the primary regulatory protection for unlisted eagle populations since 1940. All activities that may disturb or incidentally take an eagle or its nest as a result of an otherwise legal activity must be permitted by the USFWS under this act.

A programmatic permit would be available to industries or agencies undertaking activities that may disturb or otherwise take eagles on an ongoing operational basis. The USFWS has defined programmatic take as "take that (1) is recurring, but not caused solely by indirect effects, and (2) occurs over the long term and/or in a location or locations that cannot be specifically identified." The second criterion is the key factor that distinguishes programmatic take from any other take that has indirect effects that continue to cause take after the initial action.

In April 2012, a proposed rule change was published by the USFWS regarding take permits for golden eagles that would extend the maximum allowable permit life of a programmatic take permit from 5 to 30 years. The rule would also increase the associated fees to cover the actual costs of processing the permit application. The USFWS is studying the proposal pursuant to the National Environmental Policy Act (NEPA).

State

California Environmental Quality Act (CEQA) (Public Resource Code Section 21000 et seq.)

The California Environmental Quality Act (CEQA) was adopted in 1970 and applies to actions directly undertaken, financed, or permitted by State and local lead agencies. CEQA requires that

agencies inform themselves about the environmental effects of their proposed actions, consider all relevant information, provide the public an opportunity to comment on the environmental issues, and avoid or reduce potential environmental harm whenever feasible. CEQA establishes State policy to prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures. Regulations for implementation are found in the CEQA Guidelines published by the Resources Agency. These guidelines establish an overall process for the environmental evaluation of projects.

Section 15380. Although threatened and endangered species are protected by specific federal and State statutes, CEQA Guidelines Section 15380(b) provides that a species not listed on the federal or State list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in the FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in CEQA primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a candidate species that has not been listed by either USFWS or CDFW. Thus, CEQA provides an agency with the ability to protect a species from the potential impacts of a project until the respective government agencies have an opportunity to designate the species as protected, if warranted. CEQA also calls for the protection of other locally or regionally significant resources, including natural communities. Although natural communities do not at present have legal protection of any kind, CEQA calls for an assessment of whether any such resources would be affected and requires findings of significance if there would be substantial losses. Natural communities listed by CNDDB as sensitive are considered by CDFW to be significant resources and fall under the CEQA Guidelines for addressing impacts. Local planning documents such as general plans often identify these resources as well.

California Endangered Species Act (CESA)

California has a parallel mandate to the FESA, which is the CESA of 1984 and the California Native Plant Protection Act of 1977. These laws regulate the listing and take of plant and animal species designated as endangered, threatened or rare. The State of California also lists Species of Special Concern based on limited distribution, declining populations, diminishing habitat or unusual scientific, recreational or educational value. Under state law, the CDFG is empowered to review projects for their potential to impact listed species and their habitats.

Section 2080. Section 2080 of the California State Fish and Game Code states, "No person shall import into this State [California], export out of this State, or take, possess, purchase, or sell within this State, any species, or any part or product thereof, that the Commission [State Fish and Game Commission] determines to be an endangered species or threatened species, or attempt any of those acts, except as otherwise provided in this chapter, or the Native Plant Protection Act, or the California Desert Native Plants Act." Pursuant to Section 2081 of the California State Fish and Game Code, the CDFW may authorize individuals or public agencies to import, export, take, or possess, any State-listed endangered, threatened, or candidate species as long as they do not have State Fully Protected status. These otherwise prohibited acts may be authorized through permits or a memorandum of understanding (MOU) if: (1) the take is incidental to an otherwise lawful activity; (2) impacts of the authorized take are minimized and fully mitigated; (3) the permit is consistent with any regulations adopted pursuant to any recovery plan for the species; and, (4) the project proponent ensures adequate

funding to implement the measures required by the CDFW. The CDFW makes this determination based on available scientific information and considers the ability of the species to survive and reproduce.

Fully Protected Species. The State of California first began to designate species as "Fully Protected" prior to the creation of the CESA. Lists of Fully Protected species were initially developed to provide protection to those animals that were rare or faced possible extinction, and included fish, mammals, amphibians and reptiles, birds, and mammals. Most Fully Protected species have since been listed as threatened or endangered under the CESA and/or ESA. The regulations that implement the Fully Protected Species Statute (Fish and Game Code Sections 3511, 4700, 5050, 5515) provide that Fully Protected species may not be taken or possessed at any time. Furthermore, the statute prohibits any State agency from issuing incidental take permits for Fully Protected species, except for scientific research or relocation of the bird species for the protection of livestock pursuant to Section 670.7 of the California Code of Regulations or Section 2835 of the Fish and Game Code.

Fish and Game Code

The CDFW is responsible for conserving, protecting and managing California's fish, wildlife and native plant resources. Protected species may not be "taken" or possessed without a permit from the Fish and Game Commission and/or the CDFW. Information on these species can be found within Section 3511 (birds), Section 4700 (mammals), Section 5050 (reptiles and amphibians) and Section 5515 (fish) of the Fish and Game Code. It is unlawful to take the nest or eggs of any bird, or to take any bird of prey per Section 3503 of the Fish and Game Code.

Local

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan cites policies to provide decision-makers with long-range guidance affecting the future character of the Metropolitan Bakersfield planning area. The elements within the Metropolitan Bakersfield General Plan provide goals, policies, and implementation measures in order to reduce impacts to biological resources. Applicable goals relative to the proposed Project within the Biological Resources Element are listed in Table 4.4-3, *Metropolitan Bakersfield General Plan Goals and Policies for Biological Resources*, below.

Table 4.4-3. Metropolitan Bakersfield General Plan Goals and Policies for Biological Resources

Goals and Policies: Conservation/Biological Resources Element
Conservation/Biological Resources Goal #1: "Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources."
Conservation/Biological Resources Goal #2: "To conserve and enhance habitat areas for designated 'sensitive' animal and plant species."
Conservation/Biological Resources Policy #1: "Direct development away from 'sensitive biological resource' areas, unless effective mitigation measures can be implemented."

Table 4.4-3. Metropolitan Bakersfield General Plan Goals and Policies for Biological Resources

Goals and Policies: Conservation/Biological Resources Element
Conservation/Biological Resources Policy #2: "Preserve areas of riparian vegetation and wildlife habitat within floodways along rivers and streams, in accordance with the Kern River Plan Element and channel maintenance programs designed to maintain flood flow discharge capacity."
Conservation/Biological Resources Policy #3: "Discourage, where appropriate, the use of off-road vehicles to protect designated sensitive biological and natural resources."
Conservation/Biological Resources Policy #4: "Determine the feasibility of enhancing sensitive biological habitat and establishing additional wildlife habitat in the study area with State and/or Federal assistance."
Conservation/Biological Resources Policy #5: "Determine the locations and extent of suitable habitat areas required for the effective conservation management of designated "sensitive" plant and animal species."
Conservation/Biological Resources Policy #6: "Investigate the feasibility of including natural areas selected for the habitat conservation plan as a component of the regional park system."

Metropolitan Bakersfield Habitat Conservation Plan (MBHCP)

Kern County and the City of Bakersfield developed the MBHCP to acquire permits that allow take of Federally and State listed species included in the MBHCP area. The permits acquired include a permit under Section 10(a)(1)(B), of the Federal Endangered Species Act (hereafter referred to as a 10(a) permit), and a permit under Section 2081 of the CESA (CESA 9322). The MBHCP is designed to offset impacts resulting from the incidental take of listed species and the loss of habitat incurred through the authorization of otherwise lawful activities. The goal of the MBHCP is to acquire, preserve and enhance native habitats that support special status species while allowing development to proceed as set forth in the Metropolitan Bakersfield General Plan. The study area covered by the MBHCP contains both the City of Bakersfield and Kern County jurisdictions.

The proposed Project is within the boundaries of the adopted MBHCP. The MBHCP meets the requirements of both state and federal endangered species acts and fully complies with state and federal environmental regulations set forth in NEPA and CEQA. Upon payment of the required mitigation fees, currently $2,145 per gross acre, and receipt of project approval, a developer/applicant becomes a subpermittee and is allowed the incidental take of the covered species of the San Joaquin kit fox and Bakersfield cactus in accordance with state and federal endangered species laws. Mitigation fees are used for the acquisition and management of lands for conservation. The lands are held in perpetuity. The MBHCP program has preserved approximately 18,000 acres of endangered species habitat and contributed over six million dollars toward management of preserve areas.

4.4.4 Impacts and Mitigation Measures

Methodology

The potential impacts associated with the proposed Project are evaluated on a qualitative and quantitative basis through a comparison of the anticipated Project effects on biological habitat. The change in the land use is significant if the effects described below occur. The evaluation of proposed Project impacts as based on professional judgment, analysis of the County's biological resources polices and adopted Kern County thresholds in the Kern County CEQA Implementation Document.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies, or regulations or by the CDFG or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFG or USFWS;
- Have a substantial adverse effect on Federally protected wetlands, as defined by Section 404 of the CWA (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; and/or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

Project Impacts

Impact 4.4-1: The Project Would Have a Substantial Adverse Effect, Either Directly or Through Habitat Modifications, on Any Species Identified as a Candidate, Sensitive or Special Status Species in Local or Regional Plans, Policies or Regulations, or by the CDFW or USFWS.

Special Status Plants

According to the Biota Report, the literature review, and based on general habitat conditions (given the decades of intensive row crop farming of the site and adjacent properties), out of 21 special-status plant species that occur in the region of the Project, no plants were determined to potentially exist on the Project site. Therefore, less than significant impacts to special-status plant species are anticipated.

Special Status Wildlife

Of the 32 wildlife species identified as potentially occurring in the region of the project site, 10 of these were determined to have the potential to be affected by the Project. Direct impacts could occur with the construction and development of the proposed Project, which could result in an "incidental take" of a threatened, endangered, or otherwise protected species. Indirect impacts, in the form of loss of foraging habitat associated with a threatened, endangered, or otherwise protected species, may also occur as a result of the development of the proposed Project.

San Joaquin kit fox. No San Joaquin kit fox were observed during the biological surveys of the proposed Project site; however, the Project site represents suitable habitat. Additionally, dens were identified during the 2017 biological survey. The proposed Project site also provides suitable foraging habitat for the species and is within the mapped distribution for the species. In addition, the CNDDB documents the presence of the species in the vicinity of the proposed Project.

Potential direct adverse impacts to the San Joaquin kit fox include direct mortality from vehicle collision, entrapment in open pipes, trenches or pits and contamination. Habitat loss, degradation, and fragmentation are also potential impacts to the species resulting from the proposed Project. Potential indirect impacts to the San Joaquin kit fox resulting from the implementation of the proposed Project include those associated with human habitation of the agricultural property, such as increased traffic, refuse, domestic pets and pedestrian use of adjacent open lands. Such potential impacts to the species resulting from the proposed Project would result in a "take" of the San Joaquin kit fox and be considered a significant impact.

Tulare Grasshopper. No Tulare grasshopper mice were observed during the biological surveys of the proposed Project site. Suitable habitat is present on the project site. Although individual Tulare grasshopper mice may be impacted, the number is likely to be extremely limited based on discing conducted over four consecutive years and no previously known occurrences on the site or in the vicinity. Consequently, impacts to this species are considered less than significant.

Pallid Bat. No Pallid bats were observed during the biological surveys of the proposed Project site. Additionally, no suitable roosting habitat exists on the project site and the site represents marginal foraging habitat for the species. Therefore, no impacts are anticipated given the project size relative to surrounding area which contains similar habitat suitable for foraging.

Greater Wester Mastiff Bat. No Greater western mastiff bats were observed during the biological surveys of the proposed Project site. Additionally, no suitable roosting habitat exists on the project site and the site represents marginal foraging habitat for the species. Therefore, no impacts are anticipated given the project size relative to surrounding area which contains similar habitat suitable for foraging.

Silvery Legless Lizard. No Silvery legless lizards were observed during the biological surveys of the proposed Project site. Although suitable soils for this species exist on the project site and individual silvery legless lizards may be impacted, the number is likely to be extremely limited based on past history of agriculture and disking conducted over four consecutive years. Additionally, no previously known occurrences on the site or in the vicinity. Consequently, impacts to this species are considered less than significant.

However, because the proposed Project lies within the MBHCP area, mitigation and compensation requirements of the implemented MBHCP would reduce listed potential impacts to a less than significant level. Several special status birds have potential, or have been observed, to occur within the proposed Project site. Disturbance of the sensitive bird species would be prohibited under CEQA, CDFG Code, CESA and/or the MBTA. Although the site may represent marginal foraging habitat, it is unlikely that any of these species, except the burrowing owl, use the Project site for nesting purposes due to the lack of suitable nesting habitat. The proposed Project would result in adverse impacts to burrowing owl foraging and nesting habitat.

To reduce impacts to special status species that may occur on the Project site, mitigation provided by the MBHCP would mitigate for the loss of foraging habitat. Compliance with the MBHCP is intended to conserve entire communities and ecosystems. Impacts on habitat for special status species, including San Joaquin kit fox, will be mitigated through the payment of a one-time mitigation fee due prior to disturbance and payable to Kern County at the time grading plans are approved or building permits are issued. The MBHCP mitigation fee is currently $2,145 per gross acre, although it may be increased in the future to keep pace with inflation. The mitigation fee will apply to the acres of all vegetation types directly impacted by the proposed Project. In addition to the MBHCP, conformance to other species protection regulations, such as compliance with Section 3503 of the California Fish and Game Code, which prohibits the disturbance of nesting birds, would ensure impacts to these species are less than significant.

Burrowing Owl. Although no burrowing owls were observed, because the site contains ground squirrel burrows, the site does represent suitable nesting habitat for burrowing owl. Therefore, Project implementation would result in adverse impacts to burrowing owl foraging and nesting habitat. Because the burrowing owl is not covered by the MBHCP, additional avoidance and mitigation measures would be required to avoid violations of the MBTA and California Fish and Game Code.

Northern Harrier Hawk, Sharp-Shinned Hawk and other raptors. Although northern harrier and sharp-shinned hawk were observed during the 2009 biological surveys, Project implementation is not expected to result in adverse impacts to these species as nesting habitat does not occur on-site.

The proposed Project would result in adverse impacts to foraging habitat for sensitive bird species and raptors. American kestrels have been observed foraging on-site and owl and red-tailed hawk roosts were identified within the proposed Project boundaries during the surveys. Mitigation provided by the MBHCP for other sensitive species would mitigate for the loss of foraging habitat because of project implementation. Disturbance of nesting birds, sensitive and non-sensitive, is prohibited by Section 3503 of the California Fish and Game Code. An owl nest and a rock pigeon nest were identified in the eastern portion of the site, during the biological surveys. These species are not considered sensitive species; however, the CDFG Code prohibits disturbance of a nest site until the young have fledged.

Therefore, implementation of mitigation measures and compliance with federal, State, and County guidelines would reduce impacts to special-status species potentially occurring in the vicinity of the project to a less than significant level.

Mitigation Measures

MM 4.4-1: **Biological Monitoring.** Prior to initiation of any site preparation and/or construction activities, the project proponent shall retain a Lead Biologist who shall be approved prior to conducting pre-construction surveys by the Kern County Planning and Natural Resources Department with a submitted resume. The Lead Biologist will have oversight over implementation of all necessary avoidance and minimization efforts and will have the authority to stop construction activities, if any of the requirements associated with these measures are not being fulfilled. If the biologist has requested work activities stop due to take of any listed species, the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife will be notified within 1 day via email and telephone. In addition to the Lead Biologist, all other qualified biologists or monitors working on site, conducting evaluations, etc., shall submit resumes for approval to the Kern County Planning and Natural Resources Department.

MM 4.4-2: **Environmental Awareness Training and Education Program.** Prior to the issuance of grading or building permits and for the duration of construction activities, all new construction workers at the project site shall attend an Environmental Awareness Training and Education Program (WEAP), developed and presented by the Lead Biologist. Any employee responsible for the operations and maintenance or decommissioning of the project facilities shall also attend the Environmental Awareness Training and Education Program.

a. The Training Program shall include, but not be limited to, information on the life history of species including the blunt-nosed leopard lizard, San Joaquin whipsnake, coast horned lizard, burrowing owl, Swainson's hawk, prairie falcon, Le Conte's thresher, Nelson's antelope squirrel, giant kangaroo rat, short-nosed kangaroo rat, Tipton kangaroo rat, Tulare grasshopper mouse, San Joaquin pocket mouse, American badger, nesting birds, and San Joaquin kit fox, as well as other wildlife and plant species that may be encountered during construction activities, their legal protections, the definition of "take" under the Endangered Species Act, measures to protect the species, reporting requirements, specific measures that each worker shall employ to avoid take of wildlife species, and penalties for violation of the Act.

b. To ensure employees and contractors understand their roles and responsibilities, training may be conducted in languages other than English.

    1. An acknowledgement form signed by each worker indicating that Environmental Awareness Training and Education Program has been completed would be kept on record;

    2. A sticker shall be placed on hard hats indicating that the worker has completed the Environmental Awareness Training and Education Program. Construction workers shall not be permitted to operate equipment within the construction areas unless they have attended the

Environmental Awareness Training and Education Program and are wearing hard hats with the required sticker;

3. A copy of the training transcript and/or training video, as well as a list of the names of all personnel who attended the Environmental Awareness Training and Education Program and copies of the signed acknowledgement forms shall be submitted to the Kern County Planning and Natural Resources Department; and,

4. The construction crews and contractor(s) shall be responsible for unauthorized impacts from construction activities to sensitive biological resources that are outside the areas defined as subject to impacts by project permits.

5. An Operation and Maintenance-phase version of the WEAP will be maintained within the onsite O&M facility for review as may be necessary during the life of the project.

6. All vehicles will be directed to exercise caution when commuting within the project area. A 15-mile per hour speed limit will be enforced on unpaved roads.

7. Project employees will be provided with written guidance governing vehicle use, speed limits on unpaved roads, fire prevention, and other hazards.

8. A litter control program shall be instituted at the project site. All workers shall ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash from the project area are deposited in covered or closed trash containers. The trash containers shall be removed from the project area at the end of each working day.

9. No canine or feline pets or firearms (except for federal, state, or local law enforcement officers and security personnel) shall be permitted on construction sites to avoid harassment, killing, or injuring of listed species.

10. Maintenance and construction excavations greater than 2 feet deep shall be covered, filled in at the end of each working day, or have earthen escape ramps no greater than 200 feet apart provided to prevent entrapment of listed species.

11. All construction activities shall be confined within the project construction area, which may include temporary access roads, haul roads, and staging areas specifically designated and marked for these purposes. At no time shall equipment or personnel be allowed to adversely affect areas outside the project site.

12. Because dusk and dawn are often the times when listed species are most actively foraging, all construction activities will cease 0.5 hour before sunset and will not begin prior to 0.5 hour before sunrise. Except when necessary for driver or pedestrian safety, lighting of the project site by artificial lighting during nighttime hours is prohibited.

13. Tightly woven fiber netting or similar material shall be used for erosion control or other purposes at the project site to ensure that special-status species do not get trapped. This limitation will be communicated to the contractor through use of Special Provisions included in the bid solicitation package.

14. Use of rodenticides and herbicides at the project site shall be avoided to the maximum extent feasible. If use is unavoidable, rodenticides and/or herbicides shall be utilized in such a manner to prevent primary or secondary poisoning of special-status species and depletion of prey populations on which they depend. All uses of such compounds shall observe labels and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Pesticide Regulation, and other appropriate state and federal regulations as well as additional project-related restrictions deemed necessary by the U.S. Fish and Wildlife Service or California Department of Fish and Wildlife.

MM 4.4-3: **Preconstruction Surveys.** A pre-construction survey by a qualified biologist or monitor shall be conducted no more than 30 days and no less than 14 days prior to the commencement of any site preparation, ground disturbance, and/or construction activities in previously undisturbed areas of the project site. If any evidence of occupation of that portion of the project site by listed or other special-status plant or animal species is observed, a buffer shall be established by a qualified biologist that results in sufficient avoidance to comply with applicable regulations. If sufficient avoidance cannot be established, the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife shall be contacted for further guidance and consultation on additional measures. The project proponent or operator shall obtain any required permits from the appropriate wildlife agency. Copies of the pre-construction survey and results, as well as all permits and evidence of compliance with applicable regulations, shall be submitted to the Kern County Planning and Natural Resources Department.

The following buffer distances shall be established prior to commencement of any site preparation and/or construction activities, if any listed or other special status plant or animal species is observed:

a. San Joaquin kit fox or American badger potential den: 50 feet;

b. San Joaquin kit fox or American badger known den: 100 feet;

c. San Joaquin kit fox or American badger pupping den: contact the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife;

d. Burrowing owl burrow outside of breeding season: as recommended by the California Department of Fish and Wildlife Staff Report 2012;

e. Burrowing owl burrow during breeding season: as recommended by the California Department of Fish and Wildlife Staff Report 2012;

f. Swainson's hawk nest during breeding season: 0.5 mile;

g. Other protected raptor nests during the breeding season: as recommended by a qualified biologist;

h. Other protected nesting migratory bird nests during the breeding season: as recommended by a qualified biologist; and

i. Coast horned lizard, San Joaquin whipsnake, and other special-status wildlife species: as recommended by a qualified biologist.

MM 4.4-4: If construction activities are conducted during the typical nesting bird season (February 15 through September 15), pre-construction surveys shall be conducted by a qualified biologist prior to any site preparation and/or construction activity to identify potential nesting bird activity. The survey area shall include a 500-foot buffer surrounding the property. If no active nests are found within the survey area, no further mitigation is required. If nesting activity is identified during the pre-construction survey process, the following measures will be implemented:

a. If active nest sites of bird species protected under the Migratory Bird Treaty Act and/or California Fish and Game Code are observed within the project site, then the project will be modified and/or delayed as necessary to avoid direct take of the identified nests, eggs, and/or young;

b. If active nest sites of raptors and/or bird species of special concern are observed within the vicinity of the project site, then the appropriate buffer around the nest site (typically 250 feet for passerines and 500 feet for raptors) will be established. Construction activities in the buffer zone will be prohibited until the young have fledged the nest and achieved independence; and,

c. Active nests shall be documented by a qualified biologist, and a letter report shall be submitted to the Kern County Planning and Natural Resources Department documenting project compliance with the Migratory Bird Treaty Act and California Fish and Game Code.

MM 4.4-5: Within 6 months prior to commencement of site preparation and/or construction activities, the project proponent shall ensure that a U.S. Fish and Wildlife Service-approved biologist conducts a protocol survey for blunt-nosed leopard lizard in

accordance with the guidelines published by the California Department of Fish and Wildlife, Region 4, Fresno Office (CDFW 2004). If blunt-nosed leopard lizards are located within the action area, the U.S. Fish and Wildlife Service will be contacted to discuss methods for proceeding with the project in a manner which will avoid take.

MM 4.4-6: **Burrowing Owl.** The project proponent shall implement the following measures, based on the recently updated California Department of Fish and Game (now California Department of Fish and Wildlife) 2012 Staff Report on Burrowing Owl Mitigation, to ensure potential impacts to burrowing owl resulting from project implementation will be avoided and minimized to less-than-significant levels:

a. A qualified wildlife biologist (i.e., a wildlife biologist with previous burrowing owl survey experience) shall conduct pre-construction surveys of the permanent and temporary impacts areas, plus an ISO-meter (approximately 492-foot) buffer, to locate active breeding or wintering burrowing owl burrows no less than 14 days prior to construction. The survey methodology will be consistent with the methods outlined in the Staff Report and will consist of walking parallel transects 7 to 20 meters apart, adjusting for vegetation height and density as needed, and noting any potential burrows with fresh burrowing owl sign or presence of burrowing. As each burrow is investigated, biologists will also look for signs of American badger and kit fox. Copies of the survey results shall be submitted to the California Department of Fish and Wildlife and Kern County Planning and Natural Resources Department.

If burrowing owls are detected, no ground-disturbing activities, such as road construction or ancillary facilities, shall be permitted within the distances listed below in the table titled "Burrowing Owl Burrow Buffers," unless otherwise authorized by California Department of Fish and Wildlife. Burrowing owls shall not be moved or excluded from burrows during the breeding season.

If avoidance of active burrows is infeasible, the owls can be passively displaced from their burrows according to recommendations made in the 2012 Staff Report on Burrowing Owl Mitigation. Burrowing owls should not be excluded from burrows unless or until:

a. Occupied burrows shall not be disturbed during the nesting season unless a qualified biologist meeting the Biologist Qualifications set forth in the May 2012 California Department of Fish and Wildlife Staff Report, verifies through noninvasive methods that either: (1) the owls have not begun egg-laying and incubation; or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival. Burrowing owls will not be moved or excluded from burrows during the breeding season.

A Burrowing Owl Exclusion Plan is developed and approved by the applicable local California Department of Fish and Wildlife office and submitted to the Kern

County Planning and Natural Resources Department. The plan shall include, at a minimum:

a. Confirm by site surveillance that the burrow(s) is empty of burrowing owls and other species preceding burrow scoping;

b. Type of scope and appropriate timing of scoping to avoid impacts;

c. Occupancy factors to look for and what will guide determination of vacancy and excavation timing (one-way doors should be left in place 48 hours to ensure burrowing owls have left the burrow before excavation, visited twice daily, and monitored for evidence that owls are inside and can't escape, i.e., look for sign immediately inside the door);

d. How the burrow(s) will be excavated. Excavation using hand tools with refilling to prevent reoccupation is preferable whenever possible (may include using piping to stabilize the burrow to prevent collapsing until the entire burrow has been excavated and it can be determined that owls reside the burrow);

e. Removal of other potential owl burrow surrogates or refugia on-site;

f. Photographing the excavation and closure of the burrow to demonstrate success and sufficiency;

g. Monitoring of the site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use to avoid take;

h. How the impacted site will continually be made inhospitable to burrowing owls and fossorial mammals (e.g., by allowing vegetation to grow tall, heavy disking, or immediate and continuous grading) until development is complete.

Permanent loss of occupied burrow(s) and habitat is mitigated in accordance with the measures described below.

Temporary exclusion is mitigated in accordance with the measures described below.

Site monitoring is conducted prior to, during, and after exclusion of burrowing owls from their burrows sufficient to ensure take is avoided. Conduct daily monitoring for 1 week to confirm young of the year have fledged if the exclusion will occur immediately after the end of the breeding season.

Excluded burrowing owls are documented using artificial or natural burrows on an adjoining mitigation site (if able to confirm by band re-sight).

In accordance with the Burrowing Owl Exclusion Plan, a qualified wildlife biologist shall excavate burrows using hand tools. Sections of flexible plastic pipe or burlap bag shall be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow. One-way doors shall be installed at the entrance to the active burrow and other potentially active burrows within 160 feet of the active burrow. The one-way doors can be removed 48 hours after installation, and ground-disturbing activities can proceed. Alternatively, burrows can be filled to prevent reoccupation.

During construction activities, monthly and final compliance reports shall be provided to the California Department of Fish and Wildlife, Kern County Planning and Natural Resources Department, and other applicable resources agencies documenting the effectiveness of mitigation measures and the level of burrowing owl take associated with the proposed project.

Should burrowing owls be found on-site, compensatory mitigation for lost breeding and/or wintering habitat shall be implemented on-site or off-site in accordance with Burrowing Owl Staff Report guidance and in consultation with the California Department of Fish and Wildlife. At a minimum, the following recommendations shall be implemented:

a. Temporarily disturbed habitat shall be restored, if feasible, to pre-project conditions, including decompacting soil and revegetating. If restoration is not feasible, then the project proponent shall implement (2) below.

Permanent impacts to nesting, occupied, and satellite burrows and/or burrowing owl habitat will be mitigated such that the habitat acreage, number of burrows, and burrowing owls impacted are replaced based on a site-specific analysis and shall include:

a. Permanent conservation of similar vegetation communities (grassland, scrublands, desert, urban, and agriculture) to provide for burrowing owl nesting, foraging, wintering, and dispersal (i.e., during breeding and non-breeding seasons) comparable to or better than that of the impact area, and with sufficiently large acreage, and presence of fossorial mammals. Conversation shall occur in areas that support burrowing owl habitat and can be enhanced to support more burrowing owls.

Permanently protect mitigation land through a conservation easement deeded to a nonprofit conservation organization or public agency with a conservation mission. If the project is located within the service area of a California Department of Fish and Wildlife-approved burrowing owl conservation bank, the project operator may purchase available burrowing owl conservation bank credits.

Develop and implement a mitigation land management plan in accordance with Burrowing Owl Staff Report guidelines to address long-term ecological sustainability and maintenance of the site for burrowing owls.

Fund the maintenance and management of mitigation land through the establishment of a long-term funding mechanism such as an endowment.

Habitat shall not be altered or destroyed, and burrowing owls shall not be excluded from burrows, until mitigation lands have been legally secured, are managed for the benefit of burrowing owls according to California Department of Fish and Wildlife-approved management, monitoring and reporting plans, and the endowment or other long-term funding mechanism is in place or security is provided until these measures are completed.

Mitigation lands should be on, adjacent to, or in proximity to the impact site, where feasible, and where habitat is sufficient to support burrowing owls.

Consult with the California Department of Fish and Wildlife when determining off-site mitigation acreages.

MM 4.4-7: **Burrowing Owl Buffers.** The project proponent shall continuously comply with the following: If any burrowing owl burrows are observed during the pre-construction survey, avoidance measures shall be consistent with those included in the California Department of Fish and Wildlife staff report on burrowing owl mitigation (CDFG, 2012).

If occupied burrowing owl burrows are observed outside of the breeding season, a passive relocation effort may be instituted in accordance with the guidelines established by the California Burrowing Owl Consortium (1993) and the California Department of Fish and Wildlife (CDFG, 2012) (Table 1). During the breeding season, a buffer zone, as noted in Table 1, shall be maintained unless a qualified biologist verifies through noninvasive methods that either the birds have not begun egg laying and incubation or that juveniles from the occupied burrows are foraging independently and are capable of independent survival. Buffer zones may be reduced in size through consultation with appropriate agencies and the project biologist to determine if avoidance would still be achieved. The Kern County Planning and Natural Resources Department shall be kept apprised of meetings and correspondence for any consultation.

Table 4.4-4. Burrowing Owl Burrow Buffers (CDFG Staff Report, 2012)

Location	Time of Year	Level of Disturbance		
		Low	Medium	High
Nesting Sites	April 1-Aug 15	656 ft	1,640 ft	1,640 ft
Nesting Sites	Aug 16-Oct 15	656 ft	656 ft	1,640 ft
Any Occupied Burrow	Oct 16-Mar 31	164 ft	328 ft	1,640 ft

MM 4.4-8: **Trash Abatement.** Prior to issuance of grading or building permits, a long-term trash abatement program shall be established for construction, operations and maintenance. Trash and food items shall be contained in closed containers and removed daily.

MM 4.4-9: **Trash Abatement and Trench Monitoring Requirements.** Prior to and during construction activities, the project proponent shall ensure the project complies with the following:

a. Any pipe, culvert, or similar structure with a diameter of 4 inches or greater, stored onsite for one or more nights shall be inspected to ensure kit foxes or other wildlife have not become entrapped or buried in the pipes. If the pipes, culverts, or similar structures with a diameter of 4 inches or greater are not capped or otherwise covered, they shall be inspected twice daily, in the morning and evening, and prior to burial or closure, to ensure no kit foxes or other wildlife become entrapped or buried in the pipes.

b. All food, garbage, and plastic shall be disposed of in closed containers and regularly removed from the site to minimize attracting ranging kit fox, or other wildlife to the site where they may be harmed. All trash shall be removed and disposed of regularly in accordance with state and local laws and regulations.

MM 4.4-10: **San Joaquin kit fox.** Prior to and during construction activities:

a. If any San Joaquin kit fox dens are found during pre-construction surveys, the status of the dens shall be evaluated no more than 14 days prior to project ground disturbance. Provided that no evidence of kit fox occupation is observed, potential dens shall be marked and a 50-foot avoidance buffer delineated using stakes and flagging or other similar material to prevent inadvertent damage to the potential den. If a potential den cannot be avoided, it may be hand-excavated following United States Fish and Wildlife Service standardized recommendations for protection of the San Joaquin kit fox prior to or during ground disturbance by the lead biologist. If kit fox activity is observed at a den, the den status shall change to "known" per United States Fish and Wildlife Service guidelines (1999), and the buffer distance shall be increased to 100 feet. Absolutely no excavation of San Joaquin kit fox known or pupping dens shall occur without prior authorization from the United States Fish and Wildlife Service and California Department of Fish and Wildlife.

b. To enable kit foxes and other wildlife (e.g., American badger) to pass through the project site during construction, the perimeter security fence shall leave a 5-inch opening between the fence mesh and the ground or the fence shall be raised 5 inches above the ground. The bottom of the fence fabric shall be knuckled (wrapped back to form a smooth edge) to protect wildlife that passes under the fence.

c. All pipes, culverts, or similar structures with a diameter of four inches or more that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the United States Fish and Wildlife Service has been consulted. If necessary, under the direct supervision

of the biologist, the pipe may be moved once to remove it from the path of construction activity until the fox has escaped.

d. To prevent inadvertent entrapment of San Joaquin kit foxes, badgers, or other animals during construction, all excavated, steep-walled holes or trenches more than two feet deep shall be covered with plywood or similar materials at the close of each working day, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals. If trapped animals are observed, escape ramps or structures shall be installed immediately to allow escape. If listed species are trapped, the United States Fish and Wildlife Service and California Department of Fish and Wildlife shall be contacted.

e. All vertical tubes used in project construction, such as chain link fencing poles shall be temporarily or permanently capped at the time they are installed to avoid the entrapment and death of special-status birds.

MM 4.4-11: **Nesting Birds.** A pre-construction protocol-level surveys by a qualified biologist for nesting birds shall be required if construction activities are scheduled to occur during the breeding season for raptors and other migratory birds (February 1–August 31), to reduce potential impacts to nesting birds and raptors. The survey shall be conducted within 30 days of ground disturbance activities.

a. If any nesting birds/raptors are observed, a qualified biologist shall determine buffer distances and/or the timing of project activities so that the proposed project does not cause nest abandonment or destruction of eggs or young. This measure shall be implemented so that the proposed project remains in compliance with the Migratory Bird Treaty Act and applicable State regulations.

MM 4.4-12: Prior to any vegetation removal during site preparation, the areas required for construction shall be surveyed for actively nesting birds. If any wildlife is encountered during the course of construction, the wildlife shall be allowed to leave the construction area unharmed. Should any active bird nests be identified, the vegetation shall not be removed in areas that contain actively nesting birds. A biological monitor shall survey the areas of vegetation slated for removal, a report shall be submitted to the Kern County Planning and Natural Resources Department for review prior to site preparation.

MM 4.4-13: The measures below shall be implemented throughout construction and operation of the project:

a. Project-related vehicles shall observe a 15 mile-per-hour speed limit in all project areas, except on county roads and State and federal highways. Construction after sundown shall be prohibited. Off-road traffic outside of designated project areas shall be prohibited.

b. No pets shall be allowed in project areas, except for trained canine animals related to security and operation of the facility.

c. All uses of such herbicidal and rodenticide compounds shall observe label and other restrictions mandated by the United States Environmental Protection Agency, California Department of Food and Agriculture, and federal and State legislation as well as additional project-related restrictions deemed necessary by the California Department of Fish and Wildlife and/or the United States Fish and Wildlife Service.

d. No plants or wildlife shall be collected, taken, or removed from the construction areas or areas of off-site improvements, except as necessary for project-related vegetation removal or wildlife relocation. Salvage of native vegetation to be removed from construction areas is encouraged but shall only be performed by qualified biologists and with written approval from the California Department of Fish and Wildlife.

e. If San Joaquin kit fox known or pupping dens are observed in project areas, the project proponent shall contact the United States Fish and Wildlife Service and California Department of Fish and Wildlife to discuss appropriate actions.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.4-2: The Project Would Have a Substantial Adverse Effect on any Riparian Habitat or Other Sensitive Natural Community Identified in Local or Regional Plans, Policies, Regulations, or by the CDFG or USFWS.

The proposed Project site does not contain any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFW or USFWS. Two agricultural sumps were identified within the proposed Project boundaries; however, they are not considered a wetland-riparian habitat. Lined and unlined irrigation ditches throughout the Project site; however, they do not provide sensitive habitat because of regular maintenance and clearing. Accordingly, potential wetland, riparian, or other aquatic habitats were not identified on-site during the biological surveys or reviews of regional plans. Consequently, no substantial adverse effect will occur as a result of the development of the project. Impacts would be considered less than significant and additional mitigation is not required

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.4-3: The Project Would Have a Substantial Adverse Effect on Federally Protected Wetlands, as Defined by Section 404 of the CWA (Including, But Not Limited to, Marsh, Vernal Pool, Coastal, etc.) Through Direct Removal, Filling, Hydrological Interruption or Other Means.

The proposed Project does not contain any features identified in wetland categories appear on the USFWS National Wetlands Inventory mapping (McIntosh & Associates 2009; McCormick Biological 2017). Therefore, the proposed Project would not result in the disturbance to any wetland, no impacts would occur, and additional mitigation is not required.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.4-4: The Project Would Interfere Substantially with the Movement of Any Native or Migratory Fish or Wildlife Species or With Established Native Resident or Migratory Wildlife Corridors or Impede the Use of Native Wildlife Nursery Sites.

The entire Project site is highly disturbed in nature due to agricultural activities and the proposed Project site does not contain any wildlife movement corridors. Wildlife corridors can be defined as connections between wildlife blocks that meet specific habitat needs for species movement generally during migratory periods but seasonally as well. While wildlife corridor width requirements can vary based on the needs of the species utilizing them, wildlife corridors generally contain habitat dissimilar to the surrounding vicinity and include examples such as riparian areas along rivers and streams, washes, canyons, or otherwise undisturbed areas within urbanization. The Project site does not contain any of these types of habitats and contains no water bodies that would be used by any fish species. Land uses on properties surrounding the proposed Project consist of residential or other agricultural uses. Overall, the proposed Project is not anticipated to significantly impair or impact movement or migration of wildlife species. However, the proposed Project contains open areas (vacant land) that is adjacent to properties that contain open areas. Therefore, there is the potential for wildlife species to traverse the Project site. Mitigation Measures MM 4.4-1 through MM 4.4-12 would be implemented as part of the proposed Project and ensure impacts remain less than significant.

Mitigation Measures

Implement Mitigation Measures MM 4.4-1 through MM 4.4-12, above.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.4-5: The Project Would Conflict With Any Local Policies or Ordinances Protecting Biological Resources, Such as a Tree Preservation Policy or Ordinance.

The proposed Project is required to comply with the MBHCP and all requirements in the Kern County Ordinance Codes and the Metropolitan Bakersfield General Plan. There are no biological resources on the Project site that are protected by local policies. Therefore, the proposed Project would not conflict with any local policies or ordinances that protect biological resources.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.4-6: The Project Would Conflict with the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan or Other Approved Local, Regional or State Habitat Conservation Plan.

As discussed above, the proposed Project is located within the MBHCP. The proposed Project would implement the policies required by the MBHCP, which provides mitigation sufficient to reduce potential impacts to a less than significant level. Conformance to the requirements, including payment of fees, would ensure that no conflict with any HCP, NCCP, or other approved local, regional, or state habitat conservation plan occurs. Additionally, consultation with USFWS and CDFW regarding special-status species is not required due to the implementation of the MBHCP. Therefore, the Project will not conflict with the provisions of the MBHCP. Impacts would be less than significant, and no additional mitigation is required included.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Ecological Communities Previously Occurring within the Metropolitan Bakersfield General Plan Area

The proposed Project would not result in cumulative impacts to wetlands or other sensitive habitats, special status plants, violation of local or ordinances protecting biological resources, or conflict with an adopted HCPs, NCCPs, or other approved local, regional, or State HCPs. The Metropolitan Bakersfield General Plan lists 21 sensitive natural communities know to occur or potentially occur in

the Bakersfield area. Of these 21 sensitive ecological communities, no sensitive natural communities occur within the proposed Project boundaries. The proposed Project boundaries include agricultural and ruderal habitat types.

Because no sensitive natural communities are present within the proposed Project boundaries, impacts would be less than significant. However, as a byproduct of the applicant paying mitigation fees to acquire habitat to support San Joaquin kit fox, some grasslands are anticipated to be acquired, leading to a potential for a net benefit to this resource.

Mitigation Measures

Implement Mitigation Measures MM 4.4-1 through MM 4.4-12, above.

Level of Significance after Mitigation

Impacts would be less than significant.

Species of Concern Occurring within the Metropolitan Bakersfield General Plan Area

Plants

Ten special-status plant species were identified within the boundaries of the Metropolitan Bakersfield General Plan area:

- Bakersfield cactus (*Opuntia treleasei*),
- Bakersfield saltbush (*Atriplex tularensis*),
- Hoover's wooly-star (*Eriastrum hooveri*),
- California jewel flower (*Caulanthus californicus*),
- Kern mallow (*Ermalche kernensis*),
- Tulare pseudobahia (*Pseudobahai peirsonii*),
- Striped adobe lily (*Fritillaria straita*),
- Slough thistle (*Cirsium crassicule*),
- Recurved larkspur (*Delphinium recuvatum*), and
- San Joaquin wooly-threads (*Lembertia congdonii*).

Of the above listed plants, no species were identified as occurring on the proposed Project site. The Applicant's contribution to purchase mitigation habitat that supports San Joaquin kit fox (per requirements of the MBHCP) would, as a beneficial side-effect of acquiring undeveloped property to protect that species, acquire property that could support one or more of the seven special-status plant species listed above.

Wildlife

Seven special-status wildlife species were identified within the boundaries of the Metropolitan Bakersfield General Plan area:

- San Joaquin kit fox,
- Blunt-nosed leopard lizard,
- Tipton kangaroo rat,
- Short-nosed kangaroo rat,
- Giant kangaroo rat,
- San Joaquin antelope ground squirrel, and
- San Joaquin pocket mouse.

Of the above lists wildlife species, only evidence of San Joaquin kit fox was identified on the Project site. The San Joaquin kit fox is known to occur in the vicinity of the proposed Project site and although none were observed, dens were identified within the proposed Project boundaries. The Applicant will be required to pay a fee pursuant to the MBHCP to purchase habitat to support the lifecycle needs of this species. The Applicant's contribution to purchase mitigation habitat that supports San Joaquin kit fox will, as a beneficial side effect, acquire property that could support one or more of the other six special-status wildlife species listed above. No significant cumulative impacts are anticipated.

Mitigation Measures

Implement Mitigation Measures MM 4.4-1 through MM 4.4-12, above.

Level of Significance after Mitigation

Impacts would be less than significant.

Section 4.5

Cultural Resources

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Section 4.5
Cultural Resources

4.5.1 Introduction

This section of the RDEIR addresses the potential cultural resources impacts associated with construction and operation of the proposed Project. It describes the cultural background and setting of the Project area, discusses the regulatory setting, and provides the results of cultural resources surveys and analyses conducted for the proposed Project. Potential impacts on cultural resources that could result from the proposed Project, including prehistorical and historical archaeological sites and paleontological discoveries, are also discussed and feasible mitigation measures are provided.

The purpose of this section is to identify the potential for cultural resources to occur on the property and to assess the significance of such resources. A Phase I Cultural Resource Survey was prepared by Hudlow Cultural Resource Associates in October of 2008 and revised in May 2009. Included in the original report is information from two records searches and complete site survey of the Project area completed between February and March 2006. A subsequent Field Check and Record Search was prepared by Hudlow Cultural Resource Associates in March 2016 and revised in July 2017. See Appendix E, *Cultural Resources*. And Appendix N, *Original Technical Studies.*

The analysis in this section has been prepared in accordance with Section 15064.5 of the California Quality Act (CEQA) Guidelines, which considers potential impacts on prehistoric, historic, and paleontological resources.

4.5.2 Environmental Setting

The proposed Project is situated in the southern San Joaquin Valley in Kern County, California. The Project site consists of approximately 314.30 acres, generally located north of Houghton Road, east of State Route (SR) 99, west of South Union Avenue, and south of DiGiorgio Road, within the unincorporated area of Kern County, California.

The approximately 314.30-acre Project site consists of vacant, disked land that has been utilized for row-crop agriculture. The proposed Project site is mostly vacant; however, the site does contain a steel storage building associated with agricultural activities, one plugged and abandoned oil well, two active, diesel-powered irrigation wells, and one domestic well. The surrounding land uses includes vacant and agricultural lands and a cluster of single-family residential to the east and an automobile wrecking yard to the south.

The proposed Project is located along the southwestern edge of the San Joaquin Valley. The San Joaquin Valley is characterized by relatively low rainfall, averaging less than 10 inches per year, mostly between January and March. Average temperatures are relatively high, and total evaporation exceeds total precipitation. Summers are mostly cloudless, hot, and dry, with daytime temperatures frequently above 100 °Fahrenheit (°F). Winters are generally cool and foggy, but occasionally freezing temperatures occur.

The Kern County General Plan (KCGP) describes the Valley Region as "the southern San Joaquin Valley below an elevation of 1,000 feet [mean sea level] msl" within Kern County. The proposed Project area is located at elevations between 330 and 340 feet above msl.

Ethnographic and Archaeological Context

The proposed Project is located within the territory historically occupied by the Yokuts. The Yokuts were a California Penutian family of languages population who were allied linguistically with other Penutian speakers of the Uto-Aztecan linguistic stock such as the Miwok, Costanoan, Maiduan and Wintuan. The word "Yokuts" is an English version of the term for "person" or "people" in the Yawelmani dialect, while the word "Yawelmani" itself means "where the animal hole is, at the animal hole". The Yokuts are unique among California natives in that they are divided into true tribes. Each tribe has a name, a dialect, and a territory. The Yokuts occupied the majority of the San Joaquin Valley, as well as some of the foothills of the Sierra Nevada. Distinction has been made between the Southern Valley Yokuts, who inhabited the San Joaquin Valley from the lower Kings River in the north to the Tehachapi Mountains in the South, and the Northern Valley Yokuts who inhabited the Valley from the southern extent of the San Joaquin River to slightly north of the Calaveras River. Additionally, the Foothill Yokuts occupied the foothills of the Sierra Nevada between the Fresno and Kern Rivers. The tribe of the Southern Valley Yokuts that inhabited the Project area was the Yawelmani or Yaudimni, who occupied the village of Woilo ("planting place", "sowing place" – the name was given after mission influences began to reach them) that was situated on the site of present day Bakersfield. Below the City, on one of the channels of the river draining toward Kern Lake was the village of Kuyo and Halau.

Prior to the introduction of European agricultural practices, the San Joaquin Valley was a vast wetland area, comprised on interconnected lakes, sloughs, and rivers, interspersed with marshes of tules and dry ground. This unique environment provided the Yokuts with a great abundance of resources. Waterfowl, fish, turtles, and freshwater mussels were hunted or gathered by the Yokuts from the wetlands, while surrounding plains provided large mammals such as tule elk and pronghorn antelope. The starchy tule root was utilized for food, as were a variety of other plants. Single-family structures were built of tule mats covering a wooden framework; larger communal houses were similarly constructed. Canoes for transport were constructed of bundled balsas or dried tules. The political organization of Southern Valley Yokuts was characterized by small groups or tribes. No overall political unity existed within the several Southern Valley Yokuts tribes. Rather they were split into self-governing local groups or miniature tribes, averaging 350 members. Each had a special name and spoke a different dialect. A strip of territory of approximately 250 square miles belonged to each tribe. The land was owned collectively, and every tribal member utilized its resources. In some localities, tracts that yielded plentiful supplies of seeds were claimed by individual women.

There are three general archaeological periods: The Proto-Archaic, Archaic, and the Post-Archaic. The Proto-Archaic period dates back 11,000 to 8,000 years ago. A deeply buried stratum on the western shore of Buena Vista Lake was radiocarbon-dated at 6,000 B.C. The site was found to contain a meager range of stone artifacts used for the killing and butchering of big game. Thereafter, bands of hunters frequented the area at an early date, exploiting the herds of large game animals. Subsequently, tools uncovered in sites on Buena Vista Lake included seed-grinding implements, which suggested a shift from hunting to a food-collecting economy. The third archaeological period,

the Post Archaic, includes the cultures of the Yokuts and their immediate antecedents. By this period, the native inhabitants had developed a diverse subsistence pattern through greater exploitation of the natural foods from the lakes and marshes. At this time, the people had developed a culture of greater material wealth and lived in larger settlements. It has been estimated that the total Yokut population was about 5,250 for the 15 southern Joaquin Valley tribes. The ancestral Yokuts have possibly been in the valley for the last three-thousand years, and by the eighteenth century were the largest pre-contact population, approximately 40,000 individuals, in California (Hudlow Cultural Resource Associate 2009).

Historical Context

Contact with Europeans began in 1772, when Pedro Fages entered the southern San Joaquin Valley via Tejon Pass with a band of soldiers. Subsequent contact with the Spanish had little effect on the Yokuts' way of life. Unlike other groups, such as the Tongva to the south or the Chumash to the west, the Yokuts were modestly affected by missionization. By the first half of the 19th century, the southern San Joaquin Valley witnessed an influx of Native Americans from other areas seeking to escape mission control. However, the influx of settlers into the San Joaquin Valley after the annexation of California by the United States ended the traditional Yokut way of life. In 1851, the tribes agreed to relinquish their lands, but the United States never ratified the treaty. Subsequently, many of the Yokuts people went to the Tejon and Fresno reservations.

After California's inclusion into the United States, the San Joaquin Valley was utilized for various purposes, which greatly altered the landscape. Cattle ranching was the predominant land use between 1850 and 1867, with grain farming predominate from 1867 until 1900. The arrival of the Southern Pacific Railroad in the 1870s also contributed to economic expansion of the region.

The most important economic factor of the region was the discovery of "black gold" in the Southern San Joaquin Valley. The production of petroleum became a significant factor in the region with the opening of the McKittrick field in 1887 and the Kern River field in 1899. The Kern River field was discovered in a shallow hand dug well on the west bank of the Kern River. The Kern River discovery started an oil boom in the region and numerous wooden oil derricks sprang up overnight on the flood plain just north of Bakersfield. Soon thereafter, the Kern River production accounted for seven out of 10 barrels of oil that came from California. Between 1900 and 1936, the production from this area made California the nation's leading petroleum producer and the second ranking producer in 1958. After the Kern River findings, many discoveries followed including a string of gushers at Coalinga, McKittrick, and Midway-Sunset fields. According to the San Joaquin Geological Society, Kern County has 18 giant oil fields that have produced over 100 million barrels of oil each, including four "super giants" that have each produced over one billion barrels of oil. Among the "super giants" are the Midway-Sunset, the largest oil field in the lower 49 states, and Elk Hills, the former United States Naval Petroleum Reserve.

The 20th Century witnessed the rise of irrigation agriculture in the San Joaquin Valley, along with mechanized farming practices and a diversity of crops. Today, lands once used primarily for oil production and agricultural purposes are rapidly giving way to an expanding suburban community.

4.5.3 Regulatory Setting

Federal

Section 106 of the National Historic Preservation Act (NHPA)

Archaeological resources are protected through the National Historic Preservation Act (NHPA) of 1966, as amended (54 USC 300101 et seq.); and its implementing regulation, Protection of Historic Properties (36 CFR Part 800), the Archaeological and Historic Preservation Act of 1974, and the Archaeological Resources Protection Act of 1979. The NHPA authorized the expansion and maintenance of the National Register of Historic Placed (NRHP), established the position of State Historic Preservation Officer (SHPO), and provided for the designation of State Review Boards, set up a mechanism to certify local governments to carry out the purposes of the NHPA, assisted Native American tribes to preserve their cultural heritage, and created the Advisory Council on Historic Preservation (ACHP). Prior to implementing an "undertaking" (e.g., issuing a federal permit), Section 106 of the NHPA requires federal agencies to consider the effects of the undertaking on historic properties and to afford the ACHP and the SHPO a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the National Register of Historic Places (NRHP). As indicated in Section 101(d)(6)(A) of the NHPA, properties of traditional religious and cultural importance to a tribe are eligible for inclusion in the NRHP. Under the NHPA, a resource is considered significant if it meets the NRHP listing criteria at 36 Code of Federal Regulations (CFR) 60.4.

National Register of Historic Places (NRHP)

The NRHP was established by the NHPA of 1966, as "an authoritative guide to be used by federal, state, and local governments, private groups, and citizens to identify the Nation's cultural resources and to indicate what properties should be considered for protection from destruction or impairment" (CFR 36 Section 60.2). The NRHP recognizes both historic-period and prehistoric archaeological properties that are significant at the national, State, and local levels.

To be eligible for listing in the NRHP, a resource must be significant in American history, architecture, archaeology, engineering, or culture. A property (districts, sites, buildings, structures, and objects of potential significance) is eligible for the NRHP if it is significant under one or more of the following four established criteria:

- **Criterion A:** It is associated with events that have made a significant contribution to the broad patterns of our history.
- **Criterion B:** It is associated with the lives of persons who are significant in our past.
- **Criterion C:** It embodies the distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction.
- **Criterion D:** It has yielded, or may be likely to yield, information important in prehistory or history.

Cemeteries, birthplaces, or graves of historic figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historic buildings; and properties that are primarily commemorative in nature are not considered eligible for the NRHP unless they satisfy certain conditions. In general, a resource must be at least 50 years of age to be considered for the NRHP, unless it satisfies a standard of exceptional importance.

In addition to meeting the criteria of significance, a property must have integrity. Integrity is defined as "the ability of a property to convey its significance." The NRHP recognizes seven qualities that, in various combinations, define integrity. To retain historic integrity a property must possess several, and usually most, of these seven aspects. Thus, the retention of the specific aspects of integrity is paramount for a property to convey its significance. The seven factors that define integrity are location, design, setting, materials, workmanship, feeling, and association.

Native American Graves Protection and Repatriation Act of 1990

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 sets provisions for the intentional removal and inadvertent discovery of human remains and other cultural items from federal and tribal lands. It clarifies the ownership of human remains and sets forth a process for repatriation of human remains and associated funerary objects and sacred religious objects to the Native American groups claiming to be lineal descendants or culturally affiliated with the remains or objects. It requires any federally funded institution housing Native American remains or artifacts to compile an inventory of all cultural items within the museum or with its agency and to provide a summary to any Native American tribe claiming affiliation.

State

California Environmental Quality Act (CEQA)

CEQA is the principal statute governing environmental review of projects occurring in the State and is codified at Public Resources Code (PRC) Section 21000 et seq. CEQA requires lead agencies to determine if a proposed project would have a significant effect on the environment, including significant effects on historical or archaeological resources.

Under CEQA (PRC Section 21084.1), a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment. The CEQA Guidelines (14 California Code of Regulations [CCR] 15064.4) recognizes that historical resources include:

1. A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR;

2. A resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); and

3. Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

The fact that a resource does not meet the three criteria outlined above does not preclude the lead agency from determining that the resource may be a historical resource as defined in PRC Sections 5020.1(j) or 5024.1.

If a lead agency determines that an archaeological site is a historical resource, the provisions of PRC Section 21084.1 of CEQA and 14 CCR 15064.4 of the CEQA Guidelines apply. If a project may cause a substantial adverse change (defined as physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired) in the significance of a historical resource, the lead agency must identify potentially feasible measures to mitigate these effects (14 CCR 15064.4(b)(1), 15064.4(b)(4)).

If an archaeological site does not meet the historical resource criteria contained in the CEQA Guidelines, then the site may be treated as a unique archaeological resource in accordance with the provisions of PRC Section 21083. As defined in PRC Section 21083.2 of CEQA, a unique archaeological resource is an archaeological artifact, object, or site for which it can be clearly demonstrated that without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information;
- Has a special and particular quality such as being the oldest of its type or the best available example of its type; or,
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

If an archaeological site meets the criteria for a unique archaeological resource as defined in PRC Section 21083.2, then the site is to be treated in accordance with the provisions of PRC Section 21083.2, which state that if the lead agency determines that a project would have a significant effect on unique archaeological resources, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place (PRC Section 21083.1(a)). If preservation in place is not feasible, mitigation measures shall be required.

The CEQA Guidelines note that if an archaeological resource is neither a unique archaeological nor a historical resource, the effects of the project on those resources shall not be considered a significant effect on the environment (14 CCR 15064.4(c)(4)).

California Register of Historical Resources (CRHR)

Created in 1992 and implemented in 1998, the California Register of Historical Resources (CRHR) as "an authoritative guide in California to be used by State and local agencies, private groups, and citizens to identify the State's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change." Certain properties, including those listed in or formally determined eligible for listing in the NRHP and California Historical Landmarks numbered 770 and higher, are automatically included in the CRHR. Other properties recognized under the California Points of Historical Interest program, identified as significant in historical resources surveys or designated by local landmarks programs, may be nominated for inclusion in the CRHR. A resource, either an individual property or a contributor to a historic district, may be listed in the CRHR if the State Historical Resources Commission (SHRC) determines that it meets one or more of the following criteria, which are modeled on NRHP criteria:

- **Criterion 1:** It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- **Criterion 2:** It is associated with the lives of persons important in our past.
- **Criterion 3:** It embodies the distinctive characteristics of a type, period, region, or method of construction; represents the work of an important creative individual; or possesses high artistic values.
- **Criterion 4:** It has yielded, or may be likely to yield, information important in history or prehistory.

Furthermore, under PRC 5024.1, 14 CCR, Section 4852(c), a cultural resource must retain integrity to be considered eligible for the CRHR. Specifically, it must retain sufficient character or appearance to be recognizable as a historical resource and convey reasons of significance. Integrity is evaluated with regard to retention of such factors as location, design, setting, materials, workmanship, feeling, and association. Cultural sites that have been affected by ground-disturbing activities, such as grazing and off-road vehicle use (both of which occur within the project site), often lack integrity because they have been directly damaged or removed from their original location, among other changes.

Typically, a prehistoric archaeological site in California is recommended eligible for listing in the CRHR based on its potential to yield information important in prehistory or history (Criterion 4). Important information includes chronological markers such as projectile point styles or obsidian artifacts that can be subjected to dating methods or undisturbed deposits that retain their stratigraphic integrity. Sites such as these have the ability to address research questions.

California Historical Landmarks (CHLs)

California Historical Landmarks (CHLs) are buildings, structures, sites, or places that have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value and that have been determined to have statewide historical significance by meeting at least one of the criteria listed below. The resource also must be approved for designation by the County Board of Supervisors (or the city or town council in whose jurisdiction it is located); be recommended by the SHRC; and be officially designated by the Director of California State Parks.

To be eligible for designation as a landmark, a resource must meet at least one of the following criteria:

- It is the first, last, only, or most significant of its type in the State or within a large geographic region (Northern, Central, or Southern California);
- It is associated with an individual or group having a profound influence on the history of California; or
- It is a prototype of, or an outstanding example of, a period, style, architectural movement or construction or is one of the more notable works or the best surviving work in a region of a pioneer architect, designer, or master builder.

California Points of Historical Interest

California Points of Historical Interest are sites, buildings, features, or events that are of local (city or county) significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value. Points of historical interest designated after December 1997 and recommended by the SHRC are also listed in the CRHR. No historic resource may be designated as both a landmark and a point. If a point is later granted status as a landmark, the point designation will be retired. In practice, the point designation program is most often used in localities that do not have a locally enacted cultural heritage or preservation ordinance.

To be eligible for designation as a point of historical interest, a resource must meet at least one of the following criteria:

- It is the first, last, only, or most significant of its type within the local geographic region (city or county);
- It is associated with an individual or group having a profound influence on the history of the local area; or
- It is a prototype of, or an outstanding example of, a period, style, architectural movement or construction or is one of the more notable works or the best surviving work in the local region of a pioneer architect, designer, or master builder.

Native American Heritage Commission (NAHC)

PRC Section 5097.91 established the Native American Heritage Commission (NAHC), the duties of which include inventorying of places of religious or social significance to Native Americans and identifying known graves and cemeteries of Native Americans on private lands. PRC Section 5097.98 specifies a protocol to be followed when the NAHC receives notification of a discovery of Native American human remains from a county coroner.

California Public Records Act

Sections 6254(r) and 6254.10 of the California Public Records Act were enacted to protect archaeological sites from unauthorized excavation, looting, or vandalism. Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Section 6254.10 specifically exempts from disclosure requests for "records that relate to

archaeological site information and reports, maintained by, or in the possession of the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the NAHC, another State agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a State or local agency."

California Health and Safety Code, Sections 7050 and 7052

Health and Safety Code, Section 7050.5, declares that, in the event of the discovery of human remains outside of a dedicated cemetery, all ground disturbance must cease and the county coroner must be notified. Section 7052 establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives.

California Penal Code, Section 622.5

The California Penal Code, Section 622.5, provides misdemeanor penalties for injuring or destroying objects of historic or archaeological interest located on public or private lands, but specifically excludes the landowner.

Public Resources Code, Section 5097.5

PRC Section 5097.5 defines as a misdemeanor the unauthorized disturbance or removal of archaeological, historic, or paleontological resources located on public lands.

Senate Bill (SB) 18

Senate Bill 18 (SB 18), which went into effect January 1, 2005, requires local governments (city and county) to consult with Native American tribes before making certain planning decisions and to provide notice to tribes at certain key points in the planning process. The intent is to "provide California Native American tribes an opportunity to participate in local land use decisions at an early planning stage, for the purpose of protecting, or mitigating impacts to, cultural places."

The purpose of involving tribes at these early planning stages is to allow consideration of cultural places in the context of broad local land use policy, before individual site-specific, project-level, land use designations are made by a local government. The consultation requirements of SB 18 apply to general plan or specific plan processes proposed on or after March 1, 2005.

According to the Tribal Consultation Guidelines: Supplement to General Plan Guidelines published by the Governor's Office of Planning and Research, the following are the contact and notification responsibilities of local governments:

- Prior to the adoption or any amendment of a general plan or specific plan, a local government must notify the appropriate tribes (on the contact list maintained by the Native American Heritage Commission [NAHC]) of the opportunity to conduct consultations for the purpose of preserving, or mitigating impacts to, cultural places located on land within the local government's jurisdiction that is affected by the proposed plan adoption or amendment. Tribes have 90 days from the date on which they receive notification to request consultation, unless a shorter timeframe has been agreed to by the tribe (Government Code Section 65352.3).

- Prior to the adoption or substantial amendment of a general plan or specific plan, a local government must refer the proposed action to those tribes that are on the NAHC contact list and have traditional lands located within the city or county's jurisdiction. The referral must allow a 45-day comment period (Government Code Section 65352). Notice must be sent regardless of whether prior consultation has taken place. Such notice does not initiate a new consultation process.
- Local government must send a notice of a public hearing, at least ten (10) days prior to the hearing, to tribes who have filed a written request for such notice (Government Code Section 65092).

In accordance with Senate Bill 18 and the California Tribal Consultation guidelines, the appropriate native groups were consulted with respect to the project's potential impacts on Native American places, features, and objects. As of the writing of this report, Staff has not received any comments from consulted tribes in regards to the department's SB 18 request. Staff notes consultation with appropriate Native American groups per Senate Bill 18 requirements has occurred.

Assembly Bill (AB) 52

AB 52, which went into effect on July 1, 2015, requires CEQA lead agencies to engage in early consultation with California Native American Tribes on all projects. AB 52 creates a new CEQA resource: Tribal Cultural Resources, which include sites, features, places, cultural landscapes, sacred place, objects, or archeological resources with cultural value to a California Native American Tribe that is listed or eligible for listing in the national, California or local registers.

AB 52 requires lead agencies to consider whether a project may cause a substantial adverse change in the significance of a Tribal Cultural Resource and to consider a tribe's cultural values when determining the appropriate environmental assessment, impacts and mitigation. AB 52 can draw upon SB 18's guidelines and can be completed in tandem.

AB 52 applies to projects with a Notice of Preparation (NOP) or notice of a Negative Declaration or Mitigated Negative Declaration issued on or after July 1, 2015. The OPR must propose and CNRA must adopt revisions to the CEQA Guidelines by July 1, 2016 in order to: (1) separate the consideration of paleontological resources from Tribal Cultural Resources and update the relevant sample questions and (2) add consideration of Tribal Cultural Resources with relevant sample questions. The NOP for this proposed Project was issued on May 1, 2009; therefore, AB 52 does not apply to this proposed Project.

Local

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan Land Use Element includes the following relevant goal and policies related to cultural resources (refer to Table 4.5-1, *Metropolitan Bakersfield General Plan Goals and Policies for Cultural Resources*):

Table 4.5-1. Metropolitan Bakersfield General Plan Goals and Policies for Cultural Resources
Goals and Policies: Land Use Element
Goal #6: Accommodate new development that is sensitive to the natural environment, and accounts for environmental hazards.
Policy #105: Development on land containing known archaeological resources (i.e., high sensitivity areas) shall utilize methodology set forth as described necessary by a qualified archaeologist to locate proposed structures, paving, landscaping and fill dirt in such a way as to preserve these resources undamaged for future generations when it is the recommendation of a qualified archaeologist that said resources be preserved in situ.
Policy #107: The preservation of historical resources shall be promoted and other public agencies or private organizations shall be encouraged to assist in the purchase and/or relocation of sites, buildings, and structures deemed to be of historical significance.

4.5.4 Impacts and Mitigation Measures

This section describes the impact analysis relating to cultural resources for the proposed Project. It describes the methods used to determine the proposed Project's impacts, lists the thresholds used to conclude whether an impact would be significant, and discusses the impacts of the proposed Project based on these thresholds.

Methodology

The potential impacts associated with the proposed Project are evaluated on a qualitative and quantitative basis through a comparison of the anticipated Project effects on cultural resources. The change in the land use is significant if the effects described below occur. The evaluation of proposed Project impacts as based on professional judgment, analysis of the County's cultural resource polices and the significance criteria established by Appendix G of the State CEQA Guidelines, which the County has determined to be appropriate criteria for this Recirculated Draft EIR.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:

- Cause a substantial adverse change in the significance of a historical resource, as defined in CEQA Guidelines Section 15064.5;
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
- Disturb any human remains, including those interred outside of formal cemeteries.

Section 21083.2(g) of CEQA further defines "unique archaeological resource" for purposes of determination as to whether a project may have a significant effect on archaeological resources. As used in this section "unique archaeological resource" means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;
- Has a special and particular quality such as being the oldest of its type or the best available of its type; or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

CEQA does not define a unique paleontological resource but for purposes of this EIR, a paleontological resource or site is considered "unique" where it meets any of the following criteria:

- It is the best example of its kind locally or regionally;
- Illustrates a geologic principle;
- Provides a critical piece of paleobiological data;
- Encompasses any part of a "type locality" of a fossil or rock unit/formation;
- Contains a unique or particularly unusual assemblage of fossils;
- Occupies a unique position stratigraphically; and/or
- Occupies a unique position, proximally, distally or laterally within a rock unit/formation's extent or distribution.

According to CEQA Guidelines, California Code of Regulations (CCR) Title 14, 15064.5, a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment (CCR Title 14, 15064.5(b)). The guidelines further state that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historic resource would be materially impaired. Actions that would materially impair the significance of a historical resource are any actions that would demolish or adversely alter those physical characteristics of a historical resource that convey its historical significance and qualify it for inclusion in the CRHR or in a local register or survey that meet the requirements of PRC Sections 5020.1(k) and 5024.1(g).

Project Impacts

Impact 4.5-1: The Project Would Cause a Substantial Adverse Change in the Significance of a Historical or Archaeological Resource.

No historical or archaeological resources were identified within the proposed Project boundaries during the archaeological resources studies completed for the project site. A Phase I Cultural Resource Survey was prepared in October of 2008 and revised in May 2009. Included in the original report is information from two records searches and complete site survey of the Project area completed between February and March 2006. A subsequent Field Check conducted on-site, and a subsequent records search was performed between February and March 2016. Neither the site survey, field check, or records searches conducted by Hudlow Cultural Resource Associates identified any historical or archaeological resources (Hudlow Cultural Resources Associates 2017). The records searches of the proposed Project and surrounding area were conducted at the Southern San Joaquin Archaeological Information Center (SSJAIC) at California State University, Bakersfield in February 2006 and March 2016. The SSJAIC is the designated repository of the California Historical Resources Information System (CHRIS) for records concerning archaeological and other cultural resources in Kern County. No cultural resources were identified within one mile of the Project site (Hudlow Cultural Resource Associates 2009 and 2017).

As discussed above, pedestrian field surveys were conducted between February 6 and March 8, 2006 and on March 5, 2016. The pedestrian surveys covered the entire Project site and was conducted by walking north/south and east/west transects across the entire site at 15-meter intervals. No archaeological resources were identified.

However; because the potential remains that buried or otherwise hidden historical resources and/or archaeological deposits or isolate artifacts could be located on the Project site, development of the proposed Project has the potential to disturb or destroy undocumented historical and/or archaeological resources. Implementation of mitigation measures would reduce potential impacts to undocumented historical and/or archaeological resources to less than significant levels.

Mitigation Measures

MM 4.5-1: **Archaeological Resources.** Prior to ground disturbance, or the issuance of grading or building permits, the project proponent shall retain a qualified lead archaeologist to carry out all mitigation measures related to archaeological resources.

1. The approved monitor shall monitor all initial ground-disturbing activities (such as site preparation and initial grading) and excavations on the project site.

2. If archaeological resources are encountered during implementation of the project, ground-disturbing activities will cease within the immediate vicinity of the find. The lead archaeologist shall establish a buffer area around the find and make an evaluation of the find to determine appropriate treatment that may

include the development and implementation of a data recovery investigation or preservation in place.

3. All cultural resources recovered will be documented on California Department of Parks and Recreation Site Forms to be filed with the California Historic Resources Information System (CHRIS). The archaeologist will prepare a final report about the find to be filed with the Applicant/landowner and the CHRIS. The report will include documentation and interpretation of resources recovered. Interpretation will include full evaluation of the eligibility with respect to the National Register of Historic Places and California Register of Historical Resources and CEQA. The developer, in consultation with the Lead Agency and Project Archaeologist, will designate repositories in the event that resources are recovered.

MM 4.5-2: **Paleontological Resources.** During project construction, if a paleontological resource is found, the project contractor shall cease ground-disturbing activities within 50 feet of the find. A qualified paleontologist shall be obtained to evaluate the significance of the resource(s) and recommend appropriate treatment measures. Any fossils encountered and recovered shall be catalogued and donated to a public, non-profit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County. Accompanying notes, maps, and photographs shall also be filed at the repository.

MM 4.5-3: **Historical Resources.** Prior to the issuance of grading or building permits, the project proponent shall ensure the following measures are implemented for resources, which are discretionarily considered historical resources for the purposes of this project:

1. The construction zone shall be narrowed or otherwise altered to avoid resources. All avoidance areas delineated on the site plan shall be coordinated through the lead archeologist and submitted to the Kern County Planning and Natural Resources Department for approval.

2. In coordination with the qualified archaeologist avoidance shall be ensured by the delineation of environmentally sensitive areas. Protective fencing shall not identify the protected area as a cultural resource area in order to discourage unauthorized disturbance or collection of artifacts.

3. Consistent with Mitigation Measure 4.5-1 (above) a qualified archaeological monitor and Native American Monitor, shall monitor all project-related ground disturbing activities within 150 feet of the environmentally sensitive areas, in order to ensure avoidance.

4. If avoidance is demonstrated to be infeasible, the resource shall be collected and curated at an appropriate curatorial facility. Or if avoidance is demonstrated to be infeasible, a detailed Cultural Resources Treatment Plan shall be prepared and implemented by a qualified archaeologist. The Cultural

Resources Treatment Plan shall include a research design and a scope of work for data recovery of the portion(s) to be impacted by the project. Treatment may consist of (but would not be limited to):

a. a sufficient avoidance buffer to protect the resource until data recovery and/or removal is completed;

b. sample excavation;

c. surface artifact collection;

d. site documentation; and,

e. historical research, with the aim to target the recovery of important scientific data contained in the portion of the significant resource to be impacted by the project.

5. The Cultural Resources Treatment Plan shall also include provisions for analysis of data in a regional context, reporting of results within a timely manner, and curation of artifacts and data at an approved facility. The reports documenting the implementation of the Cultural Resources Treatment Plan shall be submitted to and approved by the Kern County Planning and Natural Resources Director and shall also be submitted to the Southern San Joaquin Valley Information Center at California State University, Bakersfield.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.5-2: The Project Would Directly or Indirectly Destroy a Unique Paleontological Resource or Site or Unique Geologic Feature.

According to the KCGP and the Metropolitan Bakersfield General Plan, the areas of paleontological resources within Metropolitan Bakersfield are located at the Maricopa and Citric Brea Tar Pits, the Bean Hills Petrified Forest and Shark Tooth Hill at Round Mountain. The proposed Project is not located in or near any of these areas. Furthermore, according to the Metropolitan Bakersfield General Plan, geological records of the region indicate that the proposed Project site is underlain by recent alluvial deposits to all depths likely to be reached by excavations associated with development. These deposits appear to be too young geologically to contain significant fossil remains. However, the destruction of any unique fossil resource would be a significant impact.

Implementation of mitigation measure would reduce potential proposed Project-related adverse impacts to unknown and unidentified paleontological resources encountered during construction of the proposed Project.

Mitigation Measures

MM 4.5-4: **Found Paleontological Resource.** During implementation of the proposed project, if a paleontological resource is found, the project contractor shall cease ground-disturbing activities within 50 feet of the find.

1. A qualified paleontologist shall evaluate the significance of the resource(s) and recommend appropriate treatment measures.

    a. At each fossil locality, field data forms shall be used to record pertinent geologic data, stratigraphic sections shall be measured, and appropriate sediment samples shall be collected and submitted for analysis.

    b. Any fossils encountered and recovered shall be catalogued and donated to a public, non-profit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County. Accompanying notes, maps, and photographs shall also be filed at the repository.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.5-3: The Project Would Disturb Any Human Remains, Including Those Interred Outside of Formal Cemeteries.

Ground-disturbing activities are anticipated to include excavation and grading at shallow depths during proposed Project construction. Ground-disturbing activities associated with development of the proposed Project could unearth previously undocumented human remains. Therefore, development of the proposed Project has the potential to disturb or destroy undocumented human remains. Implementation of the mitigation measure identified below would reduce potential impacts to less than significant levels.

Mitigation Measures

MM 4.5-5: **Found Human Remains.** If human remains are uncovered during project construction, the project proponent shall immediately halt work, contact the Kern County Coroner to evaluate the remains, and follow the procedures and protocols set forth in Section 15064.4 (e)(1) of the California Environmental Quality Act Guidelines. If the County Coroner determines the remains are Native American, the coroner shall contact the Native American Heritage Commission, in accordance with Health and Safety Code Section 7050.5, subdivision (c), and Public Resources Code 5097.98 (as amended by Assembly Bill 2641). The Native American Heritage Commission shall designate a Most Likely Descendent (MLD) for the remains per Public Resources Code 5097.98. Per Public Resources Code 5097.98, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains

are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendent regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. If the remains are determined to be neither of forensic value to the Coroner, nor of Native American origin, provisions of the California Health and Safety Code (7100 et. seq.) directing identification of the next-of-kin will apply.

The MLD shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Potential historical, archaeological, and paleontological impacts are considered and evaluated on a project specific basis. Each incremental development would be required to comply with all applicable State, Federal, and County regulations concerning preservation, salvage, or handling of cultural resources including compliance with required mitigation. In consideration and through implementation of these regulations, potential cumulative impacts upon historical, archaeological, and paleontological resources would not be considered significant.

Mitigation Measures

Implement Mitigation Measures MM 4.5-1 through MM 4.5-5, above.

Level of Significance after Mitigation

Impacts would be less than significant.

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Section 4.6

Energy

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Section 4.6
Energy

4.6.1 Introduction

This section of the Recirculated Draft Environmental Impact Report (RDEIR) evaluates potential energy impacts associated with implementation of the proposed Project. The analysis in this section relies of some information previously discussed and disclosed in Section 4.3, Air Quality and Section 4.8, Greenhouse Gas (GHG) Emissions, which in part analyzes GHGs emitted from use of energy. The analysis in this Section considers whether implementation of the proposed project would result in wasteful, and unnecessary consumption of energy. This analysis considers the electricity, natural gas, and transportation fuel (petroleum) demands of the Project, as well as potential service delivery impacts. This section also includes where appropriate and feasible mitigation measures based on the Energy Assessment – Energy Mitigation for 99 Houghton Industrial Park, prepared by McIntosh Associates, April 23, 2019 and attached as Appendix O. This section of the RDEIR is closely related to Section 4.8, Greenhouse Gases. Where appropriate, and to minimize redundancy, cross references to the applicable analysis contained within the Section 4.8, Greenhouse Gases is provided.

4.6.2 Environmental Setting

The Environmental Setting describes the existing setting of the Project site as it relates to energy conservation.

California's Energy Use and Supply

Californians consumed 290,567 gigawatt hours (GWh) of electricity in 2016, which is the most recent year for which data is available. Of this total, Kern County consumed 18,440 GWh (CEC, 2017a). In 2016, the California electricity mix included natural gas (33.67 percent), coal (4.13 percent), large hydroelectric plants (14.72 percent), nuclear (9.08 percent), oil (0.01 percent), petroleum coke/waste heat (0.14 percent) and unspecified sources of power (9.25 percent). The remaining 29 percent was supplied from renewable resources, such as wind, solar, geothermal, biomass, and small hydroelectric facilities (CEC, 2017b). In 2017, the state consumed 2,110,829 million cubic feet of natural gas.

Energy usage is typically quantified using the British Thermal Unit (BTU). Total energy usage in California was 7,830 trillion BTU in 2016 (the most recent year for which this specific data is available), which equates to an average of 199 million BTU per capita (EIA, 2017b). Of California's total energy usage, the breakdown by sector is 39 percent transportation, 24 percent industrial, 19 percent commercial, and 18 percent residential. Electricity and natural gas in California are generally consumed by stationary users such as residences and commercial and industrial facilities, whereas petroleum consumption is generally accounted for by transportation-related energy use. In 2017, taxable gasoline sales (including aviation gasoline) in California accounted for 15,540,154,774 gallons of gasoline.

Current Energy Provider

Electricity in Kern County is primarily provided by the Pacific Gas and Electric Company (PG&E). The PG&E 2017 power mix was as follows: 20 percent natural gas, 27 percent nuclear, 33 percent renewables, 18 percent large hydroelectric, and 2 percent unspecified power (PG&E, 2019b).

The electricity consumption attributable to Kern County from 2007 to 2017 is shown in Table 4.6-1 (Electricity Consumption in Kern County 2007-2017). As indicated in Table 4.6-1, energy consumption in Kern County remained relatively constant between 2007 and 2017, with no substantial increase.

Table 4.6-1. Electricity Consumption in Kern County 2007-2018

Year	Electricity Consumption (in millions of kilowatt hours)
2007	17,243
2008	15,450
2009	14,443
2010	14,955
2011	15,953
2012	16,675
2013	15,023
2014	14,295
2015	15,170
2016	16,530
2017	18,440
2018	15,805

Source: CEC, Electricity Consumption by County, 2018 and 2019.

PG&E operates one of the largest natural gas distribution networks in the country, including approximately 42,142 miles of natural gas transmission and distribution pipelines (PG&E, 2019a). In all, PG&E delivers gas to approximately 4.3 million customer accounts and approximately 5.4 million electric customer accounts in Northern and Central California, including in Kern County.

The natural gas consumption in Kern County from 2007 to 2017 is shown in Table 4.6-2 (Natural Gas Consumption in Kern County 2007-2017). Similar to energy consumption, natural gas consumption in Kern County remained relatively constant between 2007 and 2017, with no substantial increase.

The CPUC regulates California natural gas rates and natural gas services, including in-state transportation over transmission and distribution pipeline systems, storage, procurement, metering, and billing. Most of the natural gas used in California comes from out-of-state natural gas basins.

California's regulated utilities do not own any natural gas production facilities. All natural gas sold by these utilities must be purchased from suppliers or marketers. The price of natural gas sold by suppliers and marketers was deregulated by the Federal Energy Regulatory Commission in the mid-1980s and is determined by market forces. However, the CPUC decides whether California's utilities

have taken reasonable steps to minimize the cost of natural gas purchased on behalf of its core customers (CPUC 2017).

Table 4.6-2. Natural Gas Consumption in Kern County 2007-2018

Year	Natural Gas Consumption (in millions of therms)
2007	2,636
2008	2,591
2009	2,497
2010	2,327
2011	2,376
2012	2,326
2013	2,697
2014	2,715
2015	2,762
2016	2,520
2017	2,397
2018	2,427

Source: CEC, Natural Gas Consumption by County, 2018 and 2019.

As indicated in the preceding discussion, natural gas is available from a variety of in-state and out-of-state sources, and is provided throughout the state in response to market supply and demand. Complementing available natural gas resources, biogas may soon be available through existing delivery systems, thereby increasing the availability and reliability of resources.

Existing Infrastructure

The Project site is within Pacific Gas and Electric Company (PG&E) service area. Electric power supply and distribution and natural gas for the proposed Project area is furnished by PG&E. Two PG&E substations, Old River Substation and Panama Substation presently serve the proposed Project area. Existing PG&E electrical distribution facilities are located on the south side of DiGiorgio Road, on the northeast side of SR-99, along the north side of Houghton Road, and on the west side of South Union Avenue with a little intrusion into the area from South Union Avenue and Houghton Road. Currently, there is approximately 5,000 linear feet of PG&E Transmission Line 300B located in the northeast corner of the proposed Project. There is also a six-inch diameter gas distribution line located on the east side of the proposed Project.

Four pole-mounted electrical transformer locations were observed on the proposed Project site. PG&E is the owner of the transformers and should be contacted for their removal prior to Project site development.

Transportation Fuels

California's transportation sector uses roughly half of the energy consumed in the state. In 2016, Californians consumed approximately 15.1 billion gallons of gasoline and 3 billion gallons of diesel fuel, which were down from 15 billion gallons of gasoline and 2.8 billion gallons of diesel in 2008 (BOE, 2017a; 2017b).

FUEL CONSUMPTION

Automotive fuel consumption in Kern County from 2007 to 2019 is shown in Table 4.6-3 (Automotive Fuel Consumption in Kern County 2007-2019) (projections for the year 2019 are also shown). As shown in Table 4.6-3, on-road automotive fuel consumption in Kern County has declined steadily from 2007, although 2014 through 2017 were increased. Heavy-duty vehicle fuel consumption has been increasing since 2012.

Table 4.6-3. Automotive Fuel Consumption in Kern County 2007-2019

Year	On-Road Automotive Fuel Consumption (Gallons)	Heavy-Duty Vehicle/Diesel Fuel Consumption (Gallons)
2007	482,802,885	305,057,882
2008	467,282,258	275,614,151
2009	457,753,568	254,307,817
2010	459,769,506	255,617,083
2011	453,029,571	256,460,303
2012	452,705,414	256,810,320
2013	454,062,915	275,920,754
2014	458,973,481	281,393,333
2015	469,620,303	284,648,995
2016	476,390,995	301,260,345
2017	463,754,740	304,118,169
2018	454,207,143	308,064,466
2019 (projected)	445,151,657	311,403,744

Source: California Air Resources Board, EMFAC2017.

4.6.3 Regulatory Setting

Federal, state, and local agencies regulate energy use and consumption through various means and programs. On the federal level, the U.S. Department of Transportation, the U.S. Department of Energy, and the U.S. Environmental Protection Agency are three federal agencies with substantial influence over energy policies and programs. On the state level, the CPUC and CEC are two agencies with authority over different aspects of energy. Relevant federal, state, and local energy-related regulations are summarized below.

Federal

National Energy Policy and Conservation Act

The National Energy Conservation Policy Act serves as the underlying authority for Federal energy management goals and requirements. Signed into law in 1975, it has been regularly updated and amended by subsequent laws and regulations. Pursuant to the act, the National Highway Traffic Safety Administration is responsible for establishing additional vehicle standards. In 2012, new fuel economy standards for passenger cars and light trucks were approved for model years 2017 through 2021 (77 FR 62624–63200). Fuel economy is determined based on each manufacturer's average fuel economy for the fleet of vehicles available for sale in the United States.

Energy Policy Act of 2005

The Energy Policy Act of 2005 sets equipment energy efficiency standards and seeks to reduce reliance on non-renewable energy resources and provide incentives to reduce current demand on these resources. For example, under the Act, consumers and businesses can attain Federal tax credits for purchasing fuel-efficient appliances and products, including hybrid vehicles; constructing energy-efficient buildings; and improving the energy efficiency of commercial buildings. Additionally, tax credits are available for the installation of qualified fuel cells, stationary micro-turbine power plants, and solar power equipment.

Energy and Independence Security Act of 2007

The Energy and Independence Security Act of 2007 sets Federal energy management requirements in several areas, including energy reduction goals for Federal buildings, facility management and benchmarking, performance and standards for new buildings and major renovations, high-performance buildings, energy savings performance contracts, metering, energy-efficient product procurement, and reduction in petroleum use and increase in alternative fuel use. This act also amends portions of the National Energy Policy and Conservation Act. In addition to setting increased Corporate Average Fuel Economy standards for motor vehicles, the EISA includes the following other provisions related to energy efficiency:

- Renewable Fuel Standard (RFS) (Section 202)
- Appliance and Lighting Efficiency Standards (Sections 301–325)
- Building Energy Efficiency (Sections 411–441)

State

Assembly Bill (AB) 32 and Senate Bill 32

California's major initiative for reducing GHG emissions is outlined in Assembly Bill 32 (AB 32), the "California Global Warming Solutions Act of 2006." AB 32 codifies the statewide goal of reducing GHG emissions to 1990 levels by 2020 (essentially a 15 percent reduction below 2005 emission levels; the same requirement as under S-3-05), and requires CARB to prepare a Scoping

Plan that outlines the main State strategies for reducing GHGs to meet the 2020 deadline. In addition, AB 32 requires CARB to adopt regulations to require reporting and verification of statewide GHG emissions. Reductions in overall energy consumption have been implemented to reduce emissions. See Section 4.8, Greenhouse Gas Emissions, for a further discussion of AB 32.

In September 2016, the Governor signed into legislation SB 32, which builds on AB 32 and requires the state to cut GHG emissions to 40 percent below 1990 levels by 2030. With SB 32, the Legislature also passed AB 197, which provides additional direction for updating the Scoping Plan to meet the 2030 GHG reduction target codified in SB 32. CARB has published a draft update to the Scoping Plan and has received public comments on this draft but has not released the final version.

Additional energy efficiency measures beyond the current regulations are needed to meet these goals as well as the AB 32 greenhouse gas (GHG) reduction goal of reducing statewide GHG emissions to 1990 levels by 2020 and the SB 32 goal of 40 percent below 1990 levels by 2030 (see Section 4.8, Greenhouse Gas Emissions, for a discussion of AB 32 and SB 32). Part of the effort in meeting California's long-term reduction goals include reducing petroleum use in cars and trucks by 50 percent, increasing from one-third to more than one-half of California's electricity derived from renewable sources, doubling the efficiency savings achieved at existing buildings and making heating fuels cleaner; reducing the release of methane, black carbon, and other short-lived climate pollutants, and managing farm and rangelands, forests, and wetlands so they can store carbon.

2008 California Energy Action Plan Update

The 2008 Energy Action Plan Update provides a status update to the 2005 Energy Action Plan II, which is the State's principal energy planning and policy document (CPUC and CEC, 2008). The plan continues the goals of the original Energy Action Plan, describes a coordinated implementation plan for State energy policies, and identifies specific action areas to ensure that California's energy is adequate, affordable, technologically advanced, and environmentally sound. First-priority actions to address California's increasing energy demands are energy efficiency, demand response (i.e., reduction of customer energy usage during peak periods in order to address system reliability and support the best use of energy infrastructure), and the use of renewable sources of power. If these actions are unable to satisfy the increasing energy and capacity needs, the plan supports clean and efficient fossil-fired generation.

California Buildings Standards

CALIFORNIA GREEN BUILDING STANDARDS CODE

The California Green Building Standards Code (California Code of Regulations, Title 24, Part 11), commonly referred to as the CALGreen Code, is a statewide mandatory construction code that was developed and adopted by the California Building Standards Commission and the California Department of Housing and Community Development. CALGreen standards require new residential and commercial buildings to comply with mandatory measures under five topical areas: planning and design; energy efficiency; water efficiency and conservation; material conservation and resource efficiency; and environmental quality. CALGreen also provides voluntary measures (CALGreen Tier 1 and Tier 2) that local governments may adopt which encourage or require additional measures in

the five green building topics. The most recent update to the CALGreen Code was adopted in 2016 and went into effect January 1, 2017.

Among the key mandatory provisions are requirements that new buildings:

- Reduce indoor potable water use by at least 20 percent below current standards;
- Recycle or salvage at least 50 percent of construction waste;
- Utilize low VOC-emitting finish materials and flooring systems;
- Install separate water meters tracking non-residential buildings' indoor and outdoor water use;
- Utilize moisture-sensing irrigation systems for larger landscape areas;
- Receive mandatory inspections by local officials of building energy systems, such as heating, ventilation, and air conditioning (HVAC) and mechanical equipment, to verify performance in accordance with specifications in non-residential buildings exceeding 10,000 square feet; and
- Earmark parking for fuel-efficient and carpool vehicles.

BUILDING ENERGY EFFICIENCY STANDARDS

The Energy Efficiency Standards for Residential and Nonresidential Buildings, as specified in Title 24, Part 6, of the California Code of Regulations, were established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The 2016 Title 24 standards are the current applicable building energy efficiency standards, and became effective on January 1, 2017. The 2019 Building Energy Efficiency Standards will continue to improve upon the 2016 Standards for new construction of, and additions and alterations to, residential and nonresidential buildings. The 2019 Building Energy Efficiency Standards were adopted on May 9, 2018 and take effect on January 1, 2020. Under the 2019 standards, homes will use about 53 percent less energy and nonresidential buildings will use about 30 percent less energy than buildings under the 2016 Title 24 standards.

2006 APPLIANCE EFFICIENCY REGULATIONS

The California Energy Commission adopted Appliance Efficiency Regulations (Title 20, CCR Sections 1601 through 1608) on October 11, 2006. The regulations were approved by the California Office of Administrative Law on December 14, 2006. The regulations include standards for both Federally regulated appliances and non-Federally regulated appliances. While these regulations are now often viewed as "business-as-usual," they exceed the standards imposed by all other states and they reduce GHG emissions by reducing energy demand.

SENATE BILL 1078 AND 107; EXECUTIVE ORDER S-14-08, S-21-09, AND SB 2X

SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) accelerated the due date of the 20 percent mandate to 2010 instead of 2017. These mandates apply directly to investor-owned

utilities. In November 2008, then-Governor Schwarzenegger signed Executive Order S-14-08, which expands the state's Renewable Portfolio Standard to 33 percent renewable power by 2020. In September 2009, then-Governor Schwarzenegger continued California's commitment to the Renewable Portfolio Standard by signing Executive Order S-21-09, which directs the CARB under its AB 32 authority to enact regulations to help the state meet its Renewable Portfolio Standard goal of 33 percent renewable energy by 2020. CARB approved the Renewable Electricity Standard on September 23, 2010 by Resolution 10-23. SBX1-2 (2011) codified the 33 percent by 2020 goal.

EXECUTIVE ORDER B-30-15; SENATE BILL 100 AND 350

In April 2015, the Governor issued Executive Order B-30-15, which established a GHG reduction target of 40 percent below 1990 levels by 2030. SB 350 (Chapter 547, Statutes of 2015) advanced these goals through two measures. First, the law increases the renewable power goal from 33 percent renewables by 2020 to 50 percent by 2030. Second, the law requires the CEC to establish annual targets to double energy efficiency in buildings by 2030. The law also requires the California Public Utilities Commission (CPUC) to direct electric utilities to establish annual efficiency targets and implement demand-reduction measures to achieve this goal. In 2018, SB 100 revised the goal of the program to achieve the 50 percent renewable resources target by December 31, 2026, and to achieve a 60 percent target by December 31, 2030. SB 100 also established a further goal to have an electric grid that is entirely powered by clean energy by 2045.

STATE VEHICLE STANDARDS (AB 1493)

AB 1493 (Pavley Regulations and Fuel Efficiency Standards), enacted on July 22, 2002, required CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty trucks. Implementation of the regulation was delayed by lawsuits filed by automakers and by the EPA's denial of an implementation waiver. The EPA subsequently granted the requested waiver in 2009, which was upheld by the by the U.S. District Court for the District of Columbia in 2011. The regulations establish one set of emission standards for model years 2009–2016 and a second set of emissions standards for model years 2017 to 2025. By 2025, when all rules will be fully implemented, new automobiles will emit 34 percent fewer CO2e emissions and 75 percent fewer smog-forming emissions.

SUSTAINABLE COMMUNITIES STRATEGY

The Sustainable Communities and Climate Protection Act of 2008, or SB 375, coordinates land use planning, regional transportation plans, and funding priorities to help California meet its GHG emissions reduction mandates. As codified in California Government Code Section 65080, SB 375 requires metropolitan planning organizations (e.g., ABAG) to include a Sustainable Communities Strategy in their regional transportation plan. The main focus of the Sustainable Communities Strategy is to plan for growth in a fashion that will ultimately reduce GHG emissions, but the strategy is also part of a bigger effort to address other development issues, including transit and VMT, which influence the consumption of petroleum-based fuels.

RENEWABLE PORTFOLIO STANDARD

In 2002, California established its Renewable Portfolio Standard program with the goal of increasing the annual percentage of renewable energy in the state's electricity mix by the equivalent of at least 1 percent of sales, with an aggregate total of 20 percent by 2017. The California Public Utilities Commission subsequently accelerated that goal to 2010 for retail sellers of electricity (Public Utilities Code Section 399.15(b)(1)). Then-Governor Schwarzenegger signed Executive Order S-14-08 in

2008, increasing the target to 33 percent renewable energy by 2020. In September 2009, then-Governor Schwarzenegger continued California's commitment to the Renewable Portfolio Standard by signing Executive Order S-21-09, which directs the California Air Resources Board under its AB 32 authority to enact regulations to help the State meet its Renewable Portfolio Standard goal of 33 percent renewable energy by 2020. In September 2010, the California Air Resources Board adopted its Renewable Electricity Standard regulations, which require all of the state's load-serving entities to meet this target. In October 2015, then-Governor Jerry Brown signed into legislation Senate Bill 350, which requires retail sellers and publicly owned utilities to procure 50 percent of their electricity from eligible renewable energy resources by 2030. Signed in 2018, SB 100 revised the goal of the program to achieve the 50 percent renewable resources target by December 31, 2026, and to achieve a 60 percent target by December 31, 2030. SB 100 also established a further goal to have an electric grid that is entirely powered by clean energy by 2045.

Local

Kern County General Plan Energy Element

The Kern County General Plan Energy Element primarily discusses the County's wealth of existing and potential energy resources which include oil, natural gas, and renewable electricity producer. The Energy Element has three objectives: resource management and protection; establishing development standards to provide for the protection of the environment, public health, and safety; and promoting and facilitating energy development. However, the policies listed in the Energy Element are primarily directed at the County and are municipal policies rather than project specific.

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan cites policies to provide decision-makers with long-range guidance affecting the future character of the Metropolitan Bakersfield planning area. The elements within the Metropolitan Bakersfield General Plan provide goals, policies, and implementation measures in order to encourage the conservation of energy by reducing impacts of project on air quality. Applicable goals relative to the proposed Project site within these elements are listed in Table 4.7-4, *Metropolitan Bakersfield General Plan Goals and Policies for Air Quality*, below.

Table 4.6-4. Metropolitan Bakersfield General Plan Goals and Policies for Air Quality

Goals and Policies: Air Quality
Conservation/Air Quality Policy #12: "Encourage the use of mass transit, carpooling and other transportation options to reduce vehicle miles traveled."
Conservation/Air Quality Policy #13: "Consider establishing priority parking areas for carpoolers in projects with relatively large numbers of employees to reduce vehicle miles traveled and improve air quality."
Conservation/Air Quality Policy #14: "Establish park and ride facilities to encourage carpooling and the use of mass transit."
Conservation/Air Quality Policy #16: "Cooperate with Golden Empire Transit [GET] and Kern Regional Transit to provide a comprehensive mass transit system for Bakersfield; require large-scale new development to provide related improvements, such as bus stop shelters and turnouts."

Table 4.6-4. Metropolitan Bakersfield General Plan Goals and Policies for Air Quality
Goals and Policies: Air Quality
Conservation/Air Quality Policy #18: "Encourage walking for short distance trips through the creation of pedestrian friendly sidewalks and street crossings."
Conservation/Air Quality Policy #19: "Promote a pattern of land uses which locates residential uses in close proximity to employment and commercial services to minimize vehicular travel."

4.6.4 Impacts and Mitigation Measures

This section describes energy consumption on three sources of energy that are relevant to the proposed project: electricity, natural gas, and transportation fuel for vehicle trips associated with new development, as well as fuel necessary for project construction.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Appendix F does not prescribe a threshold for the determination of significance, but focuses on reducing and minimizing inefficient, wasteful, and unnecessary consumption of energy. Such an impact would occur if the proposed project would:

- Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.
- Conflict with or obstruct state or local plan for renewable energy or energy efficiency.

The analysis below generally follows Appendix F of the State CEQA Guidelines, which states that the goal of conserving energy includes decreasing overall per capita energy consumption; decreasing reliance on fossil fuels such as coal, natural gas, and oil; and increasing reliance on renewable energy.

Impact Assessment Methodology

In determining whether implementation of the Project would result in the inefficient, wasteful or unnecessary consumption of fuel or energy, this analysis considers the recommendations of Appendix F (as described above), which states that environmental impact analyses of energy conservation may include:

1. The project's energy requirements and its energy use efficiencies by amount and fuel type for each stage of the project's life cycle including construction, operation, maintenance and/or removal. If appropriate, the energy intensiveness of materials maybe discussed.
2. The effects of the project on local and regional energy supplies and on requirements for additional capacity.
3. The degree to which the project complies with existing energy standards.

4. The effects of the project on energy resources.

5. The project's projected transportation energy use requirements and its overall use of efficient transportation alternatives.

This section analyzes energy consumption on three sources of energy that are relevant to the proposed Project: electricity, natural gas, and transportation fuel for vehicle trips associated with new development, as well as the fuel necessary for project construction.

- The analysis of project electricity/natural gas usage is based on California Emissions Estimator Model (CalEEMod) modeling, which quantifies energy use for occupancy. The results of the CalEEMod modeling are included in Appendix "C" (Air Quality and GHG Data) of this Recirculated Draft EIR.

- Modeling related to transportation fuel consumption was based primarily on the default settings in the computer program for Kern County. The amount of operational fuel use was estimated using CalEEMod outputs for the proposed Project and the California Air Resources Board's Emissions Factor 2017 (EMFAC2017) computer program for typical daily fuel usage in Kern County. Construction fuel consumption was calculated based on CalEEMod emissions outputs and conversion ratios from the Climate Registry. The results of EMFAC2017 modeling and construction fuel estimates are included in Appendix "C", Air Quality and GHG Data.

Project Impacts

Impact 4.6-1: The Project Would Result in Potentially Significant Environmental Impact Due to Wasteful, Inefficient, or Unnecessary Consumption of Energy Resources, During Project Construction or Operation.

Construction (Short-Term)

The energy consumption associated with buildout of the proposed Project includes electricity usage, fuel consumption for construction diesel and gasoline powered equipment, and fuel consumption from on-road worker commute and vendor trips. Temporary electric power for as-necessary lighting and electronic equipment (such as computers inside temporary construction trailers, and heating, ventilation, and air conditioning) would be powered by a generator or temporary electricity connection. The amount of electricity used during construction would be minimal; typical demand would stem from the use of electrically powered hand tools and several construction trailers by managerial staff during the hours of construction activities. The majority of the energy used during construction would be from petroleum. The electricity used for construction activities would be temporary and minimal. The methodology for each category is discussed below. This analysis relies in part on the construction equipment list and operational characteristics, as stated in Chapter 4.3 Air Quality) and Chapter 4.8 Greenhouse Gas Emissions, as well as, Appendix C - Air Quality Impact Analysis of this RDEIR. Quantifications of energy consumption are provided for the proposed Project, followed by an analysis of impacts based on those quantifications.

ELECTRICITY USAGE

Water Consumption for Construction Dust Control

Electricity use associated with water use for construction dust control is calculated based on total water use and the energy intensity for supply, distribution, and treatment of water.

The total number of gallons of water usage is calculated based on acreage disturbed during grading and site preparation, as well as the daily water consumption rate per acre disturbed.

- The total acres disturbed are calculated using the methodology described in Chapter 4.2 of Appendix A of the CalEEMod® User's Guide (Grading Equipment Passes).
- The water application rate of 3,020 gallons per acre per day is from Air and Waste Management Association's Air Pollution Engineering Manual.

The energy intensity value is based on the CalEEMod® default energy intensity per gallon of water for Kern County.

As summarized in Table 4.6-5 (Project Energy Consumption During Construction), the total electricity consumption associated with water consumption for construction dust control would be approximately 579,342 kWh (579 megawatt hours [MWh]) over the duration of buildout of the proposed Project.

PETROLEUM FUEL USAGE

On-Road Diesel Construction Trips

The diesel usage associated with on-road construction mobile trips is calculated based on vehicle miles traveled (VMT) from vehicle trips (i.e., worker, vendor, and hauling), the CalEEMod default diesel fleet percentage, and vehicle fuel efficiency in miles per gallon. Fuel consumption is based on VMT for the entire construction period. Construction fuel consumption was calculated based on CalEEMod emissions outputs and conversion ratios from the Climate Registry. The CalEEMod emissions are specific to construction year and include fleet adjustments based on current regulations and equipment turnover.

As summarized in *Table 4.6-5, Project Energy Consumption During Construction*, the total diesel consumption associated with on-road construction trips would be approximately 108,473 gallons over the duration of buildout of the proposed Project. The exact timing and duration of construction phases are currently unknown and would depend on various market factors. As discussed in the Project Description, the Project is planned to be developed in phases over a twenty-five-year period. The modeled construction timing and phasing is conservative, but represents a realistic worst-case scenario. As such, the analysis accounts for minor modifications as project plans evolve from conceptual planning to final mapping. If construction phases start at a later time, or phases have a longer duration, construction fuel consumption would be lower on an annual basis because the

intensity of construction activities would be lower and spread out over a longer period of time. Construction equipment in future years would also be required to comply with more stringent fuel efficiency standards. Project construction fuel demand would have a lower effect on regional energy supplies.

Off-Road Diesel Construction Equipment

Table 4.6-5. Project Energy Consumption During Construction

Source	Project Construction Usage	Kern County Annual Energy Consumption	Percentage Increase Countywide
Electricity Use	**Megawatt Hours (MWh)**		
Water Consumption [a]	579	18,439,672	0.0031%
Construction Electricity Total	**579**		**0.0031%**
Diesel Use	**Gallons**		
On-Road Construction Trips [b]	108,473	311,043,744	0.0349%
Off-Road Construction Equipment [c]	214,975		0.0691%
Construction Diesel Total	**323,448**		**0.1040%**
Gasoline	**Gallons**		
On-Road Construction Trips [b]	105,562	445,151,657	0.0237%
Construction Gasoline Total	**105,562**		**0.0237%**

Notes:
a. Construction water use estimated based on acres disturbed per day per construction sequencing and estimated water use per acre (AWMA 1992).
b. On-road mobile source fuel use based on vehicle miles traveled (VMT) from CalEEMod and fleet-average fuel consumption in gallons per mile from EMFAC2017 in Placer County. Electricity demand based on VMT and calculated average electric vehicle fuel economy for 2015 models (in kWh per mile) from the DOE Fuel Economy Guide.
c. Construction fuel consumption was calculated based on CalEEMod emissions outputs and conversion ratios from the Climate Registry.
Abbreviations:
CalEEMod: California Emission Estimation Model; EMFAC: Emission Factor Model 2017; kWh: kilowatt-hour; MWh: megawatt-hour.
Sources: AWMA, 1992; DOE 2016; USEPA 1996.

The construction diesel usage associated with the off-road construction equipment is calculated based on CalEEMod emissions outputs and conversion ratios from the Climate Registry. In addition, Mitigation Measure 4.3-1 (Air Quality) would require the Project to minimize personnel and public exposure to potential Valley Fever-containing dust both on- and off-site. As summarized in Table 4.6-5, the total diesel consumption associated with off-road construction equipment is approximately 214,975 gallons for duration of buildout the proposed Project.

GASOLINE USAGE

On-Road Gasoline Construction Trips

The gasoline usage associated with on-road construction mobile trips is calculated based on VMT from vehicle trips (i.e., worker, vendor, and hauling), the CalEEMod default gasoline fleet percentage, and vehicle fuel efficiency in miles per gallon using the same methodology as the construction on-road trip diesel usage calculation discussed above. As summarized in Table 4.6-5, the total gasoline consumption associated with on-road construction trips would be approximately 105,562 gallons over the duration of buildout the proposed Project.

CONSTRUCTION ANALYSIS

Construction activities for the proposed Project are needed to grade and modify the approximate 314-acre site for the construction of 22 acres of GC (General Commercial), 108 acres of LI (Light Industrial), 159 acres SI (Service Industrial), and 25 acres of HC (Highway Commercial). Construction would occur over several phases over a twenty-five-year period and energy use is shown in Table 4.6-5 Project Energy Consumption During Construction. Although the specific layout for the proposed uses are unknown, the uses would be in the amount listed above and the approximate construction period used for analysis purposes represents the most conservative construction phasing impacts). Construction would include the use of fuels and electricity to operate equipment and machinery including graders, scrapers, and other earthmoving equipment, employee vehicles needed for transportation to and from the project site, operation of hand tools, and other common equipment used on construction sites.

Large-scale construction activities can consume a substantial amount of electricity, but the exact level of consumption will vary on a case by case basis depending on the nature and extent of the activities. While smaller scale projects will typically incur fewer construction related energy costs, due to the due to increasing transportation costs and fuel prices and the overall increase in expense of energy needed to run machinery and perform necessary tasks, these construction activities strive to be energy efficient, in part, because contractors and owners have a strong financial incentive to avoid wasteful, inefficient, and unnecessary consumption of energy. There is growing recognition among developers and retailers that sustainable construction is not prohibitively expensive, and that there is a significant cost-savings potential in green building practices and materials. Substantial reductions in energy inputs for construction materials can be achieved by selecting building materials composed of recycled materials that require substantially less energy to produce than non-recycled materials. The incremental increase in the use of energy from the proposed Project for construction materials such as asphalt, steel, concrete, pipes, and manufactured or processed materials (e.g., lumber and gas) would not substantially increase demand for energy compared to overall local and regional demand for construction materials. It is reasonable to assume that production of building materials such as concrete, steel, etc., would employ all available and reasonable energy conservation practices in the interest in minimizing the cost of doing business.

As indicated in the environmental setting above, Kern County consumed 18,439,672 MWh of electricity in 2017 (CEC, 2017a). The proposed Project is estimated to consume 579 MWh of electricity through water consumption which would represent approximately 0.0031 percent of the County's electricity use. This consumption would cease upon completion of construction activities. Therefore, it is anticipated that construction electricity consumption associated with the proposed Project would not be inefficient, wasteful, or unnecessary.

Additionally, Kern County consumed approximately 445,151,657 gallons of gasoline and 311,043,744 gallons of diesel fuel over the same time-period. Kern County occupies approximately 8,163 square miles and has a population of 916,464 people. The proposed Project would require the consumption of approximately 579 MWh of electricity, 323,448 gallons of diesel, and 105,562 gallons of gasoline. As described above, the proposed Project's fuel from the entire construction period would increase fuel use in the Kern County by approximately 0.10 percent for diesel and 0.02 percent for gasoline. Based on the total Project's relatively low construction fuel use proportional to

annual State and County use, the Project would not substantially affect existing energy fuel supplies or resources. As noted above, fuel consumption is based on a conservative construction phasing and conservative estimates for annual construction fuel consumption. Longer phases would result in lower construction intensity and a lower annual fuel consumption, resulting in lower annual demand on energy supplies. Additionally, use of construction fuel would cease once the Project is fully developed. Additionally, it can be expected that over the 25-year build-out scenario that equipment and machinery will become more fuel and energy efficient thereby reducing energy consumption over the long term. As such, Project construction would have a nominal effect on the local and regional energy supplies.

Furthermore, there are no unusual project characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at comparable construction sites in the region or state. In addition, some incidental energy conservation would occur during construction through compliance with State requirements that equipment not in use for more than five minutes be turned off. Project construction equipment would also be required to comply with the latest EPA and CARB engine emissions standards. These engines use highly efficient combustion engines to minimize unnecessary fuel consumption. Contractors would be required to minimize air quality emissions of construction activities with MM 4.3-1 (Air Quality).

Therefore, it is anticipated that construction fuel consumption associated with the proposed Project would not be inefficient, wasteful, or unnecessary. The proposed Project would not substantially affect existing energy or fuel supplies, or resources and new capacity would not be required. With the listed mitigation, impacts would be less than significant in this regard.

Operations (Long-Term)

The energy consumption associated with operation of uses pursuant to the proposed Project would include building electricity, water, and natural gas usage, as well as fuel usage from on-road vehicles. The methodology for each category is discussed below. Note that this energy resources analysis is consistent with the analysis presented in Chapter 4.3 Air Quality and Chapter 4.8 Greenhouse Gas Emissions. Quantifications of operational energy consumption are provided for the proposed Project.

PETROLEUM FUEL

The gasoline and diesel usage associated with on-road vehicular trips is calculated based on total VMT from the CalEEMod analyses, as well as the average fuel efficiency from EMFAC2017 model. The EMFAC2017 fuel efficiency data incorporates the Pavley Clean Car Standards and the Advanced Clean Cars Program. As summarized in Table 4.6-6 (Project Annual Energy Consumption During Operations), the total gasoline and diesel consumption associated with on-road trips would be approximately 2,423,099 gallons per year and 2,430,168 gallons per year, respectively.

ELECTRICITY USAGE

The electricity usage associated with operation of the proposed Project is based on CalEEMod defaults for the proposed uses, including, for the 314-acre site for the construction of 22 acres of GC (General Commercial), 108 acres of LI (Light Industrial), 159 acres SI (Service Industrial), and 25

acres of HC (Highway Commercial. As summarized in Table 4.6-6, Project Annual Energy Consumption During Operations, the buildings would increase 26,930 MWh per year.

The electricity usage associated with operational water consumption is estimated based on the default annual water consumption and the energy intensity factor in CalEEMod for Kern County. Project area water use is based on water demand per square foot factors in CalEEMod. The Project would use approximately 594 million gallons annually (571 million gallons for indoor uses and 23 million gallons for outdoor uses) of water annually which would require 3.2 GWh per year for conveyance and treatment. It should be noted that the CalEEMod water consumption estimates are more conservative than the Project water consumption calculated in the Water Supply Assessment (i.e., the Water Supply Assessment noted the project would use 544.5 acre feet per year, which is equivalent to 177 million gallons per year; refer to Section 4.16). Additionally, the proposed Project would require approximately 187.5 acre feet per year less water than the existing uses. Energy usage based on CalEEMod water consumption estimates were used to provide a conservative analysis.

NATURAL GAS USAGE

The methodology used to calculate the natural gas usage associated with the building envelopes constructed pursuant to the proposed Project is based on CalEEMod default usage rates. As summarized in Table 4.6-6 Project Annual Energy Consumption During Operations, the building area would use 55,841,900 thousand British Thermal Units (kBTU) (558,419 therms) of natural gas per year.

Table 4.6-6. Project Annual Energy Consumption During Operations

Source	Project Operational Usage	Kern County Annual Energy Consumption	Percentage Increase Countywide
Electricity Use		**Megawatt Hour/Year (MWh/year)**	
Building [a]	26,930	18,439,672	0.1460%
Water [a]	3,169		0.0172%
Total Electricity	**30,099**		0.1632%
Natural Gas Use		**Therms/year**	
Building [a]	558,419	2,397,138,219	0.0233%
Diesel Use		**Gallons/Year**	
Mobile [b]	2,430,168	311,403,744	0.7804%
Gasoline Use		**Gallons/Year**	
Mobile [b]	2,423,099	445,151,675	0.544

Notes:
a. The electricity, natural gas, and water usage are based on project-specific estimates and CalEEMod defaults.
b. Calculated based on the mobile source fuel use based on vehicle miles traveled (VMT) and fleet-average fuel consumption (in gallons per mile) from EMFAC2017. For electric vehicles, model year 2015 electric vehicle fuel economy is used from the DOE Fuel Economy Guide.

Abbreviations: CalEEMod: California Emission Estimation Model; EMFAC2017: California Air Resources Board Emission Factor Model; kBTU: thousand British Thermal Units; kWh: kilowatt-hour; MWh: Megawatt-hour.

ANALYSIS

Operation of uses implemented pursuant to the proposed Project would consume approximately 30,099 MWh of electricity and 558,419 therms of natural gas annually. Project operations would consume approximately 2,430,168 gallons of diesel, and 2,423,099 gallons of gasoline.

Kern County consumed 18,439,672 MWh of electricity in 2017 (CEC, 2017a). The proposed Project's operational electricity consumption would represent 0.16 percent of the energy consumption in Kern County. Regarding natural gas, Kern County consumed 2,397 million therms (or 239,714 million kBTU) of natural gas in 2017. Therefore, the proposed Project's operational natural gas consumption would represent 0.02 percent of the natural gas consumption in the County.

In 2018, Californians consumed approximately 15,589,042,965 gallons of gasoline and approximately 3,107,823,655 gallons of diesel fuel. Kern County annual gasoline fuel use in 2018 was 445,151,675 gallons and diesel fuel use was 311,403,744 gallons. Expected proposed Project operational use of gasoline and diesel would represent 0.54 percent of current gasoline use and 0.78 percent of current diesel use in the County.

None of the project energy uses exceed one percent of Kern County use. Therefore, proposed Project operations would not substantially affect existing energy or fuel supplies or resources. The Project would comply with applicable energy standards and new capacity would not be required. Impacts would be less than significant in this regard.

ENERGY EFFICIENCY MEASURES

Mitigation Measure 4.6-1 requires the proposed Project to be designed to include various design features that would improve energy efficiency but at this time, the exact level of design and implementation is not yet know. This is due in part because the final designs of the proposed Project have not been developed and over the expected twenty-five year and it is not known what technology will be available. Over the life of project construction, the proposed Project would promote and encourage green building practices to and to encourage innovative and sustainable design and construction techniques that reduce energy consumption. Therefore, benefits associated with these have not been quantified, which provides a conservative (or "worst case") estimate of impacts

As discussed above, California's Energy Efficiency Standards for Non-Residential Buildings create uniform building codes to reduce California's energy consumption, and provide energy efficiency standards for residential and non-residential buildings. These standards are incorporated within the California Building Code and are expected to substantially reduce electricity and natural gas use. For example, requirements for energy efficient lighting, heating and cooling systems, and green building materials are expected to save additional electricity and natural gas. These savings are cumulative, doubling as years go by. The proposed Project includes MM-4.6-1, which includes energy conservation and design features such as encouraging solar panel installation, including bicycle friendly features, installing LED lights, and including electric vehicle (EV) charging stations.

Title 24 measures would be used to minimize overall energy consumption. Renewable energy generation would be required and shortfalls in renewable energy generation can be offset with excess renewable energy generation from other buildings. Regarding water energy conservation, the proposed Project would incorporate water-conserving landscaping on the site and reduce lawn and turf areas. Water-efficient irrigation controls would also be used in landscape areas as well as recycled water for irrigation. Buildings would incorporate water-efficient fixtures and appliances, to comply with Title 24.

Furthermore, the electricity provider, PG&E, is subject to California's Renewables Portfolio Standard (RPS). The RPS requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020 and to 50 percent of total procurement by 2030. SB 100 revised the goal of the program to achieve the 50 percent renewable resources target by December 31, 2026, and to achieve a 60 percent target by December 31, 2030. SB 100 also established a further goal to have an electric grid that is entirely powered by clean energy by 2045. Renewable energy is generally defined as energy that comes from resources which are naturally replenished within a human timescale such as sunlight, wind, tides, waves, and geothermal heat.

Mitigation Measures

MM 4.6-1: The proposed Project, shall to the extent feasible and to the satisfaction of the Kern County Planning Department incorporate the following energy conservation and design features to reduce the level of energy consumption of the proposed Project. The following list is non-inclusive of all potential mitigation that may be included and may be added to at the discretion of Kern County as new technologies become available and feasible to be incorporated:

- Solar photovoltaics (PV) mounted on proposed structure's roofs to provide a portion of the future electrical demand and offset emissions from fossil fuel fired power plants. Encourage green building measures that contribute to reducing energy use to 25% less than Title 24 requirements;
- Solar water heating to provide non-industrial water heating;
- Ground mounted solar PV arrays to provide a portion of the estimated electrical demand for the proposed Wastewater Treatment and Recycle Facility;
- Commercial buildings shall be designed to meet LEED Silver standards;
- Roofs on all buildings shall be of a light color to reduce heat generation;
- Portions of parking lots (drive aisles) may be paved with concrete versus asphalt to reduce initial solar reflectance;
- Depending on the usage, portions of parking lots may be covered, and the parking lot roofs contain solar PV;
- Use LED lighting fixtures on all public streets and site lighting;
- Include dedicated EV parking at a rate more than required by current codes;
- Include EV charging facilities to encourage the usage of electric vehicles;
- Encourage the utilization of electric forklifts and other material handling vehicles to reduce usage of fossil fuels;

- Design circulation features into the public street improvements to include bus stops and/or other public transportation.
- Include bicycle friendly features to reduce Vehicle Miles Traveled (VMT) and to encourage non-vehicular transportation;
- Encourage the usage of high efficiency electric motors for the industrial uses and the wastewater treatment plant.

Level of Significance after Mitigation

As discussed above, the proposed Project would be required to adhere to all Federal, State, and Local requirements for energy efficiency, including the latest Title 24 standards. Considering these requirements in addition mitigation measure 4.6-1 described above, the Project would not result in the inefficient, wasteful, or unnecessary use of building energy. Therefore, potential impacts are less than significant.

Impact 4.6-2: The Project Would Conflict with or Obstruct State or Local Plan for Renewable Energy or Energy Efficiency.

At of the time of this writing, the Kern County does not have an adopted Energy Plan. Kern County does have an Energy Element in their General Plan, but focuses primarily on the County's energy resources and municipal measures such as encouraging the County to seek State and federal energy grants, have discussions with various energy industries, and developing long-term compensation for wildlife habitat to name a few. The proposed Project design conforms to, and operation would comply with, State Building Energy Efficiency Standards, appliance efficiency regulations, and green building standards. Conformance to the State requirements would substantially reduce the energy consumption from fossil fuels and shift consumption to renewable sources. MM 4.6-1 requires design features such as incorporating passive solar design, heat island mitigation, energy efficient low voltage lighting, and encouraging electric forklifts and other material handling vehicles to name a few. Additionally, implementation of the identified mitigation measures to reduce GHG emissions by 29 percent (MM 4.3-1) would further reduce energy consumption.

The proposed Project would not conflict with or obstruct the implementation of any state or local plan for renewable or energy efficiency. Implementation of the proposed Project would not conflict with existing energy standards, including standards for energy conservation. However, approval of and future implementation of the proposed Project would increase electricity demand over baseline conditions in the County. Electric and natural gas services are provided upon demand from consumers and consistent with local, state, and federal regulations, these services are expanded based on demand. As discussed above in Impact ER-1, development of the proposed Project would not cause inefficient, wasteful or unnecessary energy use, and impacts would be less than significant. Therefore, the project would not conflict with or obstruct state or regional plans and impacts would be less than significant.

Mitigation Measures

Implement Mitigation Measures MM 4.3-1, as described in Section 4.3, *Air Quality*; MM 4.6-1, as described in Section 4.6, *Energy.*

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Construction and operation associated with implementation of the proposed Project would result in the consumption of fuel and energy, but it would not do so in a wasteful manner, as discussed above. The consumption of fuel and energy would not be substantial in comparison to statewide electricity, natural gas, gasoline, and diesel demand; refer to Table 4.6-5 and Table 4.6-6. New capacity or supplies of energy resources would not be required. Additionally, the proposed Project would be subject to compliance with all Federal, State, and local requirements for energy efficiency.

The anticipated project impacts, in conjunction with cumulative development in the site vicinity, would increase urbanization and result in increased energy consumption. Potential land use impacts are site-specific and require evaluation on a case-by-case basis. Each cumulative project would require separate discretionary approval and CEQA assessment, which would address potential energy consumption impacts and identify necessary mitigation measures, where appropriate.

As noted above, the proposed Project would not result in significant energy consumption impacts. The proposed Project would not be considered inefficient, wasteful, or unnecessary with regard to energy. Thus, the proposed Project and identified cumulative projects are not anticipated to result in a significant cumulative impact.

Mitigation Measures

Implement Mitigation Measures MM 4.3-1, as described in Section 4.3, *Air Quality*; MM 4.6-1, as described in Section 4.6, *Energy.*

Level of Significance after Mitigation

Impacts would be less than significant.

Section 4.7

Geologic and Seismic Hazards

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Section 4.7
Geologic and Seismic Hazards

4.7.1 Introduction

The purpose of this section is to describe the geologic and seismic setting of the proposed Project area, identify potential impacts associated with implementation of the proposed Project and recommend mitigation to reduce the significance of impacts. The issues addressed in this section are risks associated with faults, strong seismic ground shaking, seismic-related ground failure such as liquefaction, landslides, subsidence and earthquake induced dam failure and flooding. A Hazardous Materials Evaluation was prepared by McIntosh & Associates in November 2008 (refer to Appendix N) to address hazardous materials and conditions on the Project site. A subsequent Hazardous Materials Evaluation was prepared by McIntosh & Associates in July 2017. Although these evaluations do not directly address seismic hazards, some of the information is relevant to this section and included in the discussion below. See Appendix F, *Hazardous Materials Evaluation*, and Appendix N, *Original Technical Studies.*

4.7.2 Environmental Setting

Regional Geologic Setting

The proposed Project is located in the Great Valley Geomorphic Province of California, which is an alluvial plain, about 50 miles wide and 400 miles long, between the Coast and Sierra Nevada Mountain Ranges. The Great Valley is drained by the Sacramento and San Joaquin rivers, which ultimately drain in the San Francisco Bay. The Great Valley is a northwesterly trending trough filled with approximately 40,000 feet of sediments deposited by the surrounding mountains. Streams flowing from the Sierra Nevada to the west have formed alluvial fans at the surface. The Kern River fan is the largest, covering about 300 square miles of the Valley, beginning as an incised channel north of downtown Bakersfield.

Local Geologic Setting

Geologic Structure

According to the United States Geological Survey (USGS) 7.5-Minute Topographic Quadrangle Maps, Gosford and Conner, California (1954, photorevised 1968, photoinspected 1973) the topography of the proposed Project site is relatively level, sloping southwesterly at an average rate of approximately 7.5 feet per mile, at an elevation ranging from approximately 331 to 340 feet above mean sea level (msl).

The Project site rests on alluvial fan deposits of Holocene (Recent) age, having been deposited on this part of the valley floor during the last 11,000 years. Near surface soils within the proposed Project area consist of interbedded sand, silt, gravels and clay overlying marine and continental sedimentary formations, which rest on a crystalline basement complex. This basement complex is estimated to

underlie the proposed Project at approximately 12,000 feet below the surface layer (McIntosh & Associates, 2017).

Soils

The following information regarding soils is based on the Custom Soil Survey of Kern County, California, Southwestern Part prepared by the United States Department of Agriculture (USDA), the Farmland Conversion Study, and the Hazardous Materials Evaluation. The proposed Project is entirely underlain by the Bakersfield fine sandy loam, drained, 0 to 1 percent slopes and Cajon sandy loam series, 0 to 2 percent slopes, overwash. The following are brief descriptions of the soil types on-site:

Bakersfield fine sandy loam, drained, 0 to 1 percent slopes: This soil is very deep, poorly drained on alluvium weathered from granite. The soil was derived predominately from granitic rock at elevations generally from 300 to 475 feet. Permeability is moderately slow, runoff is slow, available water capacity is high and the hazard of water erosion is slight and wind erosion is moderate. The shrink-swell potential is low and the corrosivity class is high for steel and moderate for concrete. The soil occurs on approximately 60 percent of the proposed Project site.

Cajon sandy loam, 0 to 2 percent slopes, overwash: This soil is deep, somewhat excessively drained on sandy alluvium dominantly granitic rocks. The soil was derived predominately from granitic sources at elevations generally from 320 to 400 feet. Permeability is moderate, available water capacity is low, runoff is very slow, and the hazard of water erosion is slight and wind erosion is severe. The shrink-swell potential is low and the corrosivity class is high for steel and low for concrete. The soil occurs on approximately 40 percent of the proposed Project site, traversing the middle of the site from the northeast corner to the southwest corner.

Faults

A fault is a fracture in the crust of the earth along which land on one side has moved relative to land on the other side. Most faults are the result of repeated displacements over a long period of time. A fault trace is the line on the earth's surface defining the fault.

An active fault is defined by the State Mining and Geology Board as a fault that has "had surface displacement within Holocene times (about the last 11,000 years)." This definition does not mean that faults lacking evidence of surface displacement within Holocene times are necessarily inactive. A fault may be presumed to be inactive based on satisfactory geologic evidence; however, the evidence necessary to prove inactivity is sometimes difficult to obtain and locally may not exist. A potentially active fault is a fault that shows evidence of surface displacement during Quaternary time (last 1.6 million years).

The Alquist-Priolo Earthquake Fault Zoning Act, passed in 1972, is primarily intended to prevent the construction of buildings used for human occupancy on the surface traces of active faults. The Act addresses only the hazard of surface fault rupture and not other earthquake hazards. The law required the State Geologist to establish regulatory zones known as "Earthquake Fault Zone" around the surface traces of active faults and to issue appropriate maps.

There are numerous geologic fractures in the earth's crust within the San Joaquin Valley, with the San Andreas Fault being the most prominent. Other fault systems occur in the Bakersfield region, as in most of California, due to the continual and historical convergence of the continental plates. Several active fault systems are located within a 50-mile radius of the proposed Project site (refer to Figure 4.7-1, *Fault Locations Map*). They include the Garlock Fault, located approximately 35 miles to the southeast, the Breckenridge-Kern Canyon Fault located approximately 30 miles to the northeast, the White Wolf Fault located approximately 12 miles to the south and the Pond Poso Fault located approximately 20 miles to the north of the proposed Project site.

White Wolf Fault

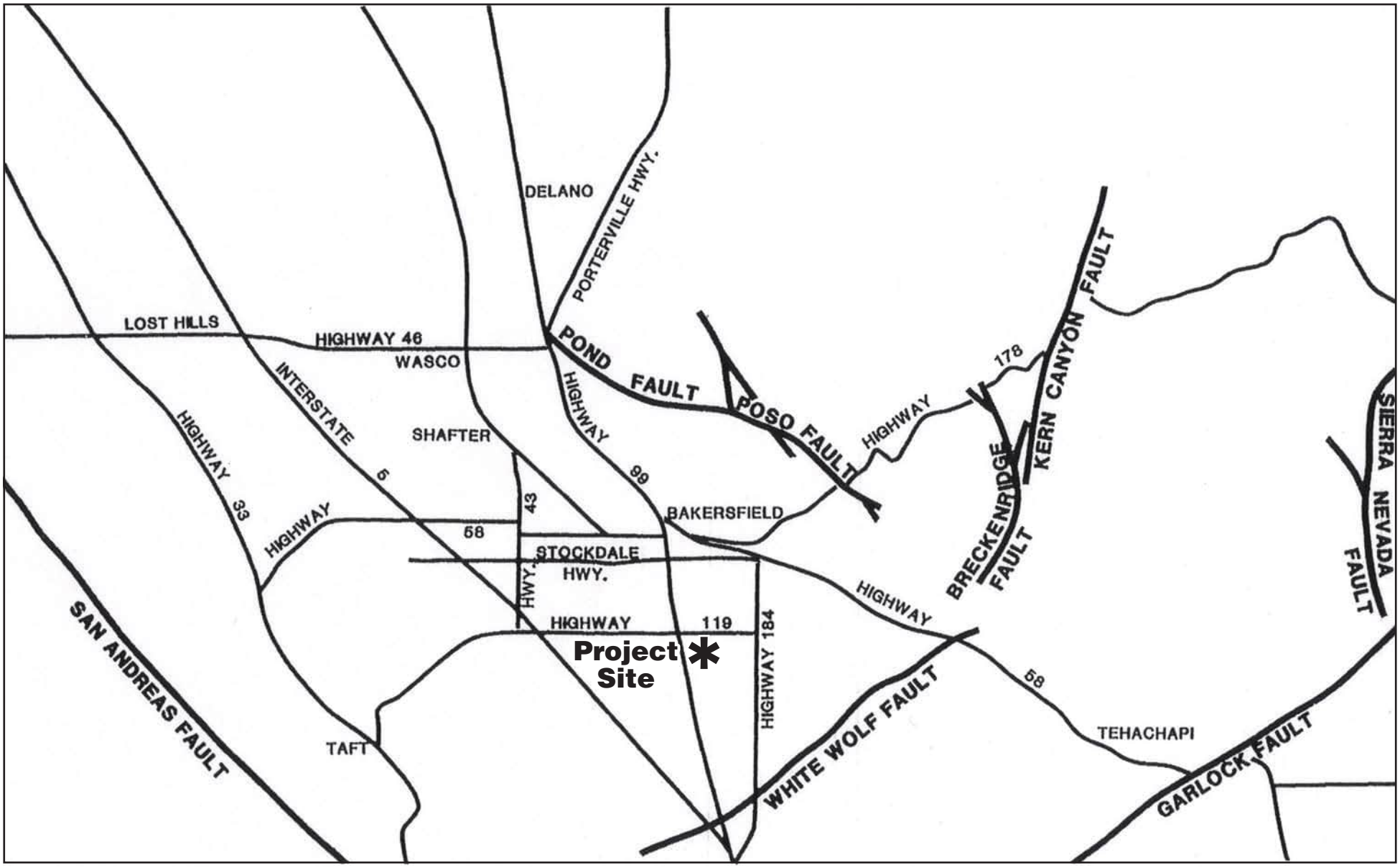
The White Wolf fault is a southeast dipping, left-lateral, oblique, reverse fault with a length of approximately 45 miles. This fault is located approximately 6 miles south of the Project site and traverses the southeastern end of the San Joaquin Valley, from Wheeler Ridge to northeast of Caliente. On July 21, 1952, the White Wolf fault ruptured, producing an earthquake of magnitude 7.5 and subsequently an extensive sequence of aftershocks. Although surface rupture formed along only 17 miles of the surface trace of this fault, rupture probably occurred along most of its length. The magnitude 7.5 of 1952 on the White Wolf Fault has been the only event in historic time. Significant features caused by the fault are the valley at the junction of Highways 58 and 223 (sometimes called "White Wolf Valley"), and the Arvin cutoff along State Route 223. This fault has been designated by the State as an Alquist-Priolo Special Studies Zone.

Breckenridge-Kern Canyon Fault

The Breckenridge-Kern Canyon fault is located in the southern Sierra Nevada Mountains, approximately 25 miles east of the Project site. It trends northward from the north end of Walker Basin to the north of Mount Whitney, a distance of approximately 100 miles. Uncertainty exists as to the degree of activity of this fault system and its classification. It is designated as active with a maximum credible earthquake of 8.0. This fault is capable of damaging the Bakersfield area. Areas along this fault have been designated by the State as Alquist-Priolo Special Studies Zones.

Pond Poso Fault

The Pond Poso Fault is located approximately 19 miles north of the Project site. It trends in a northwesterly direction. The Pond Poso Fault consists of four parallel breaks, forming a zone approximately two-thirds of a mile wide. This fault is designated as active with a maximum credible earthquake of 7.0. This is an active fault capable of damaging the Bakersfield area. Areas along the Pond Poso Fault have been designated by the State as Alquist-Priolo Special Studies Zones.



Source: Metropolitan Bakersfield, General Plan, December 11, 2002.

99 HOUGHTON INDUSTRIAL PARK PROJECT
CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07
AGRICULTURAL PRESERVE #13 EXCLUSION

Fault Locations Map

Figure 4.7-1

0 250,000'
APPROXIMA TE

San Andreas Fault

The San Andreas Fault is located approximately 30 miles southwest of the Project site. The fault is approximately 650 miles in length, reaching from the Mendocino Escarpment on the north to the Imperial Valley to the south. Along this extent, the San Andreas is considered to be the boundary between the North American Plate and the Pacific Plate. The segment of the San Andreas within Kern County is relatively short compared to its 650-mile length. However, it is important, since this segment breaks from the system's predominantly 350-degrees trending direction between the San Luis Obispo and Los Angeles County lines. The last great earthquake on this segment was the 1857 Fort Tejon earthquake, which is believed to have caused a rupture extending 200 miles or more. Geologists consider this fault as having the potential to generate an earthquake of magnitude 8.3 on the Richter scale, which is designated as the maximum credible earthquake. This is an active fault capable of damaging the proposed Project area. Areas along this fault have been designated by the State as Alquist-Priolo Special Studies Zones.

Garlock Fault

The Garlock fault extends eastward from its point of intersection with the San Andreas Fault, near Lebec, for a distance of approximately 150 miles. The fault is located approximately 30 miles southeast of the Project site. The Garlock fault zone is one of the most obvious geologic features in southern California, clearly marking the northern boundary of the area known as the Mojave Block, as well as the southern ends of the Sierra Nevada's and the valleys of the westernmost Basin and Range province. While no earthquake has produced surface rupture on the Garlock fault in historic times, there have been a few sizable quakes recorded along the Garlock fault zone. The most recent was a magnitude 5.7 near the town of Mojave on July 11, 1992. It was believed to have been triggered by the Landers earthquake, just two weeks earlier. At least one section of the fault has shown movement in recent years. This is an active fault capable of damaging the area. The slip rate is listed by the Southern California Earthquake Data Center to be between 2 and 11 millimeters per year (mm/yr), but averages approximately 7 mm/yr. Areas along this fault have been designated by the State as Alquist-Priolo Special Studies Zones.

Other Significant Faults

Other major fault systems in or near the Bakersfield area consist of the Sierra Nevada, Edison, and Kern Front systems.

Seismic Hazards

Seismicity is the geographic and historical distribution of earthquakes, including their frequency, intensity, and distribution. Seismic hazards include surface rupture, ground shaking, liquefaction, landslides, subsidence, expansive soils, and soils and soil erosion.

As described above, the southern end of the San Joaquin Valley is bordered by major active fault systems, making Kern County a historically active seismic area. To evaluate the effect a major earthquake might have on the site, the Metropolitan Bakersfield General Plan indicates which faults have been identified in the vicinity of Bakersfield capable of causing damage to the Bakersfield area; refer to Table 4.7-1, *Possible Damage Inducing Faults*.

Table 4.7-1. Possible Damage Inducing Faults

Fault	Approximate Distance from Project Site (mi)	Maximum Earthquake Magnitude	Maximum Credible Bedrock Acceleration (g)
San Andreas	30	8.0-8.3	0.2-0.25
Sierra Nevada	60	6.5-8.25	0.07-0.12
Garlock	35	7.5-8.0	0.17-0.18
Breckenridge-Kern Canyon	30	6.0-8.0	0.09-0.47
White Wolf	12	7.5-8.0	0.28-0.45
Pond Poso	20	7.0	0.31-0.48

Source: Metropolitan Bakersfield General Plan EIR, June 26, 2002.
Approximate Distance from Project Site is measured in miles (mi)
Maximum Credible Bedrock Acceleration is measured in terms of gravitation force (g)

Table 4.7-1 indicates that a maximum peak ground acceleration of 0.48g would be felt at the proposed Project site as a result of a maximum earthquake of magnitude 7.0 on the Pond Poso Fault approximately 20 miles away. A maximum probable earthquake of magnitude 8.0 on the White Wolf Fault would create a maximum credible bedrock acceleration of 0.45g at the Project site. A maximum probable earthquake of magnitude 8.3 on the San Andreas Fault would create a peak site ground acceleration of 0.25g at the proposed Project site. Due to the numerous geologic fractures in the earth's crust within the San Joaquin Valley, all development within the Metropolitan Bakersfield area is subject to seismic hazards.

Fault Rupture

Surface rupture occurs when movement on a fault deep within the earth breaks through to the surface. Fault ruptures almost always follow pre-existing faults that are zones of weakness. Rupture may occur suddenly during an earthquake or slowly in the form of fault creep. Sudden displacements are more damaging to structures because they are accompanied by shaking. Fault creep is the slow rupture of the earth's crust. It is not likely that rupture would occur at the Project site because it is not located within 500-feet of a known active fault trace.

Ground Shaking

The southern California region is characterized by, and has a history of, faults and associated seismic activity. Earthquakes are classified by their magnitude, a measure of the amount of energy released during an event. During a seismic event, the proposed Project site may be subjected to high levels of ground shaking due to its proximity to active faults in the area. As explained above, several significant, active faults are in the vicinity of the proposed Project, including the San Andreas, Pond Poso, and White Wolf faults. The Project is not in the Alquist-Priolo Earthquake Fault Zones of any of these faults. The largest of these faults is San Andreas Fault, which is considered active. The maximum probable and credible earthquake magnitude near the proposed Project area would come from the San Andreas Fault at a magnitude 8.3 on the Richter scale. The maximum bedrock acceleration at the proposed Project site due to an earthquake from the San Andreas Fault is 0.25 times the rate of acceleration due to gravity.

Liquefaction

Liquefaction occurs when saturated, loose materials (e.g., sand or silty sand) are weakened and transformed from a solid to a near-liquid state due to increased pore water pressure. The increase in pressure is caused by strong ground motion from an earthquake. The proposed Project's susceptibility to liquefaction is a function of depth, density, and groundwater level, in addition to the magnitude of an earthquake. Liquefaction-related phenomena can include lateral spreading, ground oscillation, flow failure, loss of bearing strength, subsidence, and buoyancy effects.

The surficial soils described above consist generally of medium-dense sands and gravels. For liquefaction to occur, the soil must be saturated (i.e., shallow groundwater), and the soil must be relatively loose. Properly compacted structural fills are not susceptible to liquefaction, and the risk of liquefaction and associated lateral spread and/or ground lurching is low for areas within the proposed Project area.

Seismic ground shaking of relatively loose, granular soils that are saturated or submerged can cause the soils to liquefy and temporarily behave as a dense fluid. Liquefaction is caused by a sudden temporary increase in pore water pressure due to seismic densification or other displacement of submerged granular soils. Liquefaction more often occurs in areas underlain by young alluvium where the groundwater table is higher than 50 feet below ground surface (bgs). According to the Metropolitan Bakersfield General Plan, the proposed Project is not likely to be located within an area of high groundwater and loose soils. The depth to water at the Project site is approximately 165-175 feet bgs; therefore, the proposed Project is not anticipated to be located within an area of high groundwater (McIntosh & Associates, 2017).

Landslides and Rockfalls

Landslides are large movements of land downgradient. They can be induced by seismic events or wet, saturated soil conditions and can cause significant damage to life and property. The proposed Project area is flat and not susceptible to landslides.

The proposed Project is located on relatively flat topography and is not located adjacent to any steep slopes or areas that would otherwise be subject to landslides, debris flow and/or rockfall. According to the Metropolitan Bakersfield General Plan, the areas of Metropolitan Bakersfield with slopes subject to failure are predominantly found along the river terraces, bluffs and foothills to the northeast and east of the City of Bakersfield.

Subsidence

Land subsidence is the gradual, local setting or shrinking of the earth's surface with little or no horizontal motion. Subsidence is normally the result of gas, oil or water extraction, hydrocompaction, peat oxidation and not the result of landslide or ground failure. The Metropolitan Bakersfield General Plan has indicated that although subsidence is not a significant hazard, damage to wells, foundations and underground utilities may occur.

Due to the petroleum and groundwater withdrawal activities throughout Kern County, the potential for subsidence to occur exists. The amount of petroleum withdrawal in Kern County is too small an

amount to result in serious subsidence. The State Division of Oil, Gas and Geothermal Resources monitors subsidence in oil and gas fields and regulates oil and gas withdrawal and repressurizing of the field. If subsidence is noted, remediation is accomplished by raising the water table by injecting water or reducing the volume of groundwater being pumped. The remediation activities ensure that no significant impacts from subsidence would occur.

Dam Failure

Isabella Dam is located approximately 40 miles northeast of Bakersfield (approximately 45 miles from the proposed Project) and is built near a major earthquake fault. Isabella Dam is earth-filled and is approximately 185 feet high, 1,725 feet long, and can hold 570,000 acre-feet of water.

If an earthquake were to occur near Isabella Dam, it could result in a break in the dam. This could cause the entire lake storage to be released, which would flood 60 square miles of Bakersfield. The Metropolitan Bakersfield General Plan indicates the chances of the dam failing entirely, with the lake at capacity, was judged as one day in 10,000 years.

Flooding

The proposed Project is located in an area of potential surface waters and it is possible that some flooding would occur at this site during a major earthquake from an upstream catastrophe, such as a dam collapse. The proposed Project is located within the Federal Emergency Management Agency Flood Insurance Rate Map Zone X. Flood Zone X contains areas of minimal flooding. Therefore, the proposed Project is outside the 0.2 percent annual chance floodplain.

Expansive Soils

Expansive soils generally result from specific clay minerals that expand in volume when saturated and shrink in volume when dry. The presence of this soil type can damage structures when expansion and contraction of soil cracks rigid building materials (i.e., concrete, wood, drywall, etc.). The proposed Project area's substrate is mapped as Bakersfield fine sandy loam and Granoso sandy loam.

4.7.3 Regulatory Setting

Geologic resources and geotechnical hazards are governed primarily by local jurisdictions. The conservation elements and seismic safety elements of city and county general plans contain policies for the protection of geologic features and avoidance of hazards.

The California Environmental Quality Act (CEQA) is the major environmental statute that guides the design and construction of projects on non-Federal lands in California. This statute sets forth a specific process of environmental impact analysis and public review. In addition, the project proponent must comply with other applicable State and local applicable statutes, regulations and policies. Relevant and potentially relevant statutes, regulations, and policies are discussed below.

Federal

International Building Code (IBC)

Related to the proposed Project, the International Building Code (IBC), applies to the construction, use and occupancy, location, and maintenance of buildings and structures that would be constructed after project approval. Title 24 of the California Building Code (CBC) incorporates by adoption the 2015 IBC of the International Code Council (ICC) with necessary California amendments. The adoption of the IBC and relation to the CBC is discussed in additional detail under the State regulatory setting below. These development standards require the proposed Project to comply with appropriate seismic design criteria found in the IBC, adequate drainage facility design, and preconstruction soils and grading studies. Seismic design standards have been established to reduce many of the structural problems occurring because of major earthquakes, the significant design code and construction standards include:

- Upgrade the level of ground motion used in the seismic design of buildings;
- Add site amplification factors based on local soils conditions; and
- Improve the way ground motion is applied in detailed design.

Section 1613 of the IBC references modern earthquake construction standards and includes the American Society of Civil Engineers (ASCE) minimum design loads standard, specifically ASCE Standard 7, which bases seismic design on-site class (soil specific) and seismic design category (based on risk category).

Clean Water Act (CWA)

The Clean Water Act (CWA) (33 U.S.C. Section 1251 et seq.), formally the Federal Water Pollution Control Act of 1972, was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and certain non–point source discharges to surface water. Those discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). Projects that disturb one or more acre of land are required to obtain NPDES coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit), State Water Resources Control Board Order No. 2009-0009-DWQ. The General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP), which includes Best Management Practices (BMPs) to protect stormwater runoff. Requirements of the Federal CWA and associated SWPPP requirements are described in further detail in Section 4.10, *Hydrology and Water Quality*.

Earthquake Hazards Reduction Act

The National Earthquake Hazards Reduction Program (NEHRP) was established by the U.S. Congress when it passed the Earthquake Hazards Reduction Act of 1977, Public Law (P.L.) 95–124. At the time of its creation, Congress' stated purpose for NEHRP was "to reduce the risks of life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program." Congress recognized that earthquake-related losses could be reduced through improved design and construction methods and practices, land use

controls and redevelopment, prediction techniques and early-warning systems, coordinated emergency preparedness plans, and public education and involvement programs. Since NEHRP's creation, it has become the federal government's coordinated long-term nationwide program to reduce risks to life and property in the United States that result from earthquakes. Four basic NEHRP goals are as follows:

- Develop effective practices and policies for earthquake loss reduction and accelerate their implementation
- Improve techniques for reducing earthquake vulnerabilities of facilities and systems
- Improve earthquake hazards identification and risk assessment methods, and their use
- Improve the understanding of earthquakes and their effects.

Congress has recognized that several key federal agencies can contribute to earthquake mitigation efforts. Today, there are four primary NEHRP agencies:

- Federal Emergency Management Agency (FEMA) of the Department of Homeland Security.
- National Institute of Standards and Technology (NIST) of the Department of Commerce (NIST is the lead NEHRP agency).
- National Science Foundation (NSF).
- USGS of the Department of the Interior.

Congress completed a review of NEHRP, resulting in the NEHRP Reauthorization Act of 2004, PL 108–360. PL 108–360 directed that NEHRP activities be designed to develop effective measures for earthquake hazard reduction; promote the adoption of earthquake hazards reduction measures by government agencies, standards and codes organizations, and others involved in planning and building infrastructure; improve the understanding of earthquakes and their effects through interdisciplinary research; and, develop, operate, and maintain both the Advanced National Seismic System (ANSS) and the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). In a major new initiative, PL 108–360 also directed that NEHRP support development and application of performance-based seismic design (PBSD).

State

California Building Code (CBC 2016)

The State of California provides minimum standards for building design through the California Building Code (CBC). The CBC is based on the International Building Code (IBC), which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for conditions within California. Starting in 1989, revised editions of California Code of Regulations (CCR) Title 24 has been published every three years. The 2016 edition of the CBC is based on the 2015 IBC published by the International Code Council. The current version of the CBC became effective January 1, 2017. Local agencies must ensure that development in their jurisdictions complies with guidelines contained in the CBC. Cities and counties can, however, adopt building standards beyond those provided in the code.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) was passed in 1972 to regulate development and construction of buildings intended for human occupancy to avoid the hazard of surface fault rupture. Under the Alquist-Priolo Act, the California State Geologist (CSG) identifies areas that are at risk of surface fault rupture. The primary purpose of the Alquist-Priolo Act is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. An active fault is defined by the State Mining and Geology Board (SMGB) as one which has "had surface displacement within Holocene time (about the last 11,000 years)." The CSG, previously known as the California Division of Mines and Geology (CDMG), has compiled Special Publication 42 – Fault Rupture Hazard Zones that delineates and defines active fault traces and zones that require specific studies to address rupture hazards with respect to "structure[s] for human occupancy." Any project that involves the construction of buildings or structures for human occupancy is subject to the Alquist-Priolo Act, and any structures for human occupancy must be located at least 50 feet from any active fault.

Seismic Hazards Mapping Act of 1990

In accordance with Public Resources Code, Chapter 7.8, Division 2, the CGS, formerly CDMG, is directed to delineate Seismic Hazard Zones through the Seismic Hazards Zonation Program. The purpose of the Act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards, such as those associated with strong ground shaking, liquefaction, landslides, other ground failures, or other hazards caused by earthquakes. Cities, counties, and State agencies are directed to use seismic hazard zone maps developed by CGS in their land-use planning and permitting processes. In accordance with the Seismic Hazards Mapping Act, site-specific geotechnical investigations must be performed prior to permitting most urban development projects within seismic hazard zones.

Local

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan Safety Element has identified various implementation programs with respect to fault rupture. These programs specify various requirements, including:

- Detailed geologic investigations are to be conducted, in conformance with guidelines of the California Division of Mines and Geology (CDMG), for all construction designed for human occupancy in an Alquist-Priolo Fault Study Zone;
- Construction of buildings for human occupancy within 50 feet of the trace of an active fault is prohibited;
- Plans and permits for installation of major lifeline components such as highways, utilities and petroleum or chemical pipelines are to incorporate design features to accommodate potential fault movement in areas of active faults without prolonged disruption of an essential service or threat to health and safety;

- Field information is to be developed as part of any California Environmental Quality Act (CEQA) investigations, and geologic reports by the City and County geologists should be kept current and accessible for use in report preparation, geologic reviews, and policy development.

Active faults may potentially exist outside of the Special Studies Zones. As a result, development of critical and important facilities proposed outside of these zones would require additional fault investigation. The Safety Element has specified a policy that requires that the development of critical facilities be supported by documentation of thorough hazard investigation. Critical facilities are defined by the California Seismic Safety Commission as the following three basic types of facilities:

- "Essential facilities," whose continued functioning is necessary to maintain public health and safety following a disaster. These facilities include fire and police stations, communication facilities, emergency operation centers, hospitals, administrative buildings and schools designated as mass care shelters. Also included are key transportation facilities and utility "lifeline" facilities such as water supply, sewage disposal, oil and gas storage facilities and transmission lines and electric generation stations and transmission lines.
- Those facilities where damage or failure could pose hazards to life and property well beyond their immediate vicinity. This category includes such facilities as dams and reservoirs, petroleum storage facilities and nuclear waste processing and storage facilities.
- Public or private structures for housing or assembly of large populations, where failure could pose hazards to life and property within the structures and in their immediate vicinity. These high-occupancy facilities include schools, prisons, coliseums, theaters, conference and convention facilities, high-rise buildings, and similar facilities used by large numbers of people.

Further, the Safety Element of the Metropolitan Bakersfield General Plan has identified various implementation programs to be carried out by the City and County affecting seismic safety of critical facilities. These programs include:

- Detailed site studies for fault rupture potential are to be conducted as background to the design process for critical facilities under City and County discretionary approval.
- Existing critical facilities are to be reviewed for any significant siting, design or construction problems that would make them vulnerable in an earthquake;
- The findings shall be incorporated into emergency operations plans as well as addressed in longer-term programs of facilities upgrading or relocation; and
- Construction of critical facilities is prohibited within 300 feet of the trace of an active fault.

The Metropolitan Bakersfield General Plan sets forth goals and policies to ensure public safety during seismic events and potential geologic effects, including liquefaction and subsidence. The applicable goals and policies are discussed in Table 4.7-2, *Metropolitan Bakersfield General Plan Goals and Policies for Geologic and Seismic Hazards*, below.

Table 4.7-2. Metropolitan Bakersfield General Plan Goals and Policies for Geologic and Seismic Hazards
Goals and Policies: Safety Element - Seismic
Goal 1: Substantially reduce the level of death, injury, property damage, economic and social dislocation and disruption of vital services that would result from earthquake damage.
Goal 2: Ensure the availability and effective response of emergency services following an earthquake.
Goal 3: Prepare the Planning area for effective response to, and rapid, services following an earthquake.
Goal 7: Protect land uses from the risk of dam failure inundation including the assurances that: the functional capabilities of essential facilities are available in the event of a flood; hazardous materials are not released; effective measures for mitigation of dam failure inundation are incorporated into the design of critical facilities; and the rapid and orderly evacuation of populations in the inundation area will occur.
Policy 7: Continue to address seismically hazardous buildings pursuant to Chapter 12.2 (8875 et. Seq.), Division 1 of Title 2 of the Government Code.
Policy 8: Require seismic review of other potentially hazardous buildings upon any change in their use or occupancy status.
Policy 9: Adopt and maintain high standards for seismic performance of buildings, through prompt adoption and careful enforcement of the most current seismic standards of the Uniform Building Code.
Policy 10: Prohibit development designed for human occupancy within 50 feet of a known active fault and prohibit any building from being placed astride an active fault.
Policy 11: Require site-specific studies to locate and characterize specific fault traces within an Alquist-Priolo Earthquake Fault Zone for all construction designed for human occupancy.
Policy 12: Design significant lifeline installations such as highway, utilities and petrochemical pipelines which cross an active fault, to accommodate potential fault movement without prolonged disruption of an essential service or creating threat to health and safety.
Policy 13: Determine the liquefaction potential at sites in areas of high groundwater prior to development and determine specific mitigation to be incorporated into the foundation design, as necessary to prevent or reduce damage from liquefaction in an earthquake.
Policy 14: Route major lifeline installations around potential liquefaction areas or otherwise protect them against significant damage from liquefaction in an earthquake.
Policy 15: Compile information on areas of potential hazards and field information developed as part of CEQA investigations and geologic reports and keep geologic reviews and policy development current and accessible for use in report preparation.
Policy 18: Design discretionary critical facilities located within the potential inundation area for dam failure in order to: mitigate the effects of inundation on the facility; promote orderly shut-down and evacuation (as appropriate); and, prevent on-site hazards from affecting building occupants and the surrounding communities in the event of dam failure.
Policy 19: Design discretionary facilities in the potential dam inundation area used for the manufacture, storage or use of hazardous materials to prevent on-site hazards from affecting surrounding communities in the event of inundation.
Policy 20: Require emergency response plans for the Planning area to include specific procedures for the sequential and orderly evacuation of the potential dam inundation area.
Policy 21: Encourage critical and high-occupancy facilities as well as facilities for elderly, handicapped and other special care occupants located in the potential inundation area below the dam to develop and maintain plans for the orderly evacuation of their occupants.

Table 4.7-2. Metropolitan Bakersfield General Plan Goals and Policies for Geologic and Seismic Hazards
Goals and Policies: Safety Element - Flooding
Goal 1: Minimize hazards to planning area residents resulting from flooding.
Goal 2: Reduce the risk of flooding to land uses.
Policy 1: Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry.
Policy 2: Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development or metropolitan police and fire facilities and services.

Kern County Building and Construction Ordinance (Title 17 of the Ordinance Code of Kern County)

Chapter 17.08 Kern County Building Code

All construction in Kern County is required to conform to the Kern County Building Code (Chapter 17.08, Building Code, of the Ordinance Code of Kern County). Kern County has adopted the CBC, 2016 Edition, with some modifications and amendments.

Chapter 17.28 of Kern County Grading Code

The purpose of the Kern County Grading Code is to safeguard life, limb, property, and the public welfare by regulating grading on private property. All requirements of the Kern County Grading Code will be applied during implementation of the project. All required grading permit(s) shall be obtained prior to commencement of construction activities. Sections of the Grading Code that are particularly relevant to geology and soils are provided below.

Section 17.28.140 Erosion Control

A. Slopes. The faces of cut and fill slopes shall be prepared and maintained to control against erosion. This control may consist of effective planting. The protection for the slopes shall be installed as soon as practicable and prior to calling for final approval. Where cut slopes are not subject to erosion due to the erosion-resistant character of the materials, such protection may be omitted.

B. Other Devices. Where necessary, check dams, cribbing, riprap or other devices or methods shall be employed to control erosion and provide safety.

C. Temporary Devices. Temporary drainage and erosion control shall be provided as needed at the end of each work day during grading operations, such that existing drainage channels would not be blocked. Dust control shall be applied to all graded areas and materials and shall consist of applying water or another approved dust palliative for the alleviation or prevention of dust nuisance. Deposition of rocks, earth materials or debris onto adjacent property, public roads or drainage channels shall not be allowed.

Section 17.28.170 Grading Inspection

A. General. All grading operations for which a permit is required shall be subject to inspection by the building official. Professional inspection of grading operations and testing shall be provided by the civil engineer, soils engineer, and the engineering geologist retained to provide such services in accordance with Subsection 17.28.170(E) for engineered grading and as required by the building official for regular grading.

B. Civil Engineer. The civil engineer shall provide professional inspection within such engineer's area of technical specialty, which shall consist of observation and review as to the establishment of line, grade and surface drainage of the development area. If revised plans are required during the course of the work they shall be prepared by the civil engineer.

C. Soils Engineer. The soils engineer shall provide professional inspection within such engineer's area of technical specialty, which shall include observation during grading and testing for required compaction. The soils engineer shall provide sufficient observation during the preparation of the natural ground and placement and compaction of the fill to verify that such work is being performed in accordance with the conditions of the approved plan and the appropriate requirements of this chapter. Revised recommendations relating to conditions differing from the approved soils engineering and engineering geology reports shall be submitted to the permittee, the building official and the civil engineer.

D. Engineering Geologist. The engineering geologist shall provide professional inspection within such engineer's area of technical specialty, which shall include professional inspection of the bedrock excavation to determine if conditions encountered are in conformance with the approved report. Revised recommendations relating to conditions differing from the approved engineering geology report shall be submitted to the soils engineer.

E. Permittee. The permittee shall be responsible for the work to be performed in accordance with the approved plans and specifications and in conformance with the provisions of this Code, and the permittee shall engage consultants, if required, to provide professional inspections on a timely basis. The permittee shall act as a coordinator between the consultants, the contractor and the building official. In the event of changed conditions, the permittee shall be responsible for informing the building official of such change and shall provide revised plans for approval.

F. Building Official. The building official may inspect the project at the various stages of the work requiring approval to determine that adequate control is being exercised by the professional consultants.

G. Notification of Noncompliance. If, in the course of fulfilling their responsibility under this chapter, the civil engineer, the soils engineer, or the engineering geologist finds that the work is not being done in conformance with this chapter or the approved grading plans, the discrepancies shall be reported immediately in writing to the permittee and to the

building official. Recommendations for corrective measures, if necessary, shall also be submitted.

H. Transfer of Responsibility. If the civil engineer, the soils engineer, or the engineering geologist of record is changed during the course of the work, the work shall be stopped until:

1. The civil engineer, soils engineer, or engineering geologist, has notified the building official in writing that they will no longer be responsible for the work and that a qualified replacement has been found who will assume responsibility.

2. The replacement civil engineer, soils engineer, or engineering geologist notifies the building official in writing that they have agreed to accept responsibility for the work.

Kern County Multi-Hazard Mitigation Plan

The 2005 Kern County Multi-Hazard Mitigation Plan (MHMP) describes natural hazards and impacts (including those resulting from earthquakes, landslides, and soil hazards) that threaten communities, and establishes mitigation goals and strategies. Information contained in the MHMP could also be used to help guide and coordinate mitigation activities and local policy decisions for future land use decisions. The MHMP divides the County into three regions, Valley, Mountain, and Desert. The Project site Area is located within the both the Valley region.

The governing federal law requires that the MHMP be reviewed and updated within five years in order to continue to be eligible for mitigation grant project funding. The County released a Comprehensive Update in September 2012 for its Kern Multi Jurisdiction Hazard Mitigation Plan.

4.7.4 Impacts and Mitigation Measures

Methodology

The potential impacts associated with the proposed Project are evaluated on a qualitative and quantitative basis through a comparison of the anticipated Project effects on geologic resources. The change in the land use is significant if the effects described below occur. The evaluation of project impacts as based on professional judgment, analysis of the County's safety policies, and the significance criteria established by Appendix G of the State CEQA Guidelines, which the County has determined to be appropriate criteria for this Recirculated Draft EIR.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving;
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
    - Strong seismic ground shaking;
    - Seismic-related ground failure, including liquefaction; or
    - Landslides;
- Result in substantial soil erosion or loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Expose people or structures to a significant risk of loss, injury or death including flooding, as a result of the failure of a levee or a dam;
- Be located on expansive soil, as defined in Section 1803.5.3 of the California Building Code (2016), creating substantial risks to life or property; and/or
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

Based on the standards, the potential effects of Project implementation have been categorized as either "no impact," a "less than significant impact" or a "potentially significant impact." If a potentially significant impact cannot be reduced to a less than significant level through the application of goals, policies, standards or mitigation, it is categorized as a significant and unavoidable impact.

Project Impacts

Impact 4.7-1: The Project Would Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving the Rupture of a Known Earthquake Fault.

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazards of surface faulting and fault rupture to built structures. Fault rupture is a break in the ground's surface and associated deformation resulting from the movement of a fault. Rupture has the potential to occur when a strong earthquake happens along specific active or potentially active faults. Areas around such faults are designated as Alquist-Priolo Earthquake Fault Zones and are shown in detail on the Alquist-Priolo Earthquake Fault Zone Maps. The proposed Project is not located in an Alquist-Priolo Earthquake Fault Zone. No active faults cross through or are located adjacent to the proposed Project. The nearest fault, the White Wolf Fault, is not identified as part of an Alquist-Priolo Earthquake Fault Zone. Some of the faults in the Bakersfield area are in the Alquist-Priolo Special Study Zone. Impacts involving fault rupture would be less than significant.

Given the highly seismic character of the southern San Joaquin Valley region, moderate to severe ground shaking associated with earthquakes on the nearby faults can be expected throughout the Metropolitan Bakersfield area. Maximum probable ground motion on the proposed Project site would likely be the result of movement along the White Wolf, San Andreas, or Pond Poso faults due to a maximum probable magnitude earthquake along each fault and distance to the proposed Project site. It is probable that faults within the region will move in the future. The proposed Project site is expected to experience ground shaking in the event of a major earthquake because of regional seismic activity; therefore, future residents may be exposed to seismic ground shaking. The proposed Project shall be designed and constructed to withstand the magnitude of an earthquake. The proposed Project will be constructed in conformance with the California Building Standards Code in order to minimize seismic impacts. Accordingly, the proposed Project will be required to construct all proposed structures in compliance with State law and local ordinances required by the most recent CBC (CCR Title 24) and to adhere to all modern earthquake construction standards. Modern earthquake construction standards include the American Society of Civil Engineers (ASCE) seismic design standard, specifically ASCE 7, which base seismic design on-site class (soil specific) and seismic design category (based on risk category). The required compliance with applicable CBC criteria, Alquist-Priolo Act, goals and policies of the Metropolitan Bakersfield General Plan, and the Kern County Zoning Ordinance (Kern County Building Code Chapter 17.08) would reduce impacts to less than significant levels.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.7-2: The Project Would Expose People or Structures to Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Strong Seismic Ground Shaking Including That Would Result in Potential Substantial Adverse Effects.

Active or potentially active faults are located within the southern San Joaquin Valley region. The southern end of the San Joaquin Valley is bordered by five major fault systems, all of which are considered to be active: San Andreas, Garlock, Breckenridge-Kern Canyon, Sierra Nevada, and White Wolf faults. It is probable that faults near the proposed Project will move in the future; however, it is unlikely that ground rupture would occur on-site because it is not located within an Alquist-Priolo Earthquake Fault Zone or within 500 feet of a known active fault trace. Therefore, impacts are considered to be less than significant.

Given the highly seismic character of the southern San Joaquin Valley region, moderate to severe ground shaking associated with earthquakes on the nearby faults can be expected throughout the Metropolitan Bakersfield area. Maximum probable ground motion on the proposed Project would likely be the result of movement along the White Wolf, San Andreas, or Pond Poso faults due to a maximum probable magnitude earthquake along each fault and distance to the proposed Project. It is probable that faults within the region will move in the future. The proposed Project is expected to

experience ground shaking in the event of a major earthquake because of regional seismic activity; therefore, future Project employees may be exposed to seismic ground shaking. It is assumed that future Project employees would be people from the Metropolitan Bakersfield area as opposed to people relocating to the area, therefore, the proposed Project is not anticipated to introduce additional people to seismic ground shaking hazards.

The proposed Project shall be designed and constructed to withstand the magnitude of an earthquake. The proposed Project would be required to construct structures in compliance with State law and local ordinances in accordance with the most recent CBC and to adhere to all modern earthquake construction standards. The required compliance with applicable CBC criteria, Alquist-Priolo Act, goals and policies of the Metropolitan Bakersfield General Plan, the Kern County Ordinance Code (Kern County Building Code Chapter 17.08), and adherence to Mitigation Measures MM 4.7-1 through MM 4.7-7, would reduce impacts to less than significant levels.

Mitigation Measures

MM 4.7-1: **Phased Grading.** The project proponent shall limit grading to the minimum area necessary for construction. Prior to the initiation of construction, the project proponent shall retain a California registered professional engineer to approve the final grading earthwork and foundation plans prior to construction.

MM 4.7-2: **Geotechnical Study.** Prior to the issuance of building or grading permits for the project, the Project proponent shall conduct a full geotechnical study to evaluate soil conditions on the Project site and submit it to the Kern County Public Works Department for review and approval.

1. The geotechnical study must be signed by a California-registered professional engineer and must identify the following:

    a. Maximum considered earthquake and associated ground acceleration;

    b. Potential for seismically induced liquefaction, landslides, differential settlement, and mudflows;

    c. Stability of any existing or proposed cut-and-fill slopes;

    d. Collapsible or expansive soils;

    e. Foundation material type;

    f. Recommendations for placement and design of facilities, foundations, and remediation of unstable ground.

2. The project proponent shall determine the final siting of project facilities based on the results of the geotechnical study and implement recommended measures to minimize geologic hazards. The project proponent shall not locate project facilities on or immediately adjacent to a fault trace. All structures shall be

offset at least 100-feet from any mapped fault trace. Alternatively, a detailed fault trenching investigation may be performed to accurately locate the fault trace(s) to avoid sighting improvements on or close to these fault structures and to evaluate the risk of fault rupture. After locating the fault, accurate setback distances can be proposed.

3. The Kern County Public Works Department shall evaluate any final facility siting design developed prior to the issuance of any building or grading permits to verify that geological constraints have been avoided.

MM 4.7-3: **Seismic Design On-Site.** Prior to the issuance of grading permits, the project proponent shall retain a California registered engineer to design the project facilities to withstand probable seismically induced ground shaking at the site. All grading and construction on-site shall adhere to the specifications, procedures, and site conditions contained in the final design plans, which shall be fully compliant with the seismic recommendations of the California-registered professional engineer. The procedures and site conditions shall encompass site preparation, foundation specifications, and protection measures for buried metal. The final structural design shall be subject to approval and follow-up inspection by the Kern County Building Inspection Department. Final design requirements shall be provided to the on-site construction supervisor and the Kern County Building Inspector to ensure compliance.

MM 4.7-4: Building locations shall be stabilized against the occurrence of liquefaction by dynamic compaction, or other accepted soil stabilization method approved by the County Building official.

MM 4.7-5: **Geotechnical Evaluation.** Prior to the issuance of grading permits, a geotechnical evaluation, consisting of field exploration (drilling and soil sampling), laboratory testing of soil samples, and engineering analysis, shall be prepared to determine soil properties related, but not limited, to ground-motion acceleration parameters, the amplification properties of the subsurface units at the specific site, the potential for hydrocompaction to affect the proposed facilities, and the potential for collapsible, subsiding, or expansive soils to affect the proposed facilities.

These studies shall be used to determine the appropriate engineering for foundations and support structures as well as building requirements to minimize geotechnical hazard impacts. Copies of all analyses shall be submitted to the Kern County Public Works Department for review and approval. An approved copy of the evaluation shall be submitted to the Kern County Planning and Natural Resources Department.

MM 4.7-6: **Minimizing Erosion.** The project proponent shall continuously comply with the following:

1. The project proponent shall use existing roads to the greatest extent feasible to minimize erosion.

2. Prior to approval of the grading permit, final plans shall be reviewed and approved by the Kern County Public Works Department to confirm existing roads were used to the greatest extent feasible.

MM 4.7-7: **Minimizing Grading.** The project proponent shall continuously comply with the following:

1. The project proponent shall limit grading to the minimum area necessary for construction and operation of the project. Final grading plans shall include best management practices (BMPs) to limit on-site and off-site erosion, a water plan to treat disturbed areas during construction and reduce dust, and a plan for the disposal of drainage waters originating on-site and from adjacent right-of-ways (if required).

2. The plans shall be submitted to the Kern County Public Works Department for review and approval.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.7-3: The Project Would Result in Substantial Soil Erosion or Loss of Topsoil.

As discussed above, the proposed Project is located on relatively flat terrain and consists of soils that are not considered highly erosive, with the exception of wind erosion for the Cajon sandy loam soil. Due to the characteristics of the on-site soil types and the relatively flat terrain, implementation of the proposed Project has the potential to result in minimal erosion.

Project grading activities would remove or cover existing topsoil that is used for agricultural operations and may expose soils to wind and water erosion both during and after the construction phase of the proposed Project. To mitigate the potential effects of erosion on-site, temporary and permanent erosion control measures would be required, such as the use of sandbags, hydroseeding, landscaping and/or soil stabilizers. The Project proponent(s) would be required to submit a Stormwater Pollution Prevention Plan (SWPPP), which includes erosion control measures in order to comply with the National Pollutant Discharge Elimination System (NPDES) requirements of the Federal Clean Water Act (CWA) and the requirements of the California Water Quality Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ and 2012-0006-0006-DWQ as implemented by the Kern County NPDES Permit Process. Any individual parcel Project proponent(s) would be responsible for the preparation of the SWPPPs for the individual site development. In addition, the proposed Project would be subject to County ordinances and standards relative to soils and geology. Standard compliance requirements include detailed site-specific soil analysis prior to issuance of building permits and adherence to applicable building codes in accordance with the most recent CBC. All earthwork is required to be performed in accordance with applicable County requirements as stipulated in the Kern County Ordinance Code. Implementation of Mitigation Measure MM 4.7-8 as well as mitigation measures in Section 4.10, *Hydrology and Water Quality* and compliance with applicable CBC criteria, goals and policies of the Metropolitan Bakersfield General Plan, and the Kern County Ordinance Code.

Mitigation Measures

Refer to Section 4.10, *Hydrology and Water Quality*, regarding water quality mitigation measures.

MM 4.7-8: **Soil Erosion and Sedimentation Control Plan.** The project proponent shall prepare a Soil Erosion and Sedimentation Control Plan to mitigate potential loss of soil and erosion. The plan shall be prepared by a California registered civil engineer or other professional approved to prepare said Plan and submitted for review and approval by the Kern County Public Works Department. The Soil Erosion and Sedimentation Control Plan shall include, but is not limited to, the following:

1. Best Management Practices to minimize soil erosion consistent with Kern County grading requirements and the California Regional Water Quality Control Board requirements pertaining to the preparation and approval of a Stormwater Pollution Prevention Plan (Best Management Practices recommended by the Kern County Public Works Department shall be reviewed for applicability);

2. Sediment collection facilities as may be required by the Kern County Public Works Department;

3. A timetable for full implementation, estimated costs, and a surety bond or other security as approved by the County; and

4. Other measures required by the County during permitting, including long-term monitoring (post-construction) of erosion control measures until site stabilization is achieved.

Provisions to comply with local and state codes relating to drainage and runoff, including use of pervious pavements, and/or other methods to the extent feasible, to increase stormwater infiltration and reduce runoff onto agricultural lands.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.7-4: The Project Would be Located on an Unstable Geologic Unit or Soil That Would Result in On-site or Off-site Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse.

The Metropolitan Bakersfield General Plan indicates that liquefaction most often occurs in areas underlain by young alluvium where the groundwater table is higher than 50 feet bgs. According to the Metropolitan Bakersfield General Plan EIR, the proposed Project is not likely to be located within an area of high groundwater and loose soils. The Project site is underlain by Bakersfield fine sandy loam and Cajon sandy loam-overwash. However, the depth of groundwater on-site is approximately 165-175 feet bgs. Therefore, the potential for liquefaction on the proposed Project is considered low and impacts are anticipated to be less than significant.

The proposed Project is located on relatively flat topography and is not located adjacent to any steep slopes or other areas that would be subject to seismically induced landslides. Therefore, no impacts are anticipated in this regard.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.7-5: The Project Would Result in Adverse Impacts to People or Structures Resulting in a Risk of Loss, Injury or Death Including Flooding, as a Result of the Failure of a Levee or a Dam.

As indicated above, a break in Isabella Dam caused by an earthquake would flood 60 square miles of the Bakersfield area. It would take approximately eight to 12 hours from the time the dam breaks for water to reach the proposed Project. Therefore, allowing from a minimum of eight hours up to 12 hours for evacuation. This lag time would make injury or death from dam failure unlikely in the area of the proposed Project site. The chance of the Isabella Dam failing entirely, with the lake at capacity, is approximately one day out of 10,000 years. The Safety Element of the Metropolitan Bakersfield General Plan has identified policies including a response plan for dam failure as well as the maintenance of disaster response plans, development of discretionary approval procedures for critical facilities and the review of zoning designations, street widths and circulation patterns for compatibility with evacuation plans. The proposed Project would be designed and constructed in strict adherence to policies in the Metropolitan Bakersfield General Plan; therefore, less than significant impacts would occur.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.7-6: The Project Would Result in Impacts from Being Located on Expansive Soil, as Defined in Section 1803.5.3 of the CBC (2016) Creating Substantial Risks to Life or Property.

The proposed Project is located on Bakersfield fine sandy loam and Cajon sandy loam-overwash. None of these soil types exhibits expansive characteristics; shrink-swell potential is low. The proposed Project would be required to construct structures in compliance with State law and local ordinances in accordance with the most recent CBC (CCR Title 24) and to adhere to all modern construction standards. In addition, the proposed Project would be built to modern construction standards, which include the ASCE minimum design load standard, specifically Standard 7-10 and/or

7-15, which base seismic design on-site class (soil specific) and seismic design category (based on risk category). Furthermore, light and medium industrial structures constructed within the proposed Project would be required to comply with the most recent CBC (specifically Section 1803.5.3 regarding expansive soil), Kern County Ordinance Code, and the Metropolitan Bakersfield General Plan. Therefore, the potential for risks to life and property are low.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.7-7: The Project Would Be Constructed on Soils Incapable of Adequately Supporting the Use of Septic Tanks or Alternative Wastewater Disposal Systems Where Sewers Are Not Available for the Disposal of Wastewater.

The proposed Project site area has never been served by a sewer system. There are no existing septic systems located on the proposed Project site. Currently, neighboring residential and commercial properties are served by individual, privately-owned septic systems. A private package sewer treatment plant is proposed to provide services for the proposed Project site. The proposed Project would be designed and constructed in strict adherence to policies in the Metropolitan Bakersfield General Plan, Kern County Ordinance Code, and CBC criteria. In addition, Mitigation Measure MM 4.7-9 would be implemented. Therefore, impacts would be less than significant in this regard.

Mitigation Measures

MM 4.7-9: **Septic Design Plans.** Prior to the issuance of permits, the project proponent shall provide evidence to the Kern County Planning and Natural Resources Department that the siting, design and construction of proposed septic system(s) and leach field disposal system(s) comply with the 2016 Kern County Onsite Systems Manual as authorized by the California Water Board Local Agency Management Program (LAMP) and administered locally by the Kern County Environmental Health Services Department (KCEHS). Proving the proposed septic design plans comply with these requirements will ensure that all standards for septic tanks, seepage pits, and soils are capable of adequately supporting the use of septic tanks.

MM 4.7-10: **Final Leach Field Disposal System.** The final leach field disposal system shall be designed by a licensed engineer, taking into full consideration the requirements provided in the June 2016 Kern County Onsite Systems Manual.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Soils and geologic conditions in the proposed Project vicinity may vary by location. Short-term cumulative impacts such as erosion and sedimentation would occur as a result of implementation of the proposed Project. The only cumulative long-term impact related to geology is the exposure of people to the potential for seismically induced ground shaking. Implementation of other cumulative projects would incrementally increase the number of people and structures potentially subject to a seismic event. However, such exposure would be minimized through strict engineering standards required at each respective site. The seismic and geologic significance would be considered on a project-by-project basis. Therefore, cumulative effects of increased seismic risk would be mitigated to a less than significant level on a project-by-project basis. The required compliance with applicable CBC criteria, goals and policies of the Metropolitan Bakersfield General Plan, and the Kern County Ordinance Code would reduce cumulatively considerable impacts to geologic and seismic hazard to less than significant levels.

Mitigation Measures

Implement Mitigation Measures MM 4.7-1 through MM 4.7-10, above.

Level of Significance after Mitigation

Impacts would be less than significant.

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Section 4.8

Greenhouse Gases

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Section 4.8
Greenhouse Gases

4.8.1 Introduction

This section of the Recirculated Draft Environmental Impact Report (RDEIR) evaluates the greenhouse gas (GHGs) conditions associated with buildout of the proposed Project. It also describes the impacts associated with GHGs that would result from implementation of the project, and, as necessary mitigation measures that would avoid or lessen these impacts. Insight Environmental Consultants completed an Air Quality Impact Analysis in June 2009 that evaluated the proposed Project's potential impacts on air quality. Due to the time between the technical study and this RDEIR, a second Air Quality Impact Analysis was prepared by Insight Environmental Consultants in July 2017. See Appendix C, *Air Quality Impact Analysis*, and Appendix N, *Original Technical Studies*. Information supporting this analysis is also based on the information and guidelines provided in the California Environmental Quality Act (CEQA), the San Joaquin Valley Air Pollution Control District (SJVAPCD) 2015 Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI), and Kern County's Guidelines for the Preparation of Air Quality Assessment for Environmental Impact Reports.

4.8.2 Environmental Setting

The California Air Resources Board (CARB) has divided California into regional air basins according to topographic drainage features. The proposed Project site is located in Kern County, which is within the jurisdiction of the San Joaquin Valley Air Basin (SJVAB) and locally controlled by the San Joaquin Valley Air Pollution Control District (SJVAPCD).

Greenhouse Gases (GHGs) and Global Climate Change

In the early 1960's scientists recognized that carbon dioxide (CO_2) levels in the atmosphere were rising every year. It was also noted that several other gases, including methane (CH_4) and nitrous oxides (N_2O) were also increasing. Levels of these gases have increased by about 40 percent since large-scale industrialization began around 150 years ago, according to the United States Environmental Protection Agency (EPA). After numerous computer-simulated model runs on the effects of these increases in the atmosphere, it was concluded that the rising concentrations almost always resulted in an increase of average global temperature. Rising temperatures may, in turn, produce changes in weather, sea levels and land use patterns, commonly referred to as "climate change". There is general scientific consensus that climate change is occurring, and that human activity contributes in some measure (perhaps substantially) to that change. It is difficult to determine the extent of change that humans may be causing due to the natural variability of the Earth's climate.

During the planet's history, the climate has changed many times, with events ranging from ice ages to long periods of warmth. Natural factors such as volcanic eruptions, changes in the Earth's orbit, and the amount of energy released from the sun historically have affected the Earth's climate. Human activities associated with the Industrial Revolution beginning in the late 18th century, have also

changed the composition of the atmosphere. The burning of fossil fuels, such as coal and oil, and deforestation has caused the concentrations of heat-trapping greenhouse gases (GHGs) to increase significantly in our atmosphere.

Many chemical compounds found in the Earth's atmosphere act as GHGs, which allow sunlight to enter the atmosphere freely. When sunlight strikes the Earth's surface, some of it is reflected back towards space as infrared radiation (heat). GHGs absorb this infrared radiation and trap the heat in the atmosphere. Over time, the amount of energy sent from the sun to the Earth's surface should be about the same as the amount of energy radiated back into space, leaving the temperature of the Earth's surface roughly constant. Many gases exhibit these "greenhouse" properties. Some of them occur in nature (water vapor, carbon dioxide, methane, and nitrous oxide), while others are exclusively human-made (like gases used for aerosols). The most relevant GHGs are water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. These gases prevent heat from escaping to space.

GHGs, in most cases, have both natural and anthropogenic sources. Natural mechanisms already exist as part of the 'carbon cycle' for removing GHGs from the atmosphere (often called land or ocean sinks). Levels of GHGs, due to the increase in anthropogenic sources, have exceeded the normal rates of natural absorption. This has resulted in increased atmospheric concentrations of GHGs and potentially human-induced global warming.

Our GHG emissions in the United States come mostly from energy use. These are driven largely by economic growth, fuel used for electricity generation, and weather patterns affecting heating and cooling needs. Energy-related carbon dioxide emissions, resulting from petroleum and natural gas account for approximately three-quarters of the human-generated GHG emissions in the United States, primarily in the form of carbon dioxide emissions from burning fossil fuels. More than half the energy-related emissions come from large stationary sources such as power plants; approximately a third comes from transportation; while industrial processes, agriculture, forestry, other land uses, and waste management make up a majority of the remainder of sources.

Methane, another GHG, comes from landfills, coal mines, oil and gas operations, and agriculture; representing nine percent of total GHG emissions in the United States. Nitrous oxide only represents five percent of the gas emissions, and is emitted from burning fossil fuels and through the use of certain fertilizers and industrial processes. Two percent of the total emissions are released as byproducts of industrial processes and through leakage.

The United States has the highest emissions of GHGs of any nation on Earth, though CO_2 emissions in California are less than the national average, both in per capita emissions and in emissions per gross state product. Transportation is the largest source of CO_2 emissions in California, accounting for approximately 41 percent of total emissions. Electricity generation accounts for approximately 22 percent of CO_2 emissions in California, and the industrial sector accounts for approximately 20.5 percent. California GHG emissions and the increase in project emissions of CO_2, methane (CH_4), and N_2O, are summarized in Table 4.8-1*, California Greenhouse Gas Emissions of CO_2, CH_4, AND N_2O*.

Table 4.8-1. California Greenhouse Gas Emissions of CO2, CH4, and N2O

Net - Million Tons – Carbon Dioxide Equivalent			
Greenhouse Gas	2013	2014	2015
Carbon Dioxide (CO_2)	376.1	371.8	369.9
Methane (CH_4)	39.8	40.1	39.6
Nitrous Oxide (N_2O)	12.3	12.2	11.7
High GWP Gases (HFC, PFC, SF_6)	16.8	17.8	19.1
Global Warming Potential	445.0	441.9	440.3

Source: CARB, 2017.

Global carbon dioxide emissions are expected to increase by 1.9 percent annually between 2001 and 2025. Much of the increase in these emissions is expected to occur in the developing world where emerging economies are fueled with fossil energy, such as China and India. Around 2,018 developing countries' emissions are expected to surpass the emissions of industrialized countries; increasing by 2.7 percent annually between 2001 and 2025, faster than the world average.

GHGs are a necessity to life as we know it. They keep the planet's surface warmer than it otherwise would be. However, as the concentrations of these gases increase in the atmosphere and continue to, the Earth's temperature is also increasing, exceeding past levels. The Earth's average surface temperature has increased by about 1.2 to 1.4 degrees Fahrenheit (ºF) since 1900 according to National Oceanic and Atmospheric Administration (NOAA) and National Aeronautical and Space Administration (NASA) data. On average the warmest global temperatures on record have all occurred within the past 15 years. Climate models predict that the average temperature at the Earth's surface could increase from 2.5 to 10.4ºF above 1990 levels by the end of this century if GHGs continue to increase. Other aspects of the climate are also changing such as rainfall patterns, snow and ice cover, and sea level.

Climate change affects people, plants, and animals. Scientists are certain that increasing the concentration of GHGs will change the planet's climate; however, they are not sure by how much it will change, at what rate it will change, or what the exact effects will be. They are working to better understand future climate change and how the effects will vary by region and over time.

Some climate changes are already occurring. These include; rise of sea level, shrinking glaciers, changes in the range and distribution of plants and animals, lengthening of growing seasons, trees blooming earlier, ice on rivers and lakes freezing later and breaking up earlier, and thawing of permafrost.

Scientists believe that most areas in the United States will to continue to warm, although some will likely warm more than others. Predicting which parts of the country will become wetter or drier is extremely difficult, but scientists generally expect increased precipitation and evaporation, and drier soil in the middle parts of the country. The northern regions such as Alaska are expected to experience the most warming. Alaska has already been experiencing significant climate change in recent years that may be attributable to human caused global climate change.

In addition to the changes already discussed, human health can also be affected both directly and indirectly by climate change in part through extreme periods of heat and cold, storms, climate-sensitive diseases such as malaria, and smog episodes.

In order to address climate change concerns the United States government has established a comprehensive policy to deal with global warming. This policy has three basic components:

- Slowing the growth of emissions;
- Strengthening science, technology and institutions; and
- Enhancing international cooperation.

Currently, the Federal government is using voluntary and incentive-based programs to reduce emissions and has established a variety of programs promoting climate technology and science. The United States prepared a comprehensive strategy in February 2002 to reduce the GHG intensity by 18 percent over the 10-year period from 2002 to 2012. Greenhouse gas intensity is a measurement of GHG emissions per unit of economic activity. By meeting this commitment, the United States will prevent the release of more than 500 million metric tons cumulatively between 2002 and 2012.

4.8.3 Regulatory Setting

Regulatory oversight for air quality in the SJVAB rests at EPA Region IX office at the Federal level, the CARB at the State level, and the regional level with the SJVAPCD.

Global Climate Change Regulatory Issues

In 1988, the United Nations established the Intergovernmental Panel on Climate Change to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail global climate change. In 1992, the United Nations Framework Convention on Climate Change established an agreement with the goal of controlling GHG emissions, including methane. As a result, the Climate Change Action Plan was developed to address the reduction of GHGs in the United States. The Plan consists of more than 50 voluntary programs.

The Kyoto Protocol treaty was negotiated in December 1997. The agreement came into force on February 16, 2005 following ratification by Russia on November 18, 2004. As of December 2006, a total of 169 countries and other governmental entities have ratified the agreement. Notable exceptions include the United States and Australia. Other countries, like India and China, which have ratified the protocol, are not required to reduce carbon emissions under the present agreement despite their relatively large populations.

Additionally, the Montreal Protocol was originally signed in 1987 and substantially amended in 1990 and 1992. The Montreal Protocol stipulates that the production and consumption of compounds that deplete ozone in the stratosphere (chlorofluorocarbons [CFCs], halons, carbon tetrachloride, and methyl chloroform) were to be phased out by 2000 (methyl chloroform was to be phased out by 2005).

On September 27, 2006, Assembly Bill (AB) 32, the California Global Warming Solutions Act, of 2006 was enacted by the State of California. The legislature stated that "global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California." (AB 32). The Act caps California's GHG emissions at 1990 levels by 2020. The Act

defines GHG emissions as all of the following gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexaflouride. This agreement represents the first enforceable state-wide program in the U.S. to cap all GHG emissions from major industries that includes penalties for non-compliance. While acknowledging that national and international actions will be necessary to fully address the issue of global warming, AB 32 lays out a program to inventory and reduce GHG emissions in California and from power generation facilities located outside the state that serve California residents and businesses.

AB 32 charges CARB with responsibility to monitor and regulate sources of GHG emissions in order to reduce those emissions. By July 1, 2007, CARB adopted a list of discrete early action measures to be adopted and implemented before January 1, 2010, to reduce GHG emissions. CARB staff recommended an amount of 427 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) as the total statewide greenhouse gas 1990 emissions level and 2020 emissions limit. The Board approved the 2020 limit on December 6, 2007. This limit is an aggregated statewide limit, rather than sector- or facility-specific. CARB is then to conduct rulemaking, culminating in rule adoption by January 1, 2011, for reducing GHG emissions to achieve the emissions cap by 2020. The rules must take effect no later than 2012. In designing emission reduction measures, CARB must aim to minimize costs, maximize benefits, improve and modernize California's energy infrastructure, maintain electric system reliability, maximize additional environmental and economic co-benefits for California, and complement the state's efforts to improve air quality.

At this time, the EPA does not regulate GHG emissions; however, in *Massachusetts et al. v, EPA (Environmental Protection Agency)*, the U.S Supreme Court determined that the EPA does have the authority to regulate GHGs under the Clean Air Act (CAA). The Court also instructed the EPA to review its policies toward regulation of vehicle emissions under the CAA. It is now anticipated that regulations will eventually be promulgated by the EPA to further control GHG emissions from vehicles as well as other sources.

Global warming and climate change have received substantial public attention for more than 15 years. For example, the United States Global Change Research Program was established by the Global Change Research Act of 1990 to enhance the understanding of natural and human-induced changes in the Earth's global environmental system, to monitor, understand and predict global change, and to provide a sound scientific basis for national and international decision making. Even so, the analytical tools have not been developed to determine the effect on worldwide global warming from a particular increase in GHG emissions, or the resulting effects on climate change in a particular locale. The scientific tools needed to evaluate the impacts that a specific project may have on the environment are even farther in the future.

Accordingly, there is no local or statewide significance threshold developed to evaluate the impacts of the proposed Project, or any project, on global climate change or on the environment in California.

Federal

U.S. Environmental Protection Agency (EPA)

On April 2, 2007, in *Massachusetts v. EPA*, 549 U.S. 497 (2007), the Supreme Court found that greenhouse gases are air pollutants covered by the CAA. The Court held that the EPA must determine whether or not emissions of GHGs from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In making these decisions, the EPA is required to follow the language of section 202(a) of the Clean Air Act. The Supreme Court decision resulted from a petition for rulemaking under section 202(a) filed by more than a dozen environmental, renewable energy, and other organizations.

On April 17, 2009, the Administrator signed Proposed Endangerment and Cause or Contribute Findings for GHGs under Section 202(a) of the CAA. EPA held a 60-day public comment period, which ended June 23, 2009, and received over 380,000 public comments. These included both written comments as well as testimony at two public hearings in Arlington, Virginia and Seattle, Washington. EPA carefully reviewed, considered, and incorporated public comments and has now issued these Final Findings.

The EPA found that six GHGs taken in combination endanger both the public health and the public welfare of current and future generations. The EPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG air pollution that endangers public health and welfare under CAA section 202(a). These Findings were based on careful consideration of the full weight of scientific evidence and a thorough review of numerous public comments received on the Proposed Findings published April 24, 2009. These Findings were effective on January 14, 2010.

Specific GHG Regulations that the U.S. EPA has adopted to date are as follows:

40 CFR Part 98. Mandatory Reporting of Greenhouse Gases Rule

This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 $MTCO_2e$ emissions per year. CO_2e is a quantity that describes, for a given mixture and amount of GHG, the amount of CO_2 that would have the same GWP, when measured over a specified timescale (generally, 100 years). It is also a measure for comparing CO_2 with other GHGs (which generally have a higher GWP), based on the amount of those other gases multiplied by the appropriate GWP factor, commonly expressed as $MTCO_2e$. CO_2e is calculated by multiplying the metric tons of gas by the appropriate GWP. Additionally, reporting of emissions is required for owners of SF_6- and PFC-insulted equipment when the total nameplate capacity of these insulating gases is above 17,280 pounds. The proposed project would not be expected to trigger GHG reporting according to the rule; however, GHG emissions of the proposed project are quantified in this Recirculated Draft Environmental Impact Report (RDEIR).

40 CFR Part 52. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule

The U.S. EPA mandated application of the Prevention of Significant Deterioration (PSD) requirements to facilities whose stationary source CO_2e emissions exceed 75,000 tons per year.

National Climate Action Plan

In June 2013, the President enacted a national Climate Action Plan (Plan) that consisted of a wide variety of executive actions and had three pillars discussed below (EOP 2013).

Cut Carbon in America – The Plan consists of actions to help cut carbon by deploying clean energy such as cutting carbon from power plants, promoting renewable energy, and unlocking long-term investment in clean energy innovation.

Prepare the United States for Impacts of Climate Change – The Plan consists of actions to help prepare for the impacts through building stronger and safer communities and infrastructure by supporting climate resilient investments, supporting communities and tribal areas as they prepare for impacts, and boosting resilience of building and infrastructure; protecting the economy and natural resources by identifying vulnerabilities, promoting insurance leadership, conserving land and water resources, managing drought, reducing wildfire risks, and preparing for future floods; and using sound science to manage climate impacts.

Lead International Efforts – The Plan consists of actions to help the United States lead international efforts through working with other countries to take action by enhancing multilateral engagements with major economies, expanding bilateral cooperation with major emerging economies, combating short-lived climate pollutants, reducing deforestation and degradation, expanding clean energy use and cutting energy waste, global free trade in environmental goods and services, and phasing out subsidies that encourage wasteful use of fossil fuels and by leading efforts to address climate change through international negotiations.

In June of 2014, the Center for Climate and Energy Solutions (C2ES) published a one-year review of progress in implementation of the Plan (C2ES, 2014). The C2ES found that the administration had made marked progress in its initial implementation. Notable areas of progress included steps to limit carbon pollution from power plants; improve energy efficiency; reduce CH_4 and HFC emissions; help communities and industry become more resilient to climate change impacts; and end U.S. lending for coal-fired power plants overseas.

Greenhouse Gas Endangerment Findings

As of January 14, 2010, the U.S. EPA's finding that six GHGs, taken in combination, endanger the public health and the public welfare of current and future generations became effective. The U.S. EPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that endangers public health and welfare under CAA Section 202(a). Subsequently, federal agencies have adopted specific GHG-related regulations and initiatives, including:

Transportation/Mobile Sources

U.S. EPA and National Highway Traffic Safety Administration Standards to Cut Greenhouse Gas Emissions and Fuel Use for New Motor Vehicles: coordinated steps to enable the production of a new generation of clean vehicles.

Renewable Fuel Standard Program: transportation fuel sold in the United States is required to contain a minimum volume of renewable fuel.

Stationary Sources

Carbon Pollution Standards for Power Plants: In September 2013, the U.S. EPA proposed a rule to reduce carbon emissions from new power plants. On June 2, 2014, the U.S. EPA issued a proposal to cut carbon pollution from existing power plants (the "Clean Power Plan"). U.S. EPA's May 2015 "Unified Agenda" indicates that both of these rules are expected to be issued in August 2015.

Final Greenhouse Gas Tailoring Rule: On May 13, 2010, the U.S. EPA set GHG emissions thresholds to define when permits under the New Source Review PSD and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule "tailors" the requirements of these CAA permitting programs to limit covered facilities to the nation's largest GHG emitters: power plants, refineries, and cement production facilities.

Timing of Applicability of the PSD Permitting Program to GHGs: On March 29, 2010, the U.S. EPA completed its reconsideration of the December 18, 2008, memorandum entitled "EPA's Interpretation of Regulations that Determine Pollutants Covered by Federal Prevention of Significant Deterioration (PSD) Permit Program" (the so-called "Johnson memo"). The final action confirmed that GHGs become covered under the PSD program on January 2, 2011, when the cars rule took effect.

In June 2014, the U.S. Supreme Court ruled that the U.S. EPA cannot classify facilities as major PSD or Title V sources based solely on its GHG emissions meeting the major source threshold. However, the Supreme Court said that the U.S. EPA could continue to require that PSD permits, required due to criteria pollutant emissions, contain Best Available Control Techniques (BACT) limits for GHG emissions. This ruling struck down Step 2 of the Tailoring Rule but kept in effect Step 1 (U.S. EPA, 2014).

Emissions Reporting

GHG Reporting Program: This program collects reported GHG emissions from facilities that emit more than 25,000 $MTCO_2e$ emissions per year. Additionally, reporting of emissions is required for owners of SF_6- and PFC-insulated equipment when the total nameplate capacity of these insulating gases is above 17,280 pounds. The Petroleum and Natural Gas Systems source category consists of onshore production; offshore production; natural gas processing; natural gas transmission; underground natural gas storage; natural gas distribution; liquefied natural gas import and export terminals; and liquefied natural gas storage equipment.

Notification Requirements for Gas Well Completions (40 CFR Parts 60 and 63): Air pollution standards established by the U.S. EPA under the New Source Performance Standard, Final Rule August 16, 2012, for oil and gas production require companies to provide notifications of natural gas well completions. The U.S. EPA expects to use the notifications required by the 2012 standards and ongoing technical studies through 2014 to make a foundation for determining how best to require additional control of methane and other air pollutants from the oil and gas sector, including completions and associated gas from ongoing production and hydraulically fractured oil wells.

State

Assembly Bill (AB) 1493

On July 22, 2002, Governor Gray Davis signed Assembly Bill (AB) 1493, also known as the Pavley Regulations or the Clean Car Standards. AB 1493 required the State to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions emitted by passenger vehicles and light-duty trucks. Subsequent regulations were adopted by CARB in September 2004.

The regulations were threatened by automaker lawsuits and were stalled by the U.S. EPA's initial denial to allow California to implement GHG standards for passenger vehicles. The U.S. EPA later granted California the authority to implement GHG emission reduction standards for new passenger cars, pickup trucks and sport utility vehicles on June 30, 2009. On September 24, 2009, the CARB adopted amendments to the Pavley regulations that reduce GHG emissions in new passenger vehicles from 2009 through 2016.

Executive Order S-3-05

Executive Order S-3-05 was established by Governor Arnold Schwarzenegger in June 2006. Executive Order S-3-05 establishes statewide emission reduction targets through the year 2050:

- By 2010, reduce greenhouse gas emissions to 2000 levels,
- By 2020, reduce greenhouse gas emissions to 1990 levels, and
- By 2050, reduce greenhouse gas emission to 80 percent below 1990 levels.

This Executive Order does not include any specific requirements that pertain to the proposed Project. However, actions taken by the State to implement these goals may affect the proposed Project, depending on the specific implementation measures that are developed.

Executive Order S-1-07

Issued on January 18, 2007, Executive Order S-1-07 sets a declining Low Carbon Fuel Standard for GHG emissions measured in CO2e grams per unit of fuel energy sold in California. The target of the Low Carbon Fuel Standard is to reduce the carbon intensity of California passenger vehicle fuels by at least 10 percent by 2020. The carbon intensity measures the amount of GHG emissions in the

lifecycle of a fuel, including extraction/feedstock production, processing, transportation, and final consumption, per unit of energy delivered. CARB adopted the implementing regulation in April 2009. The regulation is expected to increase the production of biofuels, including those from alternative sources, such as algae, wood, and agricultural waste. In addition, the Low Carbon Fuel Standard would drive the availability of plug-in hybrid, battery electric, and fuel-cell power motor vehicles. The Low Carbon Fuel Standard is anticipated to lead to the replacement of 20 percent of the fuel used in motor vehicles with alternative fuels by 2020.

Executive Order Executive Order B-30-15 – 2030 Statewide Emission Reduction Target

EO B-30-15 was signed by Governor Jerry Brown Jr. on April 29, 2015. This EO establishes an interim statewide GHG reduction target of 40 percent below 1990 levels by 2030, which is necessary to guide regulatory policy and investments in California in the midterm, and put California on the most cost-effective path for long-term emission reductions. Under this EO, all State agencies with jurisdiction over sources of greenhouse gas emissions will need to continue to develop and implement emissions reduction programs to reach the State's 2050 target and attain a level of emissions necessary to avoid dangerous climate change. According to CARB's Scoping Plan Update, this EO is in line with the scientifically established levels needed in the United States to limit global warming below 2°C - the warming threshold at which scientists say there will likely be major climate disruptions such as super droughts and rising sea levels (CARB, 2014).

Assembly Bill (AB) 32

AB 32, also known as the California Global Warming Solutions Act of 2006, was established to mandate the quantification and reduction of GHGs to 1990 levels by the year 2020. The law establishes periodic targets for reductions, and requires certain facilities to report emissions of GHGs annually. The legislation authorizes CARB to reduce emissions from certain sectors that contribute the most to statewide emissions of GHGs.

The AB 32 Scoping Plan identifies the strategies for achieving the maximum technologically feasible and cost-effective GHG reductions by 2020, and to maintain and continue reductions beyond 2020. The scoping plan includes a range of GHG emission reduction actions, which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a Cap-and-Trade system, and an AB 32 cost of implementation fee regulation to fund the program. The initial scoping plan was approved at the CARB Board hearing on December 12, 2008. CARB approved the First Update to the Scoping Plan in May 2014.

Senate Bill (SB) 97

Senate Bill (SB) 97, enacted in August 2007, required the Office of Planning and Research (OPR) to develop guidelines for the mitigation of GHG emissions or effects related to releases of GHG emissions. On April 13, 2009, OPR submitted proposed amendments to the California Natural Resources Agency (CNRA), in accordance with SB 97, regarding analysis and mitigation of GHG emissions. Formal rulemaking was conducted in 2009 prior to adopting the amendments.

As part of the guidelines, OPR recommends that CARB set statewide thresholds of significance and emphasized the need to have a consistent threshold available to analyze projects. The draft guidelines also noted that the analyses should be based on the best available information. As directed by SB 97, the CNRA adopted amendments to the State CEQA Guidelines for GHG emissions on December 30, 2009. On February 16, 2010, the Office of Administrative Law approved the amendments and filed them with the Secretary of State for inclusion in the California Code of Regulations. The amendments became effective on March 18, 2010.

Other Mobile Source Reduction Requirements

Several other State provisions address the GHG emissions reduction targets set by CARB for mobile sources, including trucks, passenger vehicles, trains, and ships. These measures include:

- Low Carbon Fuel Standard (EO S-01-07)
- Advanced Clean Cars Program
- SmartWay Truck Efficiency Regulation
- AB 32 Cap-and-Trade Program as applicable to transportation fuel suppliers (beginning January 1, 2015)
- SB 375 (Land Use Planning) including the development of a Sustainable Communities Strategy as part of a Metropolitan Planning Organization's Regional Transportation Plan.

In particular, SB 375 requires the Air Resources Board to set regional targets for GHG emission reductions from passenger vehicles and light duty trucks, and requires each regional Metropolitan Planning Organization (MPOs) to adopt a Sustainable Communities Strategy (SCS) into its regional transportation plan that would allow the region to meet its GHG emission reduction target. The Kern County Council of Governments adopted the SCS for Kern County as part of its Regional Transportation Plan (RTP) in 2014. The RTP and SCS incorporate forecasted development patterns, modeling and measures designed to integrate land use and transportation planning to reduce local and regional GHG emissions. Oil and gas resources, as well as other land uses, are components of the SCS. While SB 375 does not require local governments to amend their General Plans to implement the SCS, it provides incentives for them to do so. Implementation of SB 375 is expected to substantially reduce GHG emissions in the County and throughout the State.

California Air Pollution Control Officers Association (CAPCOA)

The California Air Pollution Control Officers Association (CAPCOA) is the association of air pollution control officers representing all 35 air quality agencies throughout California. CAPCOA is not a regulatory body, but it has been an active organization in providing guidance in addressing the CEQA significance of GHG emissions and climate change as well as other air quality issues. The GHG analysis set forth in this report has been informed, in part, by the expertise and methodologies described in the following documents published by CAPCOA: (1) CEQA & Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act (CAPCOA, 2008); and (2) Quantifying Greenhouse Gas Mitigation

Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures (CAPCOA, 2010). The methodologies used in this GHG analysis are consistent with the CAPCOA guidelines

California Environmental Quality Act (CEQA)

There are a variety of statewide rules and regulations which have been implemented or are in development in California which mandate the quantification or reduction of GHGs. Under CEQA, an analysis and mitigation of emissions of GHGs and climate change in relation to a project is required where it has been determined that a project will result in a significant addition of GHGs. Certain Air Pollution Control Districts (APCDs) have proposed their own thresholds of significance and /or best performance standards.

California Code of Regulations Title 24

Title 24 of the California Code of Regulations was established in 1978, and serves to enhance and regulate California's building standards. While not initially promulgated to reduce GHG emissions, Part 6 of Title 24 specifically establishes energy efficiency standards for residential and non-residential buildings constructed in the State of California in order to reduce energy demand and consumption. Part 6 is updated periodically to incorporate and consider new energy efficiency technologies and methodologies. The current version of the California Building Code became effective January 1, 2017. Local agencies must ensure that development in their jurisdictions complies with guidelines contained in the California Building Code. Cities and counties can, however, adopt building standards beyond those provided in the code.

San Joaquin Valley Air Pollution Control District (SJVAPCD)

On December 17, 2009, the SJVAPCD's Governing Board adopted the first comprehensive regional policy and guidance on addressing and mitigating GHG emission impacts caused by industrial, commercial, and residential development in the San Joaquin Valley. This set of guidance documents is designed to assist local permitting agencies and businesses by answering several questions related to CEQA and how to address GHG impacts under existing CEQA law.

To assist Lead Agencies, project proponents, permit applicants, and interested parties in assessing and reducing the impacts of project specific GHG emissions on global climate change, the SJVAPCD has adopted the guidance: *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA* and the policy: *District Policy – Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency*. The following criteria was outlined in the document to determine whether a project could have a significant impact:

- Projects determined to be exempt from the requirements of CEQA would be determined to have a less than significant individual and cumulative impact for GHG emissions and would not require further environmental review, including analysis of project specific GHG emissions. Projects exempt under CEQA would be evaluated consistent with established rules and regulations governing project approval and would not be required to implement BPS.

- Projects complying with an approved GHG emission reduction plan or GHG mitigation program which avoids or substantially reduces GHG emissions within the geographic area in which the project is located would be determined to have a less than significant individual and cumulative impact for GHG emissions. Such plans or programs must be specified in law or approved by the lead agency with jurisdiction over the affected resource and supported by a CEQA compliant environmental review document adopted by the lead agency. Projects complying with an approved GHG emission reduction plan or GHG mitigation program would not be required to implement BPS.

- Projects implementing Best Performance Standards would not require quantification of project specific GHG emissions. Consistent with CEQA Guideline, such projects would be determined to have a less than significant individual and cumulative impact for GHG emissions.

- Projects not implementing Best Performance Standards would require quantification of project specific GHG emissions and demonstration that project specific GHG emissions would be reduced or mitigated by at least 29 percent, compared to Business-as-Usual (BAU*), including GHG emission reductions achieved since the 2002-2004 baseline period. Projects achieving at least a 29 percent GHG emission reduction compared to BAU would be determined to have a less than significant individual and cumulative impact for GHG.

- Notwithstanding any of the above provisions, projects requiring preparation of an Environmental Impact Report for any other reason would require quantification of project specific GHG emissions. Projects implementing BPS or achieving at least a 29 percent GHG emission reduction compared to BAU would be determined to have a less than significant individual and cumulative impact for GHG.

Local

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan cites policies to provide decision-makers with long-range guidance affecting the future character of the Metropolitan Bakersfield planning area. The elements within the Metropolitan Bakersfield General Plan provide goals, policies, and implementation measures in order to reduce impacts of projects on air quality. Applicable goals relative to the proposed Project site within these elements are listed in Table 4.8-2, *Metropolitan Bakersfield General Plan Goals and Policies for Air Quality*, below.

Table 4.8-2. Metropolitan Bakersfield General Plan Goals and Policies for Air Quality

Goals and Policies: Air Quality
Conservation/Air Quality Goal #1: "Promote air quality that is compatible with health, well being, and enjoyment of life by controlling point sources and minimizing vehicular trips to reduce air pollutants."
Conservation/Air Quality Goal #2: Continue working toward attainment of Federal, State and Local standards as enforced by the San Joaquin Valley Air Pollution Control District."
Conservation/Air Quality Goal #3: "Reduce the amount of vehicular emissions in the planning area."

Table 4.8-2. Metropolitan Bakersfield General Plan Goals and Policies for Air Quality

Goals and Policies: Air Quality
Conservation/Air Quality Policy #1: "Comply with and promote San Joaquin Valley Unified Air Pollution Control District (SJVAPCD) control measures regarding Reactive Organic Gases (ROG). Such measures are focused on: (a) steam driven well vents, (b) Pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test stations, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance."
Conservation/Air Quality Policy #2: "Encourage land uses and land use practices which do not contribute significantly to air quality degradation."
Conservation/Air Quality Policy #3: "Require dust abatement measures during significant grading and construction operations."
Conservation/Air Quality Policy #4: Consider air pollution impacts when evaluating discretionary permits for land use proposals. Considerations should include: a) Alternative access routes to reduce traffic congestion, b) Development phasing to match road capacities, c) Buffers including increase vegetation to increase emission dispersion and reduce impacts of gaseous or particulate matter on sensitive uses."
Conservation/Air Quality Policy #11: "Improve the capacity of the existing road system through improved signalization and traffic control systems."
Conservation/Air Quality Policy #12: "Encourage the use of mass transit, carpooling and other transportation options to reduce vehicle miles traveled."
Conservation/Air Quality Policy #13: "Consider establishing priority parking areas for carpoolers in projects with relatively large numbers of employees to reduce vehicle miles traveled and improve air quality."
Conservation/Air Quality Policy #14: "Establish park and ride facilities to encourage car pooling and the use of mass transit."
Conservation/Air Quality Policy #16: "Cooperate with Golden Empire Transit [GET] and Kern Regional Transit to provide a comprehensive mass transit system for Bakersfield; require large-scale new development to provide related improvements, such as bus stop shelters and turnouts."
Conservation/Air Quality Policy #18: "Encourage walking for short distance trips through the creation of pedestrian friendly sidewalks and street crossings."
Conservation/Air Quality Policy #19: "Promote a pattern of land uses which locates residential uses in close proximity to employment and commercial services to minimize vehicular travel."

4.8.4 Impacts and Mitigation Measures

This section describes the air quality significance thresholds, the air quality methodology used to evaluate whether the proposed Project would exceed the thresholds, and an evaluation of the proposed Project's impacts.

Methodology

The primary source of emissions (approximately 50 percent) from the proposed Project is from mobile sources. There are a number of factors available for estimating the GHG from mobile sources. Not all GHGs exhibit the same ability to induce climate change; as a result, GHG contributions are commonly quantified in carbon dioxide equivalencies (CO_2e). The CO_2e portion of GHG emissions from the proposed Project were estimated using the URBEMIS2007 v9.2.4 program and the California Climate Action Registry (CCAR) General Reporting Protocol.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment;
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Project Impacts

Impact 4.8-1: The Project Would Generate Greenhouse Gas Emissions, Either Directly or Indirectly, That May Have a Significant Impact on the Environment.

Neither the SJVAPCD nor any other federal, state, or local agency has adopted a threshold to measure a project's impact on global climate change. Global climate change is an international phenomenon, and the regulatory background and scientific data are changing rapidly. In 2006, the California State Legislature adopted AB 32, the California Global Warming Solutions Act of 2006. AB 32 describes how global climate change would impact the environment in California. The impacts described in AB 32 include changing sea levels, changes in snow pack and availability of potable water, changes in storm flows and flood inundation zones, and other impacts.

The list of impacts included in AB 32 may be considered substantial evidence of environmental impacts requiring analysis in CEQA documents. AB 32 requires CARB, the State agency charged with regulating statewide air quality, to adopt rules and regulations that would achieve greenhouse gas emissions equivalent to statewide levels in 1990 by 2020. By July 1, 2007, CARB adopted a list of discrete early action GHG emission reduction measures that could be implemented by January 1, 2010.

As required by AB 32, CARB determined what the statewide GHG emissions level was in 1990, and approved a statewide GHG emissions limit that is equivalent to that level, to be achieved by 2020. CARB approved the 2020 limit on December 6, 2007. CARB's GHG inventory has estimated 427 million $MTCO_2e$ in California in 1990. In 2004, the emissions were estimated at 480 $MMTCO_2e$.

Climate Change Impacts on the Project

AB 32 indicates that "the potential effects of global climate change include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snow pack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidence of infections, disease, asthma, and other health-related problems" (AB 32, section 38501[a]).

According to the California Climate Change Center (CCCC), climate change impacts would affect all of the sectors considered in this report: sea level rise, agriculture, snowpack and water supply, forestry, wildfire risk, public health, and electricity demand and supply. Additionally, climate change could produce compounding impact. For instance, in the San Francisco Bay Delta, heightened sea levels and high river inflows from warmer storms would place levee systems in greater jeopardy of flooding. The CCCC indicates that some of the most dramatic climate change impacts would be experienced as increased frequency and severity of extreme events, such as heat waves, wildfires, flooding, and conditions conducive to air pollution formation.

The proposed Project must comply with Title 24 energy efficiency standards. Vehicles purchased by residents would produce fewer GHG emissions than those produced today with implementation of AB 1493. Regulations stemming from AB 32 would result in reductions in emissions from major sources such as electrical power generation and cement production. Although it is unknown if AB 32 alone is enough to reduce California's fair-share contribution to global GHG inventory, it is currently the only well-defined and widely accepted benchmark for GHG emissions in California. The threshold that is to be used for this proposed Project is as follows:

Would the project be consistent with California's strategies to reduce greenhouse gas emissions to the levels in AB 32?

This threshold is qualitative in nature, and is addressed as such in this analysis. Note that the thresholds and the analysis may not be relevant to other projects. Therefore, this analysis does not establish thresholds in Kern County.

Project GHG Inventory

The primary source of GHG emissions (approximately 50 percent) from the proposed Project during operation would result from mobile sources. Proposed Project construction and operational activities would generate GHG emissions. Criteria and GHG emissions were estimated using the California Emissions Estimator Model (CalEEMod) version 2013.2.2 (Insight Environmental Consultants 2017).

There are a number of factors available for estimating the GHGs from mobile sources. Not all GHGs exhibit the same ability to induce climate change; therefore, GHG contributions are commonly quantified in CO_2e.

The 2005 BAU and mitigated proposed Project emissions are summarized shown in Table 4.8-3, *Estimated Annual Greenhouse Gas Emissions*.

Table 4.8-3. Estimated Annual Greenhouse Gas Emissions

Source	CO_2	CH_4	N_2O	CO_2e
Construction Emissions				
2016 Construction Emissions	195.03	0.04	0.00	195.86
2017 Construction Emissions	536.28	0.07	0.00	537.67
2018 Construction Emissions	718.28	0.10	0.00	720.46
2019 Construction Emissions	361.72	0.06	0.00	362.99
2020 Construction Emissions	337.31	0.04	0.00	338.18
2021 Construction Emissions	685.16	0.10	0.00	687.26

Table 4.8-3. Estimated Annual Greenhouse Gas Emissions

Source	CO_2	CH_4	N_2O	CO_2e
2022 Construction Emissions	348.46	0.06	0.00	349.70
2023 Construction Emissions	333.10	0.04	0.00	333.93
2024 Construction Emissions	681.33	0.10	0.00	683.40
Operational Emissions				
Area Emissions	0.05	0.0001	0.00	0.05
Energy Emissions	10,814	0.41	0.13	10,862
Mobile Emissions	43,523	0.94	0.00	43,543
Waste Emissions	689.03	40.72	0.00	1,544.2
Water Emissions	1,103.1	18.64	0.45	1,633.0
Total Proposed Project Operational Emissions	*56,129*	*60.7*	*0.58*	*57,582*
Annualized Construction Emissions[1]	*139.89*	*0.02*	*0.00*	*140.32*
Proposed Project Emissions	**62,301**	**54.44**	**0.55**	**63,614**

Notes: emissions are measures in tons/year; 0.00 could represent <0.00

[1] Per South Coast AQMD's Methodology: Construction emissions are annualized over a 30-year period.

Source: Insight Environmental Consultants, 2017.

Emission Estimation Assumptions

The proposed Project's construction and operational GHG emissions were estimated using the CalEEMOD program and can be found in Appendix C. BAU emissions were calculated based on the proposed Project activities using 2005 regulations and technologies built into CalEEMod, available as defaults. According to the SJVAPCD, in order for the proposed Project to conform with the goals of AB32 at least a 29 percent reduction from the 2002-2004 BAU period by 2020 must be demonstrated (Insight Environmental Consulting 2017). Because 2002 to 2004 emission factors were not available in CalEEMod, year 2005 was used for BAU. Using 2005 as BAU results in more conservative emission reduction estimations as the emission factors in 2005 are lower (more efficient), thereby producing a smaller reduction between mitigated and BAU. Mitigated proposed project emissions were calculated using updated emission factors from CalEEMod for the anticipated years of operation and corresponding land uses (Insight Environmental Consultants 2017).

Electricity usage for industrial land uses was estimated using CCAR Protocol. The CCAR emission factors for electricity use are 804.54 pounds of CO_2 per megawatt hour (MWh), 0.0067 pounds of NH_4 per MWh, and 0.0037 pounds of N_2O per MWh.

The proposed Project does not contribute substantially to water vapor because water vapor concentrations in the upper atmosphere are primarily due to climate feedbacks rather than emissions from project-related activities.

The proposed Project would not result in the emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), or sulphur hexafluoride (SF_6), the other gases identified as GHG in AB 32. The proposed Project would be subject to any regulations developed under AB32, the California Global Warming Solutions Act of 2006, as determined by CARB. As demonstrated in Table 4.8-4, *Comparison of BAU and Proposed Mitigated Emissions (Tons/Year*), below, the mandated required 29 percent reduction needed to conform with AB 32 goals would be reached with already in place state regulations for mobile sources such as low carbon fuel standards. This would result in a 33 percent reduction from the proposed Project's BAU GHG operation emissions of 85,842 $MTCO_2e$ per year to 57,582 $MTCO_2e$ per year as shown in Table 4.8-4, *Comparison of BAU and Proposed*

Mitigated Emissions (Tons/Year). Therefore, the proposed project would be considered less than significant.

Table 4.8-4. Comparison of BAU and Proposed Project Mitigation Emissions (Tons/Year)

	2011 BAU	Proposed Project Mitigated (2020)
Co2e Emissions	85,842	57,582
Percent Reduction		33%

Source: Insight Environmental Consultants 2017.

Attorney General Mitigation Analysis

The Office of the California Attorney General maintains a website with a list of CEQA Mitigations for Global Climate Change Impacts. The Attorney General has listed some examples of types of mitigations that local agencies may consider in order to offset or reduce global climate change impacts from a project. The Attorney General assures that the presented lists are examples and not intended to be exhaustive but instead provides measures and policies that could be undertaken. Moreover, the measures cited may not be appropriate for every project, so the Attorney General suggests that the lead agency should use its own informed judgment in deciding which measures it would analyze, and which measures it would require, for a given project.

The Attorney General suggests measures that could be undertaken or funded by a diverse range of projects, related to energy efficiency; renewable energy; water conservation and efficiency; solid waste measures; land use measures; transportation and motor vehicles; and carbon offsets. Implementation of the required mitigation measures will reduce the project specific generated GHGs to a less than significant level as the project proponent will be required to off-set impacts by 29 percent below business as usual, thus achieving the mandated emission reduction targets established by AB 32. Additionally, the proposed Project is located in an area of similar type industrial development, and along State Route 99, thus allowing existing infrastructure s to serve multiple users. In conclusion, the proposed Project by its design and mitigation measures would satisfy many of the suggested measures proposed by the Attorney General, which are shown in Table 4.8-5 *California Greenhouse Gas Emissions Reduction Strategies*, below.

Table 4.8-5. California Greenhouse Gas Emission Reduction Strategies

Strategy	Project Design/Mitigation to Comply with Strategy
Vehicle Climate Change Standards: AB 1493 (Pavley) required the state to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of climate change emissions emitted by passenger vehicles and light duty trucks. Regulations were adopted by CARB in September 2004.	These are CARB enforced standards; vehicles that access the proposed Project that are required to comply with the standards would comply with these strategies.
Other Light Duty Vehicle Technology: New standards would be adopted to phase in beginning in the 2017 model.	
Heavy-Duty Vehicle Emission Reduction Measures: Increased efficiency in the design of heavy-duty vehicles and an education program for the heavy-duty vehicle sector.	

Table 4.8-5. California Greenhouse Gas Emission Reduction Strategies

Strategy	Project Design/Mitigation to Comply with Strategy
Diesel Anti-Idling: In July 2004, CARB adopted a measure to limit diesel-fueled commercial motor vehicle idling.	Project would be subject to State law.
Hydrofluorocarbon Reduction: 1) Ban retail sale of HFC in small cans; 2) Require that only low GWP refrigerants be used in new vehicular systems; 3) Adopt specifications for new commercial refrigeration; 4) Add refrigerant leak-tightness to the pass criteria for vehicular Inspection and Maintenance programs; 5) Enforce federal ban on releasing HFCs.	This measure applies to consumer products. When CARB adopts regulations for these reduction measures, any products that the regulations apply to would comply with the measures.
Transportation Refrigeration Units (TRU), Off-Road Electrification, Port Electrification: Strategies to reduce emissions from TRUs, increase off-road electrification, and increase use of shore-side/port electrification.	Not applicable.
Manure Management: The proposed San Joaquin Valley Rule 4570 will reduce volatile organic compounds from confined animal facilities through implementation of control options.	Not applicable.
Alternative Fuels - Biodiesel Blends: CARB would develop regulations to require the use of 1 to 4 percent biodiesel displacement of California diesel fuel.	Not applicable.
Alternative Fuels - Ethanol: Increased use of ethanol fuel.	Not applicable.
Achieve 50 percent Statewide Recycling Goal: Achieving the State's 50 percent waste diversion mandate as established by the Integrated Waste Management Act of 1989, (AB 939, Sher, Chapter 1095, Statutes of 1989), will reduce climate change emissions associated with energy intensive material extraction and production as well as methane emission from landfills. A diversion rate of 48 percent has been achieved on a statewide basis. Therefore, a 2 percent additional reduction is needed.	Consistent with Mitigation in Section 4.17, UTILITIES, which requires construction recycling within the proposed Project.
Zero Waste - High Recycling: Additional recycling beyond the State's 50 percent recycling goal.	Consistent with Mitigation in Section 4.17, UTILITIES, which requires construction recycling within the proposed Project.
Landfill Methane Capture: Install direct gas use or electricity projects at landfills to capture and use emitted methane.	Not applicable.
Urban Forestry: A new statewide goal of planting 5 million trees in urban areas by 2020 would be achieved through the expansion of local urban forestry programs.	Consistent. Project would be subject to landscaping standards identified in the Kern County Zoning Ordinance.
Afforestation/Reforestation Projects: Reforestation projects focus on restoring native tree cover on lands that were previously forested and are now covered with other vegetative types.	Not applicable. The proposed Project area was not forested in recent times.
Water Use Efficiency: Approximately 19 percent of all electricity, 30 percent of all natural gas, and 88 million gallons of diesel are used to convey, treat, distribute and use water and wastewater. Increasing the efficiency of water transport and reducing water use would reduce greenhouse gas emissions.	Consistent with Mitigation.

Table 4.8-5. California Greenhouse Gas Emission Reduction Strategies

Strategy	Project Design/Mitigation to Comply with Strategy
Building Energy Efficiency Standards in Place and in Progress: Public Resources Code 25402 authorizes the CEC to adopt and periodically update its building energy efficiency standards (that apply to newly constructed buildings and additions to and alterations to existing buildings).	Consistent with Mitigation. Mitigation requires a 29 percent decrease of annual GHG emissions.
Appliance Energy Efficiency Standards in Place and in Progress: Public Resources Code 25402 authorizes the Energy Commission to adopt and periodically update its appliance energy efficiency standards (that apply to devices and equipment using energy that are sold or offered for sale in California).	Project would be consistent with State law.
Cement Manufacturing: Cost-effective reductions to reduce energy consumption and to lower carbon dioxide emissions in the cement industry.	Consistent with mitigation. The specific use is not proposed at this time. Mitigation requires GHG emission reductions regardless of the proposed project. Additionally, the preparation of a Precise Development (PD) Plan prior to the commencement of any ground disturbing activities will be required. The PD requirement will allow for additional review of any specific use and the incorporation of specific conditions to ensure compliance with State law, consistency with any locally adopted plans and compatibility with surrounding uses.
Smart Land Use and Intelligent Transportation Systems (ITS): Smart land use strategies encourage jobs/housing proximity, promote transit-oriented development, and encourage high-density residential/ commercial development along transit corridors. ITS is the application of advanced technology systems and management strategies to improve operational efficiency of transportation systems and movement of people, goods and services. Governor Schwarzenegger is finalizing a comprehensive 10-year strategic growth plan with the intent of developing ways to promote, through state investments, incentives and technical assistance, land use, and technology strategies that provide for a prosperous economy, social equity, and a quality environment.	The proposed Project is consistent with this strategy as the project is located along an existing State Highway. The site is located in an area with other similar type development, thus allowing all uses to capitalize on existing industrially related infrastructure.
Smart land use, demand management, ITS, and value pricing are critical elements for improving mobility and transportation efficiency. Specific strategies include: promoting jobs/housing proximity and transit-oriented development; encouraging high density residential/commercial development along transit/rail corridor; valuing and congestion pricing; implementing intelligent transportation systems, traveler information/ traffic control, incident management; accelerating the development of broadband infrastructure; and comprehensive, integrated, multimodal/ intermodal transportation planning.	Refer to response, above.
Enteric Fermentation: Cattle emit methane from digestion processes. Changes in diet could result in a reduction in emissions.	Not applicable.

Table 4.8-5. California Greenhouse Gas Emission Reduction Strategies

Strategy	Project Design/Mitigation to Comply with Strategy
Green Buildings Initiative: Green Building Executive Order, S-20-04 (CA 2005), sets a goal of reducing energy use in public and private buildings by 20 percent by the year 2015, as compared with 2003 levels. Consistent with Mitigation.	Mitigation requires compliance with State law and includes increased GHG emission reduction requirements.
California Solar Initiative: Installation of 1 million solar roofs or an equivalent 3,000 MW by 2017 on homes and businesses; increased use of solar thermal systems to offset the increasing demand for natural gas; use of advanced metering in solar applications; and creation of a funding source that can provide rebates over 10 years through a declining incentive schedule.	Not applicable.

Source: Insight Environmental Consulting, 2017.

Feasible and Reasonable Mitigation

CEQA, as well as the SJVAPCD Rule 9510, requires that all feasible and reasonable mitigation be applied to the proposed Project to reduce the impacts from construction and operations on air quality. The SJVAPCD's "Non-Residential On-Site Mitigation Checklist" was utilized in preparing the mitigation measures and evaluating the proposed Project's features. These measures include using controls that limit the exhaust from construction equipment and using alternatives to diesel when possible. Additional reductions will be achieved through the regulatory process of the air district and CARB as required changes to diesel engines are implemented which will affect the product delivery trucks and limits on idling.

While it is not possible to determine whether the proposed Project individually would have a significant impact on global warming or climate change, the proposed Project emissions will constitute a small fraction of the statewide GHG emissions. The strategies currently being implemented by CARB would help in reducing the proposed Project's GHG emissions and are summarized above in Table 4.8-5*, California Greenhouse Gas Emission Reduction Strategies*, above.

The impacts on global warming and climate change are indirect, not direct, and the emissions cannot be correlated with specific impacts based on currently available science. Climate change is a worldwide phenomenon, and local government lacks the expertise, or regulatory authority, to develop the scientific tools and policy needed to select a CEQA significance threshold for climate change or GHG emissions. The proposed Project will be subject to any regulations or requirements adopted under AB 32 or imposed by the state or federal government. In addition, as mentioned above, the proposed Project would result in a 33 percent reduction from the proposed Project's BAU GHG operation emissions of 85,842 $MTCO_2e$ per year to 57,582 $MTCO_2e$ per year as shown in Table 4.8-4, *Comparison of BAU and Proposed Project Mitigation Emissions (Tons/Year)*. Therefore, the proposed Project would be considered less than significant. The determination of project level significance, is therefore, considered less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.8-2: The Project Would Conflict with an Applicable Plan, Policy or Regulation Adopted for the Purpose of Reducing the Emissions of Greenhouse Gases.

At of the time of this writing, the County of Kern does not have an adopted GHG Climate Action Plan. Implementation of the proposed project with the identified mitigation measure to reduce business as usual (BAU) GHG emissions by 29 percent is consistent with standards established by the CARB and the California Global Warming Solutions Act of 2006. As such, impacts are considered less than significant.

Mitigation Measures

Implement Mitigation Measure MM 4.3-1, as described in Section 4.3, *Air Quality*.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

While it is not possible to determine whether the proposed Project individually would have a significant impact on global warming or climate change, the proposed Project clearly would contribute to cumulative GHG emissions in California (see Table 4.8-3) as well as related potential health effects.

Kern County and the SJVAB currently do not have GHG inventories. On December 6, 2007, the CARB established a GHG emissions limit based on the 1990 level for the year 2020 and adopted regulations requiring mandatory reporting of GHGs for large facilities. After a year of investigation, CARB has established that the state's 1990 emissions are 427 million $MTCO_2e$. Preliminary estimates indicate that 2020 emission projections could be 600 million $MTCO_2e$ if no actions are taken to reduce GHGs ("business as usual" scenario). CARB determined that California must prevent 173 million tons of $CO_e e$ from being emitted by 2020 in order to meet the 1990 level as required by AB 32.

The main contribution of GHG emissions from the proposed Project is from motor vehicles trips. Transportation sources account for approximately 42 percent of California's total GHG emissions. The proposed Project's emissions would, therefore, contribute to the increase in emissions. The effect on these emissions from other anticipated actions by CARB to address transportation issues, such as the development of fuels with less carbon, is not known at this time.

However, without the necessary science and analytical tools, it is not possible to assess, with certainty, whether the proposed Project's contribution would be cumulatively considerable within the meaning of State CEQA Guidelines Sections 15065(a)(3) and 15130. CEQA, however, does note that more severe environmental problems have lower thresholds for determining that a proposed Project's contribution to cumulative impacts is significant. Given the position of the legislature in AB 32, which

states that global warming poses serious detrimental effects, and the requirements of CEQA for the lead agency to determine that a project not have a cumulatively considerable contribution, the effect of 57,582 $MTCO_2e$ can be considered cumulatively considerable. This determination is based on the lack of clear scientific or other criteria for determining the significance of the proposed Project's contribution to the already-degraded air quality in the SJVAB

State CEQA Guidelines Section 15130 notes that sometimes the only feasible mitigation for cumulative impacts may involve the adoption of ordinances or regulations rather than the imposition of conditions on a project-by-project basis. Global climate change is this type of issue. Causes and effects are not just regional or statewide, they are worldwide. Given the uncertainties in identifying, let alone quantifying, the impact of any single project on global warming and climate change, and the efforts made to reduce emissions of GHGs from the project through design, in accordance with State CEQA Guidelines Section 15130, any further feasible mitigation will be accomplished through CARB regulations adopted pursuant to AB 32. The cumulative impacts of the proposed Project to global climate change as demonstrated in Table 4.8-4, above, would achieve greater than the required 29 percent reduction needed to conform with AB 32 goals.

Mitigation Measures

Implement Mitigation Measure MM 4.3-1, as described in Section 4.3, *Air Quality*.

Level of Significance after Mitigation

Cumulative impacts on global climate change and associated health effects are considered significant. and unavoidable.

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Section 4.9

Hazards/Hazardous Materials

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Section 4.9
Hazards/Hazardous Materials

4.9.1 Introduction

The purpose of this section is to identify, to the extent feasible, the potential for hazards associated with historic and current site uses, surrounding sites and recognized environmental conditions (RECs) in connection with the proposed Project site and to identify potential risks to human health, including future residents surrounding the site, users of the proposed Project site, workers and construction workers. A Hazardous Materials Evaluation was prepared by McIntosh & Associates in November 2008 and a subsequent Hazardous Materials Evaluation was prepared by McIntosh & Associates in July 2017. In addition, A Petroleum and Natural Gas Pipeline Assessment was prepared by McIntosh & Associates in July 2017. See Appendix F, *Hazardous Materials Evaluation*, Appendix G, *Petroleum and Natural Gas Pipeline Assessment*, and Appendix N, *Original Technical Studies*.

4.9.2 Environmental Setting

Local Character

The proposed Project site is undeveloped and is used mainly for agricultural purposes. A shop building is located in the easternmost portion of the Project site, near South Union Avenue. According to the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR), the proposed Project is not located within an oil or gas field. There is one plugged and abandoned well with the proposed Project boundaries. A Pacific Gas and Electric (PG&E) natural gas transmission pipeline, number L-300B, traverses the site at a diagonal from northwest to southeast. Six pole-mounted electrical transformers (PMT) were observed within and adjacent to the proposed Project boundaries.

Surrounding Property Uses

Existing rural residential, agricultural, and commercial/light industrial land uses currently surround the proposed Project. The land uses for the adjacent properties is presented in the Table 4.9-1, *Surrounding Land Uses.*

Table 4.9-1. Surrounding Land Uses

Location	Adjacent Roads	Land Use
North	DiGiorgio Road Unpaved Western	Agricultural and roadway uses are present to the north. The land is designated R-IA (Resource-Intensive Agriculture), LMR (Low Medium Density Residential, 4 to 10 units per acre), HMR (High Medium Density Residential, 7.26 to 17.42 units per acre), SR (Suburban, 4 units per acre), GC (General Commercial)

Table 4.9-1. Surrounding Land Uses

Location	Adjacent Roads	Land Use
South	Houghton Road	Undeveloped agriculture land and State Route (SR) 99 off-ramp south of Houghton Road. The land is designated as R-IA (Resource-Intensive Agriculture), RR (Rural Residential, 2½ acres per unit), HC (Highway Commercial).
East	South Union Avenue is adjacent to 40 acres in the eastern most portion	Agricultural and rural residential with corralsand equestrian facilities, and mobile homes along South Union Avenue and on the northeast, east and southeast adjacent to the proposed project. There is an automobile wrecking yard (Higgins Auto Wrecking, 12825 South Union Avenue) located adjacent to the southeast portion of the proposed project. The land is designated as R-IA (Resource-Intensive Agriculture), RR (Rural Residential), SI (Service Industrial)
West	SR-99	SR-99 and undeveloped agricultural land. The land is designated as PT (Public Transportation) and R-IA (Resource-Intensive Agriculture)

Historical Use of Property

In 1934, an exploratory oil well was drilled; however, it failed to produce and was abandoned in 1935. The proposed Project has remained undeveloped and has been utilized for agricultural purposes from 1940's to the present. Currently there are approximately 63 acres of alfalfa being grown along the south portion of the Project site, and the balance of the Project site is fallow due to the recent drought conditions but has been prepared to resume farming operations.

A steel shop building is located on the east side of the Project site, near South Union Avenue along Lamb Avenue and was probably used for field equipment, vehicle maintenance, and storage. A retention basin, used for agricultural purposes, is located on the south edge of the Project site at the Houghton Road/Chevalier Road intersection.

A 34-inch diameter high pressure gas transmission pipeline (Line 300B), owned and operated by PG&E, traverses the Project site. The pipeline is marked at the east boundary of South Union Avenue and at the west boundary adjacent to State Route (SR) 99. There is a 6-inch natural gas distribution pipeline operated by Pacific Gas and Electric Company that is located on the west side of the South Union Avenue.

Aerial photographs were provided by Kern County Public Works Department and Western Photogrammetrics. Additionally, aerial photographs from Google Earth online website for the years 2008, 2009, 2011, 2012, 2013, 2014, 2015, and 2016 were reviewed to assess the history of the proposed Project site. (McIntosh & Associates 2017; refer to Appendix F and Appendix N). The following provides a summary of the aerial photographs:

1937: The project site is visible as fallow land. Some scarring from sheet-flooding is visible trending generally north to south. South Union Avenue is visible along the east boundary of the Project site. Small farms and rural residences are visible to the northeast, east, and south.

1952: A grove of trees is visible adjacent to South Union Avenue in the northeast corner of the easternmost portion of the Project site. Two parcels appear to be under cultivation.

Houghton Road is visible along the south boundary of the site. Two small farms/rural residences are visible in the parcel currently occupied by Higgins Auto Wrecking, near the south boundary of the site. The rural residence and corrals immediately north of the easternmost portion of the Project site is visible in this aerial photograph. Agricultural land is visible to the north, south, east, and west.

1956: The proposed Project site appears to be under cultivation with the exception of two fallow portions of the site. The on-site location of the west irrigation well and the concrete ditch are visible. Conditions on the adjacent properties appear relatively similar to those noted in the 1952 aerial photograph.

1963: SR 99 is visible along the west boundary of the Project site, having opened in 1961. The "cloverleaf" on- and off-ramps at Houghton Road, adjacent to the southwest corner of the Project site, appear to be under construction. On- and off-site conditions appear relatively similar to those noted in the 1956 and 1952 aerial photographs.

1975: Plowed/cultivated land has replaced trees in the easternmost portion of the Project site. A clearing with a small structure, possibly a small shed or shop, is visible in the east portion of the site. The south tailwater pit located near Houghton Road is visible. The SR-99/ Houghton Road interchange has been completed, and a dairy appears to be visible on the west side of SR-99, opposite the south half of the proposed Project. The original PG&E natural gas pipeline station is visible adjacent to South Union Avenue. Additional off-site conditions appear relatively similar to those viewed in the 1963 aerial photograph.

1981: A large oak tree is visible in the west part of the site, where the domestic well is located. The north portion of the site appears fallow. Rows of wrecked automobiles are visible at the location of Higgins Auto Wrecking, adjacent to the southern Project boundary. Additional on- and off-site conditions appear relatively similar to those noted in the 1975 aerial photograph.

1990: The steel shop building is visible in the small clearing in the west part of the easternmost portion of the Project site. On- and off-site conditions appear relatively similar to those noted in the 1981 aerial photograph.

1995: Conditions on- and off-site appear relatively similar to those noted in the 1990 aerial photograph. Mobile home lots are visible off-site, located north of the easternmost proposed Project boundary. North of the proposed Project, at a distance of 0.5-mile or greater, several residential subdivisions are visible.

2000: On- and off-site conditions appear relatively similar to those noted in the 1995 aerial photograph.

2002: Conditions on- and off-site appear relatively similar to those observed on the 1995 and 2000 aerial photographs.

2003: Conditions on- and off-site appear relatively similar to those observed on the 1995, 2000, and 2002 aerial photographs. More than 50 percent of the land comprising the proposed Project appears fallow or recently plowed.

2006: Conditions on- and off-site appear relatively similar to those observed on the 1995, 2000, 2002, and 2003 aerial photographs. Approximately 50 percent of the land comprising the proposed Project site appears to have been cultivated with alfalfa.

2008: The proposed Project is comprised of agricultural land. Portions of the Project site have crops growing, and the rest has been disked. A brushy retention basin in on the south edge of the Project site and has been used for agriculture purposes. A steel shop building is located on the east side of the Project site near South Union Avenue along Lamb Avenue. The proposed Project is adjacent to other related agricultural land, rural residential properties, and an automobile wrecking yard (Higgins Auto Wrecking).

2009: Conditions on the proposed Project and other adjacent properties appear relatively similar to those observed in the year 2008 and 2009 aerial photograph

2011: Conditions on the proposed Project and other adjacent properties appear relatively similar to those observed in the year 2008 and 2009 aerial photograph

2013: Conditions on the proposed Project and other adjacent properties appear relatively similar to those observed in the year 2008, 2009, and 2011 aerial photograph.

2014: Conditions on the proposed Project and other adjacent properties appear relatively similar to those observed in the year 2008, 2009, 2011, and 2012 aerial photograph.

2015: Conditions on the proposed Project and other adjacent properties appear relatively similar to those observed in the year 2008, 2009, 2011, 2012, 2013, and 2014 aerial photograph.

2016: The conditions on the proposed Project and other adjacent properties appear relatively similar to those observed in the years 2008,2009, 2011,2012, 2013, 2014 and 2015. The proposed Project is comprised of agricultural land. A portion of the proposed Project has crop growing, and the remained of the Project site has been disked in preparation for cultivation. A brushy retention basin is on the south edge of the Project site and has been used for agriculture purposes. A steel shop building is located on the east side of the Project site, near South Union Avenue along Lamb Avenue. The proposed Project is adjacent to other related agricultural land, rural residential properties, and an automobile wrecking yard (Higgins Auto Wrecking).

Records Review

A review of regulatory agency records was conducted for the site and surrounding one-mile radius. The following documents have been reviewed: U.S. Environmental Protection Agency (EPA) Toxic Release Inventory (TRI) records; California Air Resources Board (CARB) Community Health Air Pollution Information System (CHAPIS) records, EDR Report; DOGGR records; Kern County

Environmental Health Serves Department (KCEHSD) records; and Kern County Agricultural Commissioner records.

U.S. EPA Toxic Release Inventory (TRI)

Toxics Release Inventory (TRI), a US EPA database, contains information on toxic chemical releases. The 2006 TRI Explorer Chemical Releases Report for Bakersfield area facilities provides information on all regulated industries in Kern County. The report indicated that 1,591,813 pounds of various chemicals and hazardous wastes were disposed to Class I Underground Injection Wells, RCRA Subtitle C Landfills, and other unspecified landfills during the 2006 calendar year. The TRI Explorer report also indicated that 104,181 pounds of point-source air emissions and 61,211 pounds of fugitive air emissions were released into the atmosphere in 2006. This data was released by the EPA to the public on February 21, 2008.

The proposed Project was not identified in the 2006 TRI Explorer report, and no other sites were identified within a one-mile radius of the proposed Project. Additionally, the proposed Project was not identified in the 2017 US EPA TRI Facilities for Explorer Chemical Releases Report for Bakersfield, California area facilities, and no other properties were identified within a one-mile radius of the proposed project. This data was released by the US EPA data source and updated June 2, 2017 (McIntosh & Associates 2017; refer to Appendix F).

California Air Resources Board (CARB) CHAPIS Hazardous Air Pollutant Records

Toxic air pollutants are chemicals that have the potential to cause adverse health effects, such as cancer, birth defects, and organ damage. The online CHAPIS records were reviewed June 2017 and are listed from the year 2015 database for emissions by facilities and reflect the most current data available. The proposed Project was not identified with any emission inventory, and one-mile radius of the proposed project was not identified with any emission inventory and/or any facilities were identified (McIntosh & Associates 2017; refer to Appendix F).

The closest emission facility is Kern Oil & Refining Company located at 7724 East Panama Lane, in Bakersfield. It is approximately 5.75 miles northeast of the proposed Project with Particulate Matter Emissions of 5.671 tons for the year 2015 (McIntosh & Associates 2017; refer to Appendix F).

Environmental Data Resources, Inc. (EDR) Report

In July 2008, an Environmental Data Resources, Inc. (EDR) Radius Search was conducted for the proposed Project site and properties within a one-mile radius. The EDR report includes: 1) search of Federal, State and local agencies environmental records and 2) search for information about the physical setting of the sites and their surroundings. A copy of the EDR Report is included in Appendix N, *Original Technical Studies*.

The search of Federal, State, and local agencies environmental records found no records for the proposed Project site. Three facilities were identified on one or more of the databases searched for the EDR report. In addition, five "orphan sites" were identified in the EDR report. "Orphan sites" are sites that the EDR report cannot map due to insufficient information.

The EDR report indicated that two water wells are located on-site. The irrigation wells were listed by their U.S. Geological Survey well numbers. The west on-site irrigation well was correctly identified as well no. 31S28E-7P1, and the northwest on-site water well was correctly identified as well no. 31S28E-7D1. The total depths for both wells were not reported.

Lamb Chops

Lamb Chops, a Solid Waste/Landfill-listed facility, is located at 12336 South Union Avenue. Its agricultural composting operation was listed at the address of 300 Buena Vista Road. The permitted manure throughput for the composting facility was 1,000 cubic yards per day, and its permitted capacity was 2,500 cubic yards per day. The Lamb Chops composting facility was closed on March 31, 1999.

Young's Commercial Transfer (YCT)

Young's Commercial Transfer (YCT), is located at 300 Buena Vista Road, and is listed on the following databases: Hazardous Waste and Substances Sites (CORTESE); Leaking Underground Storage Tank (LUST); Historical Underground Storage Tank (HIST UST); State Facility Inventory Database (CA FID) UST; and Statewide Environmental Evaluation and Planning System (SWEEPS) Underground Storage Tank (UST).

The CORTESE database identifies public drinking water wells with detectable levels of contamination, hazardous substance sites selected for remedial action, sites with known toxic materials identified through the abandoned site assessment program, sites with USTs having a reportable release, and all solid waste sites from which there is known migration. No details were listed by CORTESE for YCT, and it is not considered a direct or indirect threat to the project site.

The LUST database contains reported leaking UST incidents that originate within the State Water Resources Control Board's Hazardous Substance Storage Container Database. YCT had operated two diesel USTs that leaked into soil only. The case was opened by KCEHSD, on March 4, 1992, and the last reporting date was October 3, 1994; the case was closed.

The HIST UST database contains listings from the State Water Resources Control Board (SWRCB). The diesel USTs were removed from the former YCT facility in 1992 had been installed in 1972 and 1973, respectively.

CA FID UST identified the former YCT facility as located within one-half to one mile of the proposed Project site. SWEEPS UST database identifies two diesel USTs with capacities of 10,000 gallons each on the YCT facility. No further details were provided.

Limi Brothers Farm

The CA FID UST database identified Limi Brothers Farm shop facility located at 11437 South Union Avenue. No further details were provided.

Orphan Sites

No orphan sites were identified less than one mile from the project site. The nearest sites are located at the junction of Taft Highway (SR-119) and SR-99, more than one mile to the north-northwest of the proposed Project. All of the orphan sites are off-site fueling stations/minimarts and none are situated upgradient of the proposed Project. These orphan sites are located at sufficient distances from the proposed Project such that they present no significant risks to the Project site.

Kern County Environmental Health Services (KCEHS) Department Records

The KCEHS was contacted in July 2008 regarding any records associated with aboveground storage tanks (ASTs), USTs, hazardous materials business plans (HMBPs), or hazardous materials incident reports (HMIRs) for the proposed Project site and surrounding locations. One soil remediation report was on file for the proposed Project site, in the location of the irrigation water wells. The remediation report for the proposed Project site was approved by KCEHS and a closure letter was issued on December 1, 2006. No other records were identified for the proposed Project.

One HMBP was identified for Higgins Auto Wrecking and two UST removal files were identified for Louis Limi Farm Shop and Young's Commercial Storage. The KCEHS issued a closure letter on for Louis Limi Farm Shop on October 8, 1991 and a closure letter for young's Commercial Storage on October 3, 1994. At the time the three facilities identified through KCEHS records review do not appear to represent current and/or material environmental risks to the Project site.

On June 26, 2017, KCEHS was contacted regarding the potential for records associated with Aboveground Storage Tanks (ASTs), Underground Storage Tanks (USTs), HMBPs, or Hazardous Materials Incident Reports (HMIRs) for the Project site and within a one-mile radius of the Project site. No HMBPs were on file with KCEHS for the Project site. However, KCEHS reported one Soil Remediation report and three UST removal files. KCEHS also reported several sites with a history of spills and Hazardous Material Business Inventories. Those sites specifically noted in the Hazardous Materials Evaluation (McIntosh & Associates 2017) are summarized below. Refer to Appendix F, *Hazardous Materials Evaluation*, and Appendix G, *Petroleum and Natural Gas Pipeline Assessment*, for further detail.

99 Houghton Industrial Park

In 2006, petroleum hydrocarbon impacted soil was observed in the vicinity of the location of two on-site irrigation wells along the west boundary, and in the northwest corner of, the Project site. Observations regarding soil were also made surrounding a waste oil AST, adjacent to a steel shop building located on the east side near South Union Avenue along Lamb Avenue (refer to Appendix F, *Hazardous Materials Evaluation*).

The Hazardous Materials Evaluation (McIntosh & Associates 2017) also notes information regarding characterizations and cleanups of petroleum hydrocarbon contaminated soil at the two irrigation wells and the waste oil AST in 2006. Impacted, non-hazardous soil, totaling 21.1 tons, was removed and transported to the McKittrick Waste Treatment Site in western Kern County for disposal and/or recycling. Confirmation samples were collected from each of the three on-site locations to ensure that the impacted soil had been removed to appropriate levels as required by the KCEHS. KCEHS issued

a December 1, 2006 closure letter indicating that no further action was required (refer to Appendix F, *Hazardous Materials Evaluation*).

Richard Limi Custom Harvesting

Richard Limi Custom Harvesting is located at 11437 South Union Avenue, approximately 0.45 miles northeast of the proposed Project. On September 19, 1991, one 10,000-gallon capacity, single wall, steel, diesel UST was removed for off-site destruction. Soil samples collected two feet beneath the dispenser exhibited diesel at 36 milligrams per kilogram (mg/kg), less than the KCEHS action level of 100 mg/kg. Groundwater was not affected. KCEHS subsequently issued a closure letter dated October 8, 1991, indicating that no further action was required (refer to Appendix F, *Hazardous Materials Evaluation).*

KCEHS did a routine Hazardous Material Business Plan Inventory (HMBPI) Inspection and Hazardous Waste Generator Inspection on May 26, 2015 at the site. No violations were observed. Limited materials are stored on-site and consist of gear oil, hydraulic oil, and motor oil (55 gallons each), used oil filters (350 pounds), waste oil (500 gallons, and oxygen (250 cubic feet) (refer to Appendix F, *Hazardous Materials Evaluation*).

Young's Commercial Transfer Company

Young's Commercial Transfer Company is located at 300 Buena Vista Road, approximately 0.21 miles east from the proposed Project. On February 18, 1992, two 10,000-gallon capacity, single-wall, steel, diesel USTs were removed and soil samples from under the tank were taken and analyzed. Approximately, 1,000 cubic yards of diesel impacted soil were removed from the former tank settings and bio-remediated on-site between November 1992 and July 1994. Monitoring wells indicated that petroleum hydrocarbons were not detected in groundwater during monitoring activities. A site closure report/letter dated August 11, 1994 indicating that no further action is needed at this site in relation to the former diesel underground tank (McIntosh & Associates 2017; refer to Appendix F, *Hazardous Materials Evaluation*).

Souza Properties

Souza Properties is located 9869 South Union Avenue approximately one-mile northeast of the proposed Project site. In March 1993, a fluid sample was taken from a small waste oil sump and it was determined that future testing was needed. On May 21, 1993 five USTs were removed and soil samples indicated that significant contamination existed beneath the tanks to a depth of 45 feet. On May 23, 1994, a Remedial Action Plan was implemented and excavation to 51 feet was undertaken. A total of 900 cubic yards of soil was removed and spread on-site to be treated via bioremediation and aerated. A closure letter was issues dated November 15, 1994 (McIntosh & Associates 2017; refer to Appendix F, *Hazardous Materials Evaluation*).

DOGGR Records

The primary mineral resource currently under development in portions of Kern County is oil. The proposed Project is located outside the administrative boundaries of any oil or gas field. DOGGR

Wildcat Map 4-2 and records searched as part of the records review for the Hazardous Materials Evaluation identified one plugged and abandoned exploratory oil well. The exploratory well, "Sea Cliff-Houghton" 1, was drilled by the Big McKittrick Oil Company of California between November 1934 and June 1935. The oil well was a dry hole that was subsequently abandoned by October 1935. Because the well was filled only with drilling mud prior to abandonment in 1935, the DOGGR requires that the well be reabandoned to current standards prior to construction.

DOGGR Wildcat Map W4-2 indicates that the nearest active producing oil fields are: the Mountain View Field approximately 4.75 miles northeast of the Project site; the Stockdale Field approximately 4.1 miles northwest of the Project site; and the Lakeside Field approximately 7.7 miles west of the Project site. The nearest producing gas field is the Paloma Field approximately 7.1miles southwest of the Project site (McIntosh & Associates 2017; refer to Appendix G, *Petroleum and Natural Gas Pipeline Assessment*).

Kern County Agricultural Department and Measurement Standards (Agricultural Commissioner)

The Kern County Agricultural Department and Measurement Standards (Agricultural Commissioner) has a monitoring program that maintains information about the farming companies, agricultural activities and pesticides use. A Restricted Materials Permit (RMP), obtained from the Agricultural Commissioner, is required for the application of chemicals to crops. The Project site has been utilized for agricultural purposes since the 1940s. Doug Kaiser Farms (DKF) is the current grower, and alfalfa is the current crop. DKF possesses RMP No. 1500666 for applications of pesticides and herbicides, which expired on December 31, 2008. Mitchell Property Management LP, Permit Number 1502896, was the grower for the years 2010 to 2017. A total of 45 pesticides, herbicides, fertilizers, and general soil amendments have been licensed for application to the proposed Project from the years until the year 2017.

Organochlorine pesticides are defined as persistent because they are stable in the environment and resist decay with time. Organochlorine pesticides include broad groups including: Hexachlorocyclohexane (Lindane), Dichiaro Diphenyl Trichloroethane (DDT) and related compounds, Dichlorodiphenyldichloroethylene (DDE) and Dichlorodiphenyldich loroethane (DOD), Cyclodienes (Aldrin, Heptachlor, and others), and Mirex and Chlordecone. The ability of these organochlorine pesticides to persist in the environment made them highly effective and therefore widely used in agricultural insect control efforts during the years 1940s to 1970s. Most organochlorine pesticides were banned for use in the United States by the mid-years 1980s; those that remain in legal use are the active, low concentration ingredients of some home and garden products and some agricultural and environments.

Table 4.9-2, *Chemicals Used On-Site Between 2008 and 2017* provides a summary of the agricultural crops and chemical products used within the proposed Project boundaries between 2008 and 2017.

Table 4.9-2. Chemicals Used On-site Between 2008 and 2017

Restricted Materials Permitted

Product Name	Years Permitted
41-A	2008, 2016

Table 4.9-2. Chemicals Used On-site Between 2008 and 2017

Restricted Materials Permitted

Product Name	Years Permitted
AD-WET	2008, 2011
BRANDT ONSITE	2016
BUCTRIL 4EC HERBICIDE	2008, 2010, 2011
BWC SPREADER 90	2010, 2011, 2012, 2014, 2015
CHLORPYRIFOS 4E AG	2009
CLARITY HERBICIDE	2008
COMITE	2014
DIMETHOATE 2.67 EC	2014
DRIFTSTOP	2010, 2011
FIRST CHOICE NO FOAM A	2009
GRAMOXONE INTEON	2011, 2012
HELENA PENETRATOR	2010
HERBIMAX	2009
HI=WETT SUPER-SPREADER	2016
HONCHO PLUS HERBICIDE	2011, 2016
INTENSITY ONE POST-EMERGENCE GRASS HERBICIDE	2016
LOCK-ON INSECTICIDE	2011, 2012
MAESTRO 4EC (CA)	2015
MIST-CONTROL (REVISE FORMULA)	2013, 2014, 2015
MSO CONCENTRATE WITH LECI-TECH	2011
NO FOAM B	2014
NUFARM RHOMENE MCPA BROADLEAF HERBIDIDE	2008, 2009
ON-SITE	2016
OUTLOOK I HERBICIDE	2016
POAST	2011
PROI(R) H20 HERBICIDE	2011, 2012, 2014, 2015, 2016
PURSUIT HERBICIDE	2009, 2010
QUEST	2010
RAMPART FUNGICIDE	2016
RAPTOR HERBICIDE	2008, 2009, 2010
RIDOMIL GOLD BRAVO SC	2016
RNA CROP OIL CONCENTRATE 1915	2008
ROUNDUP POWERMAX HER	2012, 2013, 2014, 2015, 2016
ROVRAL BRAND 4 FLOWABLE FUNGICIDE	2016
SHARK EW	2009
SILENCER	2013
SIMPLICITY CA	2016
SOURCE 1 NO FOAM B	2009
SURF-90	2016

Table 4.9-2. Chemicals Used On-site Between 2008 and 2017

Restricted Materials Permitted

Product Name	Years Permitted
SURROUND WP CROP PROTECTANT	2016
WARRIOR II WITH ZEON TECHNOLOGY	2011, 2016
VULCAN	2014
YUKON	2014
ZEAL WDG MITICIDE	2016

Source: McIntosh & Associates, Hazardous Materials Evaluation, 2017.

Site Reconnaissance

Hazardous materials and the generation of hazardous waste raise environmental concerns when altering, changing or developing land uses. Hazardous materials can take the form of petroleum products (including oil and gasoline), vehicular fluids, paint, solvents, cleaning fluids and pesticides. By-products generated as a result of activities using hazardous materials (such as dry-cleaning solvents, oil and gasoline) are considered to be hazardous waste. Commercial uses, especially those with underground storage tanks, are most suspected for the contamination of soils and groundwater. With remediation techniques and strict guidelines currently in practice, soil contamination (unlike groundwater contamination) typically does not pose a serious health risk. The Hazardous Materials Evaluation conducted for the proposed Project noted areas of concern, which are discussed below; for further detail refer to Appendix F, *Hazardous Materials Evaluation*, Appendix G, *Petroleum and Natural Gas Pipeline Assessment*, and Appendix N, *Original Technical Studies*.

A site reconnaissance was conducted on July 1, 2008. The objective of the site reconnaissance was to visually inspect, observe and record the current physical conditions of the proposed Project and surroundings. A subsequent site reconnaissance visit was conducted on June 15, 2017 for the proposed Project and the surrounding area. The site was evaluated using a record search and site visit for the purpose of obtaining information to locate recognized environmental conditions (RECs) such as hazardous substances and petroleum products in connection with the proposed Project, including soils, surface waters, and groundwater. Emphasis was placed on the on-site area to determine if visible and recognizable hazardous materials or substances were present.

On-Site Observations

The following are observations from the July 1, 2008 and June 15, 2017 proposed Project site reconnaissance. Photographs of these observations are available in the Hazardous Materials Evaluation (refer to Appendix F and Appendix N).

- The proposed Project was observed to be agricultural land and cultivated and ready for growing crops. Some areas of the Project site were in production and some appeared to be being prepared or were fallow.
- PG&E has single pole mounted transformers at the southwest corner and approximately in the center along the west boundary edge of the proposed Project. Steel irrigation standpipes were along the west boundary edge of the proposed Project site.

- Four PG&E single Pole-Mounted Transformers (PMTs) were observed on-site. A blue label was observed affixed to one of the PMTs, indicating that it is free of electrolytic fluid containing polychlorinated biphenyls (PCBs).
- In 2017, the proposed Project was observed to be agricultural land and alfalfa was the current crop at the time of the 2017 site visit.
- The west irrigation well, powered by a late-model Cummins engine with an associated diesel AST mounted on a flatbed trailer, was observed near the west boundary, one-half mile north of the southwest corner. A 5-gallon bucket containing a small amount of waste oil was observed between the AST and the pump turbine. No oil- or diesel-stained soil was observed about the location. A decomposing, concrete-lined irrigation ditch was observed adjacent to the well location.
- In 2008, the northwest irrigation well, powered by a late-model Cummins engine with an associated diesel AST mounted on a flatbed trailer, was observed near the northwest corner of the Project site. A 2-gallon, capped plastic container of waste oil was observed on the south side of the pump turbine. By 2017, the engine, AST and 2-gallon plastic container had been removed. Well is now idle. No oil- or diesel-stained soil was observed within the vicinity of the idle irrigation well.
- Steel irrigation standpipes were observed along the west boundary.
- An unlined ditch was observed on the south side of the Di Giorgio Road unpaved alignment at the northeast corner of the proposed Project site. The ditch marks the boundary between the proposed Project and the adjacent off-site agricultural land to the north. In 2008, the ditch was identified to contain rip-rap.
- The proposed Project has an electrically operated domestic water well with associated pressure and a storage tank on the north side of the easternmost portion of the Project site. There is one pole mounted electrical transformer located off-site and to the north of the domestic water well (4) PMT.
- A PG&E Company marker indicating the presence of a natural gas pipeline no. L-300B was observed along the west boundary.
- An off-site PG&E, South Union Avenue natural gas meter and regulation Station 269.45-B, within the chain link fence and gravel surface located at the northwest corner of South Union Avenue and Mugsy Avenue, approximately 1,333 feet north of Houghton Road.
- In the easternmost portion of the Project site, an electrically-operated domestic well with associated pressure and storage tanks was observed at the north boundary. A steel shop building fixed to a concrete foundation with a floor area of 3,840 square feet was observed south of the domestic well. Two transformers, an inoperable electrical switch panel, and a cylinder-shaped, propane AST were observed near the northeast corner of the building in 2008. Propane service lines were observed on the east side of the building. An open canopied carport, out-of-service electrical panel/meter, and one pole mounted electrical transformer located on the north side at the easternmost portion of the proposed Project.

- At the Houghton Road / Chevalier Road intersection at the proposed Project, adjacent to the tail water booster pump, brushy retention basin, wooden beehives and one pole mounted electrical transformer. The wooden beehives were observed on the north side of a dry, brushy tailwater pit located in the south portion of the Project site. An irrigation riser was observed at the west end of the tailwater pit.
- A dry tailwater pit was observed in the southwest corner of the easternmost portion of the Project site.
- An out-of-service electrical turbine for a well booster pump was observed on the west slope of the dry, brushy tailwater pit.
- Two older transformers, with an associated out-of-service electrical panel and meter, were observed west of the tailwater pit.
- Higgins Auto Wrecking, Inc. is located at 12825 South Union Avenue, adjacent to the proposed Project at the southeast corner of the Project site at the intersection of South Union Avenue and Houghton Road.
- Old tire, debris and palm fronds, and row of palm trees are along the east edge of the Project site and South Union Avenue.
- The adjacent property along South Union Avenue and the east edge of the proposed Project site have rural residential units with corrals and equestrian facilities.

Off-Site Observations

The following are observations for the properties surrounding the proposed Project. Observations are from both the July 1, 2008 and June 15, 2017 site reconnaissance's. Photographs of these observations are available in the Hazardous Materials Evaluation (refer to Appendix F and Appendix N).

- Agricultural Land and rural residential with corrals and equestrian facilities, and mobile homes along South Union Avenue and on the northeast, east and southeast adjacent to the proposed project. There is an automobile wrecking yard (Higgins Auto Wrecking, 12825 South Union Avenue) located adjacent to the southeast portion of the proposed Project.
- Approximately ¼-mile southeast of the steel shop building, a fenced, off-site PG&E natural gas facility with a gravel surface was observed at South Union Avenue, adjacent to the southeast corner of the easternmost portion of the Project site.
- A fenced PG&E natural gas valve station no. 269B was observed within an unpaved road easement along the south boundary of the easternmost portion of the Project site.
- An off-site irrigation well was observed immediately east of the northeast corner of the Project site.

On-Site Hazards of Potential Concern

Pole Mounted Electrical Transformers

There are four pole mounted electrical transformer that are located on the proposed Project site, and two addition pole mounted electrical transformers are adjacent to the proposed project. The ground

surface below each pole mounted electrical transformer displayed no evidence of discoloration from fluid leakage.

PG&E is the owner of the PMTs. Mr. Mark Maytubby of PG&E reported that PMTs installed subsequent to 1990 likely did not contain polychlorinated biphenyl (PCB) insulating fluids. PMTs labeled with blue "non-PCB" stickers do not contain PCB fluids. Based on the visual absence of apparent unauthorized releases of insulating fluids from the on-site PMTs during the site reconnaissance activities, the on-site PMTs are not currently anticipated to pose adverse impacts. PG&E should be contacted regarding the disposition of these PMTs prior to development of the Project site. The electrical transformers located within the Project site are summarized in Table 4.9-3 *Electrical Transformers On-Site*.

Table 4.9-3. Electrical Transformers On-Site

Location	Number of *PMTs	*PG&E Power Rating	Year Installed
PMT– (1) - Southwest corner of the proposed project on the north side of the Houghton Road overpass.	1	15 *KvA [1]	1990
PMT– (2) - Along the west boundary adjacent to the overhead electric freeway message sign.	1	15 *KvA [1]	1994
PMT– (3) – Off–site - Adjacent to the Northeast corner of the proposed project. Blue label affixed to the transformer, indicating that it is free of electrolytic fluid containing *PCBs.	1	150 *KvA [3]	1999 [B]
PMT– (4) – Off-site – North of the electrically operated domestic water well and storage tank	1	15 *KvA [1]	2007 [B]
PMT– (5) - Located north of the Northeast corner of steel shop building on the proposed project	2	15 *KvA [1] 25 *KvA [1]	1991 1976
PMT– (6) - North of Houghton Road on the proposed project and adjacent to the tail water booster pump and brushy retention basin	1	10 *KvA [1] 10 *KvA [1]	1986 1986

Source: McIntosh & Associates, 2017.

[1] Single-Phase Transformer

[3] Three-Phase Transformer

[B] Blue sticker indicates transformer is confirmed PCB-free–*KvA - Kilovolt-Amperes

–PG&E - Pacific Gas and Electric Company

*PMTs – Pole Mounted Transformers

*PCBs – Polychlorinated Biphenyls

Pacific Gas and Electric Company Subsurface Pipelines

PG&E 34-inch diameter active natural gas transmission pipeline (Line 300-B) underlies the proposed project. The 34-inch diameter pipeline external coating includes primer, paint, two coats of asphalt, and two layers of felt. The depth of the pipeline is estimated at 36 inches to 60 inches below surface which allows the surface farmer to shallow plow and disc the soil above the pipeline a reasonable amount without endangering the pipeline. The natural gas transmission pipeline maximum operating pressure is approximately 700 pounds per square inch gauge (psig). The natural gas transmission pipeline traverses from SR-99 in the northwest to the south line bordering the easternmost portion of the proposed Project. The natural gas transmission pipeline then traverses due east for approximately 0.25 mile passing through the off-site PG&E (South Union Avenue natural gas meter and regulation Station 269.45-B), located at the northwest corner of South Union Avenue and Mugsy Avenue, which is located 1,333 feet north of Houghton Road.

PG&E operates a 6-inch diameter steel natural gas distribution pipeline operating at a maximum pressure of 60 psig parallels the west right-of-way of South Union Avenue, a 2-inch plastic distribution pipeline operating at a maximum pressure of 60 psig parallels the east right-of-way of South Union Avenue, and a 3-inch distribution pipeline operating at a maximum pressure of 60 psig parallels the north right-of-way of Houghton Road. Only the 6-inch pipeline has a segment adjacent to the proposed Project, which will require street improvements above the pipeline. The pipelines locate on-site are shown in Table 4.9-4, *Pipelines On-Site*.

Table 4.9-4. Pipelines On-Site

Pipeline Identifier	Diameter Pipeline	Year Installed	Operating Pressure Pounds Per Square Inch
(PG&E*) Natural Gas Transmission Pipeline (Line 300-B) underlies the proposed project	34 Inches	1950	700
(PG&E*) Natural Gas Distribution Pipeline traverses north to south along the west side of South Union Avenue right-a-way	6 Inches	Not available	60

Agricultural Activities

The Project site has been in agricultural production since the 1940s. The Agriculture Commissioner records revealed that herbicides, insecticides, pesticides and other chemicals were used on the proposed Project area. The years of agricultural activity conducted on the Project site has included the application of pesticides, herbicides and associated metals, which may be present in near surface soils at residual concentrations of concern. However, it is not known if environmentally-persistent pesticides and herbicides were applied to the proposed Project site.

Asbestos Containing Materials

It is possible that asbestos-containing materials could be present in subsurface concrete irrigation (transite) pipe on the site. Concrete pipe was documented in information obtained from the Kern County Assessor-Recorder's Office.

Oilfield Activities

DOGGR online website records and the Wildcat Map W4-1 identified that one exploration oil well was drilled near the north boundary of the proposed Project. The Big McKittrick Oil Company drilled one exploration well "Sea Cliff-Houghton", Well Number 1, and American Petroleum Institute (API) Number 02932362 on October 31, 1934, which was drilled to a depth of 6,756 feet. The well is east of present SR-99, along Di Giorgio Road and along the north portion of the proposed project. The well failed to produce oil or gas and was subsequently abandoned in October 9, 1935 (McIntosh & Associates 2017).

Water Wells

Two irrigation wells are located on-site. The first irrigation well is located in the western portion of the Project site and is identified as well no. 31S28E-7P1. The second irrigation well is located in the northwestern portion of the site and is identified as well no. 31S28E-7D1. These wells were confirmed during the site reconnaissance. Well no. 31S28E-7P1 is powered by late-model Cummins engine with

an associated diesel AST mounted on a flatbed trailer. Waste oil containers were observed between the AST and the pump turbine at this location in 2008, but removed since. The Cummins engine at well no. 31S28E-7D1 has been removed, and the well is now idle. Waste oil containers were observed on the south side of the pump turbine at this well location in 2008, but removed since.

As discussed previously, in the fall of 2006, petroleum-stained soil was removed from each well irrigation location and transported to the McKittrick Waste Site in western Kern County. No oil- or diesel-stained soil was observed at either well location. The wells would need to be properly abandoned per KCEHS standards prior to development. If the wells are not used in the planned development, they should be destroyed in accordance with California SWR and KCEHS requirements.

4.9.3 Regulatory Setting

Federal

U.S. Environmental Protection Agency (USEPA)

The USEPA was established in 1970 to consolidate in one agency a variety of Federal research, monitoring, standard-setting, and enforcement activities to ensure environmental protection. The USEPA's mission is to protect human health and to safeguard the natural environment - air, water, and land - upon which life depends. The USEPA works to develop and enforce regulations that implement environmental laws enacted by Congress, is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance. Where national standards are not met, the USEPA can issue sanctions and take other steps to assist the states and tribes in reaching the desired levels of environmental quality.

Federal Toxic Substances Control Act/Resource Conservation and Recovery Act (RCRA)/Hazardous and Solid Waste Act (HSWA)

The Federal Toxic Substances Control Act (1976) and the RCRA of 1976 established a program administered by the USEPA for the regulation of the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was amended in 1984 by the HSWA, which affirmed and extended the “cradle to grave” system of regulating hazardous wastes.

Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act (CERCLA)

CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law (U.S. Code Title 42, Chapter 103) provides broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA establishes requirements concerning closed and abandoned hazardous waste sites; provides for liability of persons responsible for releases of hazardous waste at these sites; and, establishes a trust fund to provide for cleanup when no responsible party can be identified. CERCLA also enables

the revision of the National Contingency Plan (NCP). The NCP (Title 40, Code of Federal Regulation [CFR], Part 300) provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, and/or contaminants. The NCP also established the National Priorities List (NPL). CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) on October 17, 1986.

Clean Water Act (CWA)/Spill, Prevention, Control, and Countermeasure (SPCC) Rule

The CWA (33 U.S.C. Section 1251 et seq., formally the Federal Water Pollution Control Act of 1972), was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. As part of the CWA, the USEPA oversees and enforces the Oil Pollution Prevention regulation contained in Title 40 of the CFR, Part 112 (Title 40 CFR, Part 112), which is often referred to as the "SPCC rule" because the regulations describe the requirements for facilities to prepare, amend, and implement SPCC plans. A facility is subject to SPCC regulations if a single oil storage tank has a capacity greater than 660 gallons, or the total above ground oil storage capacity exceeds 1,320 gallons, or the underground oil storage capacity exceeds 42,000 gallons, and if, due to its location, the facility could reasonably be expected to discharge oil into or upon the "navigable waters" of the U.S.

Other Federal regulations overseen by the USEPA relevant to hazardous materials and environmental contamination include Title 40 CFR Chapter 1, Subchapter D – Water Programs and Subchapter I – Solid Wastes. Title 40 CFR Chapter 1, Subchapter D, Parts 116 and 117 designate hazardous substances under the CWA. Title 40 CFR Part 116 sets forth a determination of the reportable quantity for each substance that is designated as hazardous. Title 40 CFR Part 117 applies to quantities of designated substances equal to or greater than the reportable quantities that may be discharged into waters of the U.S.

Occupational Safety and Health Administration (OSHA)

OSHA's mission is to ensure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health. OSHA staff establishes and enforces protective standards and reaches out to employers and employees through technical assistance and consultation programs. OSHA standards are listed in Title 29 CFR Part 1910.

National Weather Service (NWS)

Under extreme fire weather conditions, the NWS issues Red Flag Warnings for all affected areas. A Red Flag Warning means that any ignition could result in a large-scale damaging wildfire. The NWS region encompassed by the project is the San Joaquin Valley/Hanford region. Red Flag Warning criteria for are as follows: the area contains dry fuels, the National Fire Danger Rating System is high to extreme, and the following forecast weather parameters are: 1) relative humidity is 25 percent or less; 2) a sustained wind average of 15 mph or greater; and 3) a temperature of more than 75 degrees Fahrenheit (°F) (NWS, 2014).

Transportation Emergency Preparedness Program

The U.S. Department of Energy (DOE) Office of Environmental Management implements the Transportation Emergency Preparedness Program (TEPP) through the Office of Transportation. TEPP integrates a basic approach to transportation emergency planning and preparedness activities under a single program with the goal to ensure DOE, its operating contractors, and state, tribal, and local emergency responders are prepared to respond promptly, efficiently, and effectively to accidents involving DOE shipments of radioactive material. The TEPP mission is to ensure that federal, state, tribal, and local responders have access to the plans, training, and technical assistance necessary to safely, efficiently, and effectively respond to transportation accidents involving DOE-owned radioactive materials. To accomplish this mission, a suite of tools has been developed to aid the response jurisdictions in their readiness activities.

State

Division of Oil, Gas and Geothermal Resources (DOGGR)

The DOGGR is the State agency responsible for supervising the drilling, operation, maintenance, plugging and abandonment of oil, gas and geothermal wells. DOGGR's regulatory program promotes the wise development of oil, natural gas and geothermal resources in California through sound engineering practices, prevention of pollution and ensurance of public safety. To implement this program, DOGGR recommends avoidance of building over or near plugged and abandoned wells, or the replugging of wells to current DOGGR standards.

Department of Toxic Substances Control (DTSC)

The Department of Toxic Substances Control (DTSC) is responsible for restoration, protection and enhancement of the environment; ensuring public health, environmental quality and economic vitality through regulating hazardous waste; conducting and overseeing cleanups; and developing and promoting pollution prevention. DTSC implements programs that oversee cleanups, prevent releases by ensuring waste is properly generated, handled, transported, stored and disposed of; enforcing laws; promoting pollution reduction; encouraging recycling and reuse; conducted toxicological evaluations; and involving the public in decisions. DTSC also oversees the siting and cleanup of schools.

DTSC maintains the CORTESE List for use by State and local agencies to provide information about hazardous release sites. This list includes the Site Mitigation and Brownfields Reuse Program Database (CalSites).

California Environmental Protection Agency (Cal/EPA)

The Cal/EPA was created in 1991, which unified California's environmental authority in a single cabinet-level agency and brought the California Air Resources Board (CARB), State Water Resources Control Board (SWRCB), Regional Water Quality Control Boards (RWQCBs), California Department of Resources Recycling and Recovery (CalRecycle) - formerly the Integrated Waste Management Board (IWMB), DTSC, Office of Environmental Health Hazard Assessment (OEHHA), and Department of Pesticide Regulation (DPR) under one agency. These agencies were

placed within the Cal/EPA "umbrella" for the protection of human health and the environment and to ensure the coordinated deployment of State resources. Their mission is to restore, protect, and enhance the environment, to ensure public health, environmental quality, and economic vitality.

DTSC is a department of Cal/EPA and is the primary agency in California that regulates hazardous waste, cleans up existing contamination, and looks for ways to reduce the hazardous waste produced in California. DTSC regulates hazardous waste in California primarily under the authority of RCRA and the California Health and Safety Code. Other laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning.

California Office of Emergency Services (OES)

In order to protect the public health and safety and the environment, the California Office of Emergency Services (OES) is responsible for establishing and managing statewide standards for business and area plans relating to the handling and release or threatened release of hazardous materials. Basic information on hazardous materials handled, used, stored, or disposed of (including location, type, quantity, and the health risks) needs to be available to firefighters, public safety officers, and regulatory agencies and needs to be included in business plans in order to prevent or mitigate the damage to the health and safety of persons and the environment from the release or threatened release of these materials into the workplace and environment. These regulations are covered under Chapter 6.95 of the California Health and Safety Code Article 1–Hazardous Materials Release Response and Inventory Program (Sections 25500 to 25520) and Article 2–Hazardous Materials Management (Sections 25531 to 25543.3).

CCR Title 19, Public Safety, Division 2, Office of Emergency Services, Chapter 4–Hazardous Material Release Reporting, Inventory, and Response Plans, Article 4 (Minimum Standards for Business Plans) establishes minimum statewide standards for Hazardous Materials Business Plans (HMBPs). These plans shall include the following: (1) a hazardous material inventory in accordance with Sections 2729.2 to 2729.7; (2) emergency response plans and procedures in accordance with Section 2731; and, (3) training program information in accordance with Section 2732. Business plans contain basic information on the location, type, quantity, and health risks of hazardous materials stored, used, or disposed of in the State. Each business shall prepare a HMBP if that business uses, handles, or stores a hazardous material or an extremely hazardous material in quantities greater than or equal to the following:

- 500 pounds of a solid substance;
- 55 gallons of a liquid;
- 200 cubic feet of compressed gas;
- A hazardous compressed gas in any amount; or,
- Hazardous waste in any quantity.

California Occupational Safety and Health Administration (Cal/OSHA)

Cal/OSHA is the primary agency responsible for worker safety in the handling and use of chemicals in the workplace. Cal/OSHA standards are generally more stringent than Federal regulations. The

employer is required to monitor worker exposure to listed hazardous substances and notify workers of exposure (8 CCR Sections 337-340). The regulations specify requirements for employee training, availability of safety equipment, accident-prevention programs, and hazardous substance exposure warnings.

California Highway Patrol (CHP)

A valid Hazardous Materials Transportation License, issued by the CHP, is required by the laws and regulations of State of California Vehicle Code Section 3200.5 for transportation of either:

- Hazardous materials shipments for which the display of placards is required by State regulations; or,
- Hazardous materials shipments of more than 500 pounds, which would require placards if shipping greater amounts in the same manner.

Additional requirements on the transportation of explosives, inhalation hazards, and radioactive materials are enforced by the CHP under the authority of the State Vehicle Code. Transportation of explosives generally requires consistency with additional rules and regulations for routing, safe stopping distances, and inspection stops (Title 14, CCR, Chapter 6, Article 1, Sections 1150-1152.10). Inhalation hazards face similar, more restrictive rules and regulations (Title 13, CCR, Chapter 6, Article 2.5, Sections 1157-1157.8). Radioactive materials are restricted to specific safe routes for transportation of such materials.

Hazardous Material Business Plan

The State of California requires an owner or operator of a facility or business to complete and submit a Hazardous Material Business Plan (HMBP) to the Kern County Public Health Services Department if the facility or business handles a hazardous material or mixture containing a hazardous material that has a quantity at any one time during the reporting year equal to or greater than: 55 gallons; 500 pounds; 200 cubic feet at standard temperature and pressure for a compressed gas; any amount of hazardous waste; or amounts of radioactive materials requiring an emergency plan pursuant to Parts 30, 40, or 70 of Title 10, Code of Federal Regulations. Lower threshold quantities may be required for acutely hazardous substances. Pursuant to Health and Safety Code Section 25504 (a-c), an HMBP is required to contain detailed information on:

- Hazardous materials at the facility;
- Emergency response plans and procedures in the event of the reportable release or threatened release of a hazardous material; and
- Training for all new employees and annual training, including refresher courses, for all employees in safety procedures in the event of a release or threatened release of a hazardous material.

The intent of the HMBP is to provide basic information necessary for use by first responders in order to: prevent or mitigate damage to the public health and safety and to the environment from a release or threatened release of a hazardous material; and to satisfy federal and State Community Right-to-Know laws.

California Government Code

Government Code Section 65962.5 requires the DTSC, State Department of Health Services, the State Water Resources Control Board and the California Integrated Waste Management Board to assemble and annually update lists of hazardous waste sites and hazardous waste properties within California. The Secretary for Environmental Protection distributes these lists to each city and county where sites on the lists are located. Prior to approval of a development project by a lead agency the applicant shall consult these lists to determine that the project site is not listed.

California Public Resources Code

CEQA statute 21092.6 requires land agencies to consult with the compiled lists discussed above to determine whether a project or alternatives are located on a hazardous waste site.

California Education Code

The California Education Code Section 17213(a)(3) prohibits the approval of a school site if the site "contains one or more pipelines, situated underground or aboveground, which carries hazardous substances, acutely hazardous substances, or hazardous wastes, unless the pipeline is a natural gas line which is used only to supply natural gas to that school or neighborhood."

California Education Code Section 17213.1 requires DTSC to be involved in the environmental review process for the acquisition or construction of a school property utilizing state funding. The responsible school board is required to contract with an environmental assessor to supervise the preparation of a site evaluation to determine the potential for hazards or hazardous materials to exist on or near the site that could affect future staff and students, prior to acquiring a school site.

Petroleum and Natural Gas Pipelines

Pipelines that transport petroleum and natural gas are regulated by the following federal and state agencies:

- US Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety (OPS).
- California Department of Forestry and Fire Protection, Office of the State Fire Marshal (OSFM).

A setback is a minimum distance required by zoning to be maintained between structures, or between structures and property lines. Kern County has not passed a zoning ordinance specifically addressing the setback distance for petroleum and natural gas pipelines. The Kern County Fire Department has not established setbacks from hazardous liquid pipelines to structures (McIntosh & Associates 2017).

The OSFM restricts encroachments into or on hazardous liquid pipeline easements per Informational Bulletin 03-001 (revised March 13, 2017) as follows:

Section 51014.6 of the California Government Code states the following:

a) Effective January 1, 1987, no person, other than the pipeline operator shall do any of the following with respect to any pipeline easement:

   i. Build, erect or create a structure or improvement within the pipeline easement or permit the building, erection or creation thereof.

   ii. Build, erect or create a structure, fence, wall or obstruction adjacent to any pipeline easement which would prevent complete and impaired surface access to the easement, or permit the building, erection or creation thereof.

b) No shrubbery or shielding shall be installed on the pipeline easement which would impair aerial observation of the pipeline easement. This subdivision does not prevent the revegetation of any landscape disturbed within a pipeline easement as a result of construction of the pipeline and does not prevent the holder of the underlying fee interest or the holder's tenant from planting and harvesting seasonal agricultural crops on a pipeline easement.

c) This section does not prohibit a pipeline operator from performing any necessary activities within a pipeline easement, including, but not limited to the construction, replacement, relocation, repair or operation of the pipeline.

It is the position of the State Fire Marshal that nothing shall encroach into or upon the pipeline easement, which would not impede the pipeline operator from complete and unobstructed surface access along the pipeline ROW, nor shall there by any obstructions which would shield the pipeline ROW from observation. In the interest of public safety and the protection of the environment, it is imperative that the pipeline operator visually assess conditions along the easement to ensure the integrity of the pipeline.

It is the responsibility of the pipeline operator to ensure unimpeded surface access and retain the ability to physically observe all portions of their pipeline rights-of-way. In cases where this is not possible, the pipeline operator shall inform the State Fire Marshall. The State Fire Marshall shall, in conjunction with the pipeline operator, resolve the issue.

The pipeline corridor is the pathway through the jurisdiction (city or county) in which the pipelines and facilities of a pipeline operator are located, including public rights-of-way and easements over and through public or private property. The setback distance shall be measured from the nearest edge of the pipeline corridor.

Pipeline Marker Signs

Transmission and distribution pipelines located both on-site and off-site are recognized by marker signs installed along their respective routes. The signs indicate the approximate location of the pipeline corridor and provide the name of the pipeline company of ownership and toll-free telephone number where the company can be reached in the event of a suspected or witnessed pipeline emergency. It is against the law for any person to willfully and knowingly deface, damage, remove, or destroy any pipeline marker sign or ROW marker. It should be noted that markers placed near

pipelines may not directly overlie them, and a pipeline may not follow a straight line between each marker.

Truck Routes

Currently, Federal regulations allow transportation of hazardous radioactive materials on all interstate highways. Trucks traveling from the highway to sites that use such materials (such as hospitals or nuclear power plants) are allowed to use the most direct route. The California Highway Patrol (CHP) has adopted Interstate 5 (I-5) as a truck route for transporting hazardous radioactive materials.

The Circulation Element of the Metropolitan Bakersfield General Plan designates specific roadways on which trucks may travel within and through the Metropolitan Bakersfield area. These routes direct trucks away from streets that are inappropriate or inadequate to serve substantial truck traffic. Trucks are allowed to access locations on local streets for site deliveries (e.g., goods delivery or moving cars); however, they must take the most direct route to and from the designated truck routes. None of the streets surrounding the proposed Project site are identified as a truck route within the Metropolitan Bakersfield General Plan Circulation Element.

Local

Metropolitan Bakersfield General Plan (MBGP)

The Metropolitan Bakersfield General Plan cites policies to provide decision-makers with long-range guidance affecting the future character of the Metropolitan Bakersfield planning area. The elements within the Metropolitan Bakersfield General Plan provide goals, policies and implementation measures in order to reduce impacts related to public safety. Applicable hazards/hazardous materials goals and policies relative to the proposed Project are listed in Table 4.9-5, *Metropolitan Bakersfield General Plan Goals and Policies for Hazards/Hazardous Materials*, below.

Table 4.9-5. Metropolitan Bakersfield General Plan Goals and Policies for Hazards/Hazardous Materials

Goals and Policies: Public Safety Element
Goal #1: Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry.
Goal #2: Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development of metropolitan police and fire facilities and services.
Goal #3: Provide for the coordinated planning and development of service areas for police and fire protection to ensure an equitable burden of responsibility between County and City in Metropolitan Bakersfield.
Policy #4: Monitor, enforce and update as appropriate all emergency plans as needs and conditions in the Planning area change, including the California Earthquake Response Plan, the Kern County Evacuation Plan, and the City of Bakersfield Disaster Plan.
Policy #6: Promote fire prevention methods to reduce service protection costs and costs to the taxpayer.
Policy #7: Enforce ordinances regulating the use/manufacture/sale/transport/disposal of hazardous substances and require compliance with state and federal laws regulating such substances.

Table 4.9-5. Metropolitan Bakersfield General Plan Goals and Policies for Hazards/Hazardous Materials
Goals and Policies: Public Safety Element
Policy #8: The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste.
Policy #9: Restrict, after appropriate public hearings, the use of fire-prone building materials in areas defined by the fire services as presenting high-conflagration risk.

Kern County and Incorporated Cities Hazardous Waste Management Plan (HWMP)

In response to the growing concern regarding hazardous waste management, State Assembly Bill (AB) 2948 enacted legislation authorizing local government to develop comprehensive hazardous waste management plans (HWMP). The intent of each plan is to assure that adequate treatment and disposal capacity is available to manage the hazardous wastes generated within this jurisdiction. The Kern County and Incorporated Cities HWMP was first adopted by Kern County and each incorporated city before September 1988 and was subsequently approved by the State Department of Health Services. The HWMP is incorporated by reference into both the Metropolitan Bakersfield General Plan, as permitted by Health and Safety Code Section 25135.7(b), and thus must be consistent with all other aspects of both general plans.

The HWMP provides policy direction and action programs to address current and future hazardous waste management issues that require local responsibility and involvement in Kern County. In addition, the HWMP discusses hazardous waste issues and analyzes current and future waste generation in the incorporated cities, County and State and Federal lands.

The purpose of the HWMP is to coordinate local implementation of a regional action to effect comprehensive hazardous waste management throughout Kern County. The action program focuses on development of programs to equitably site needed hazardous waste management facilities; to promote on-site source reduction, treatment and recycling; and to provide for the collection and treatment of small quantity hazardous water generators.

Prior to or during construction, the remediation of hazardous materials within the proposed Project site will require the removal of hazardous materials from the Project site. Although none of the surrounding roads are identified as truck routes, pursuant to the Metropolitan Bakersfield General Plan Circulation Element, trucks hauling the hazardous materials away from the site are allowed to use the surrounding roads as long as they utilize the most direct route to designated truck routes.

Kern County Emergency Health and Safety Division

The Kern County Emergency Health and Safety Division (KCEHSD) provides oversight for locations within county jurisdiction that pose a threat to human health and safety.

Kern County Wildland Fire Management Plan

The Kern County Wildland Fire Management Plan documents the assessment of wildland fire situations throughout the SRAs within the County. The Kern County Fire Department Wildland Fire Management Plan provides for systematically assessing the existing levels of wildland protection services and identifying high-risk and high-value areas that are potential locations for costly and

damaging wildfires. The goal of the plan is to reduce costs and losses from wildfire by protecting assets at risk through focused pre-fire management prescriptions and increasing initial attack success. Based on this assessment, preventive measures are implemented, including the creation of wildfire protection zones.

Kern County Building and Construction Ordinance (Title 17 of the Ordinance Code of Kern County)

Chapter 17.32 Fire Code

> Kern County has adopted, by reference, portions of the California Building Standards Code and the International Fire Code, with modifications and amendments. The purpose of this code is to prescribe the minimum requirements necessary to establish a reasonable level of fire safety to protect life and property from hazards created by fire, explosion, and dangerous conditions.
>
> The Kern County Fire Code defines a hazardous fire area as any land that is covered with grass, grain, brush, or forest and situated (e.g., in an inaccessible location) so that a fire originating upon such land would present an abnormally difficult job of suppression and would result in great and unusual damage through fire or the resulting erosion.

Chapter 17.34 Wildland-Urban Interface Code

> Kern County has adopted, by reference the Urban Wildland Interface Code, published by the International Fire Code Institute, with modifications and amendments. The purpose of this code is to safeguard life and property and maintain public welfare to a reasonable degree by addressing hazards related to wildland fire exposures and fire exposures from adjacent structures, and to prevent structure fires from spreading to wildland fuels.

Kern County Operational Area Hazardous Materials Area Plan

The Hazardous Materials Area Plan identifies local, State, and Federal responsibilities during incidents involving the release or threatened release of hazardous substances. According to the Kern County Operational Area Hazardous Materials Area Plan (Kern County Public Health Services Department, 2011):

> [H]azardous materials emergencies are the result of threatened releases, highway accidents, clandestine drug laboratories, train derailments, pipeline transportation accidents, pesticide drift incidents, or related fire and/or spills at fixed facilities.

4.9.4 Impacts and Mitigation Measures

Methodology

The potential impacts associated with the proposed Project are evaluated on a qualitative basis through a comparison of existing conditions within the proposed Project site and the anticipated Project effects. The potential for impacts to hazards/hazardous materials would occur if the effect described under the criteria below occurs. The evaluation of Project impacts is based on professional judgment, analysis of the County's hazards/hazardous materials policies, and the significance criteria established by Appendix G of the State CEQA Guidelines, which the County has determined to be appropriate criteria for this Recirculated Draft EIR.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accidental conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or handle hazardous or acutely hazardous, substances, or waste within one-quarter mile of an existing or proposed school;
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment;
- For a project located within the adopted Kern County Airport Land Use Compatibility Plan results in a safety hazard for people residing or working in the project area;
- For a project within the vicinity of a private airstrip, results in a safety hazard for people residing or working in the project area;
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan;
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

The analysis of the existing environment and the impact analysis indicate that this proposed Project could result in a significant environmental impact if it would result in a release of hazardous materials that would, if not mitigated, adversely affect the public health and safety of future residents, surrounding residents and workers.

Project Impacts

Impact 4.9-1: The Project Would Create in a Significant Hazard to the Public or the Environment Through the Routine Transport, Use or Disposal of Hazardous Materials.

The Kern County and Incorporated Cities Hazardous Waste Management Plan (HWMP) lists goals and policies regarding the transport of hazardous wastes. The HWMP recognizes that the transportation of hazardous waste on roads poses a short-term threat to public health; of prime concern is the safety of the transportation system for hazardous waste, especially extremely hazardous waste, in and throughout Kern County. The HWMP seeks to establish State and federally maintained roads as candidate Commercial Hazardous Waste Shipping Routes in and through the County (except those to collect locally generated hazardous wastes). The current Metropolitan Bakersfield General Plan does not identify designated hazardous material shipping routes. The Kern County General Plan shows the nearest hazardous materials shipping routes to the Project site as the following: SR-99 (adjacent to the western proposed Project boundary); Interstate (I) 5 (approximately 7.5 miles west), and SR-58 (approximately 7.5 miles north).

The proposed Project would introduce approximately 4,613,004 square feet of light and service industrial, and general commercial and highway commercial land uses, which could include warehousing, distribution, and retail showroom uses. Industrial uses often involve the transport of hazardous materials. Because the proposed Project is located adjacent to SR-99, potential delivery trucks would transport materials and chemicals along a County designated hazardous materials shipping route. In addition, the proposed Project is located in an area that is currently surrounded by agricultural and some industrial (i.e., automobile wrecking yard) land uses. The number of deliveries in the area would increase; however, there is already the presence of hazardous material transport within the vicinity of the proposed Project. While the risk of exposure to hazardous materials cannot be fully eliminated, measures can be implemented to maintain risks at acceptable levels. As described above, several federal, state, and local regulatory agencies oversee hazardous materials transportation. Oversight by the appropriate agencies and compliance with applicable regulations are considered adequate to offset the negative effects related to the transport of hazardous materials within the proposed Project area.

The proposed Project would include a private package sewer treatment plant to provide sewer services for the Project site. Sewer System for the proposed Project area has never been provided, and currently the neighboring residential and commercial properties are served by individual and privately owned septic systems. The developer would be required to construct a new wastewater plant facility for the proposed Project that could cause significant environmental effects. Based on wastewater generation rate for general commercial and industrial development uses utilized by the County of Kern, the proposed project would result in the generation of a normal, unpeaked flow of approximately 1.46 million gallons per day, with a peak flow maximum generation rate of 2.91 million gallons per day of wastewater. The new wastewater package plant facility would be constructed according to State specifications and would be operated in such a way as to not contaminate the underlying unconfined aquifer, and not cause a nuisance to existing agricultural land, neighboring residential and commercial properties.

In accordance with the California Health and Safety Code and Kern County regulations, the Project applicant would be required to prepare and submit a HMBP for any uses that would require the use

and storage of hazardous materials (such as a wastewater treatment facility, water treatment facility, maintenance facilities, emergency response services).

Compliance with state and federal law, and the Metropolitan Bakersfield General Plan, as well as the implementation of mitigation measures would ensure impacts associated with routine transport, use, or disposal of hazardous waste during construction or operation of the proposed Project are reduced to less than significant levels.

Mitigation Measures

MM 4.9-1: **Hazardous Materials Business Plan.** During the life of the project, including decommissioning, the project operator shall prepare and maintain a Hazardous Materials Business Plan (HMBP), as applicable, pursuant to Article 1 and Article 2 of California Health and Safety Code 6.95 and in accordance with Kern County Ordinance Code 8.04.030, by submitting all the required information to the California Environmental Reporting System (CERS) at http://cers.calepa.ca.gov/ for review and approval. The HMBP shall:

- Delineate hazardous material and hazardous waste storage areas
- Describe proper handling, storage, transport, and disposal techniques
- Describe methods to be used to avoid spills and minimize impacts in the event of a spill
- Describe procedures for handling and disposing of unanticipated hazardous materials encountered during construction
- Establish public and agency notification procedures for spills and other emergencies including fires.
- Include procedures to avoid or minimize dust from existing residual pesticides and herbicides that may be present on the site

The project proponent shall ensure that all contractors working on the project are familiar with the facility's HMBP as well as ensure that one copy is available at the project site at all times. In addition, a copy of the approved HMBP from CERS shall be submitted to the Kern County Planning and Natural Resources Department for inclusion in the projects permanent record.

MM 4.9-2: **Spill Prevention Control and Countermeasures (SPCC) Response Plan.** Prior to the issuance of a certificate of occupancy for an individual parcel project which exceeds any of the thresholds established by Title 40, Code of Federal Regulations, Part 112, related to facilities requiring a Spill Prevention Control and Countermeasures (SPCC) Response Plan, the individual parcel proponent shall prepare and submit an SPCC Response Plan to the Kern County Public Health Services Department/Environmental Health Division and the California Department of Water Resources. The individual parcel proponent shall ensure the project is

implemented in compliance with the approved Spill Prevention Control and Countermeasures Response Plan.

~~**MM 4.9-3: Hazardous Waste Exclusion/Business Plan.** The individual parcel proponent shall continuously comply with the following:~~

~~1. All hazardous wastes shall be stored and properly managed in accordance with the approved Kern County Waste Management Department Hazardous Waste Exclusion Plan and Hazardous Materials Business Plan, until transported for proper disposal.~~

~~2. A copy of the Hazardous Waste Exclusion Plan shall be submitted to the Kern County Planning and Natural Resources Department.~~

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.9-2: The Project Would Create a Significant Hazard to the Public or the Environment Through Reasonably Foreseeable Upset and Accidental Conditions Involving the Release of Hazardous Materials into the Environment.

Project construction activities are not anticipated to result in a significant release of hazardous materials into the environment. However, during construction, there is a possibility of accidental release of hazardous substances, such as spilling petroleum-based fuels used for construction equipment. The level of risk associated with the accidental release of hazardous substances is not considered significant because of the small volume and low concentration of hazardous materials utilized during the construction phases. The Project contractor would be required to use standard construction controls and safety procedures that would avoid and minimize the potential for accidental release of such substances into the environment. Standard construction practices would be observed such that any materials released would be appropriately contained and remediated as required by local, State, and Federal law.

Light and medium industrial uses may result in increased risks from hazardous materials. These types of uses may allow the installations of ASTs and USTs utilized for fueling vehicles and backup generators (this short list is not all-inclusive). These uses could potentially result in environmental impacts from hazardous materials and/or substances; however, various government entities require permits for the hazardous materials concerns. These various permits require controls that would reduce the potential impacts to a less than significant level. The proposed Project would comply with all applicable rules and regulations dealing with hazardous materials and/or substances from the following agencies: SJVAPCD, California Regional Water Quality Control Board (CRWQCB), California Integrated Waste Management Board, DTSC, California Office of Environmental Health Hazard Assessment, KCDEHS, and the Kern County Fire Department.

As noted above, a physical inspection of the proposed Project site, as part of the Hazardous Materials Evaluation, revealed evidence of hazardous materials and waste present within the proposed Project site. The evidence consists of abandoned petroleum prospect well, use of pesticides and herbicides,

PMTs, the potential for asbestos containing materials, high-pressure pipelines within and adjacent to the proposed Project site, and water wells.

Local regulatory agency records were reviewed to help determine whether hazardous materials have been handled, stored or generated on the proposed Project site and/or the adjacent properties and businesses. In the fall of 2006, petroleum-stained soil was removed from each irrigation well location and transported to the McKittrick Waste Site in western Kern County. The remediation report for the proposed Project site was approved by KCEHSD and a closure letter was issued on December 1, 1006. No other hazardous materials records related to the Project site were found.

As discussed above, four PMTs were observed within the proposed Project boundaries. The PMTs were observed to be in good condition and no apparent corrosion was noted. The ground surface below each PMT displayed no evidence of discoloration from fluid leakage. PG&E is the owner of the PMTs. According to PG&E, PMTs installed after 1990 likely did not contain PCB insulating fluids. PMTs labeled with blue "non-PCB" stickers do not contain PCB fluids. Based on the visual absence of apparent unauthorized releases of insulating fluids, the on-site PMTs are not currently anticipated to pose adverse impacts.

PG&E maintains two natural gas pipelines, a 34-inch pipeline and 6-inch pipeline within areas that would be improved as part of the proposed Project. The 34-inch pipeline is one of many pipelines monitored for leaks daily by aircraft. The rupture of natural gas pipelines would result in the release of petroleum products to the Project site. A pipeline rupture could result in environmental contamination and human health effects in the rural-residential areas adjacent to the proposed Project site. For safety reasons, State regulations prohibit the construction of any structures directly over the pipeline and a right-of-way (ROW) is usually established. The width of the ROW is negotiated between the property owner and the pipeline operator and usually ranges between 20 and 100 feet. Types of shrubs may be restricted; specifically, structures and large trees cannot be located over pipelines. With the compliance with Federal, State and applicable local regulations, and implementation of mitigation measures, impacts from potential health risks or damaging incidents associated with the pipelines would be reduced to a level of less than significant.

The potential impacts resulting from the operation of the existing pipeline are reduced with the use of pipeline markers, signs and underground warning tape and further reduced by enhanced safety features, including intrusion detection and leak monitoring system (central control room via supervisory control and data acquisition to detect third party dig-in), automatic and remote-controlled shut-off valves. Given the design of the pipeline, recently imposed integrity management protocol for all utility pipeline operators, and pipeline monitoring and reporting requirements, the potential impacts associated with reasonably foreseeable upset and accident conditions during the operation of the existing pipelines within the proposed project would be less than significant with the implementation of mitigation measures.

According to the Hazardous Materials Evaluation, one previously abandoned oil prospect well is present within the proposed Project site. Public Resources Code Section 3208.1 authorizes the State Oil and Gas Supervisor to order the reabandonment of a previously abandoned well when construction of any structure over or in the proximity of the well could result in a hazard. The well was filled only with drilling mud prior to abandonment in 1935, therefore, the DOGGR will require

that the well be reabandoned to current standards prior to grading and development of the proposed Project. DOGGR will furnish the necessary closure specifications. Adherence to closure provisions would serve to reduce impacts to less than significant levels.

One active diesel powered and one idle irrigation well are located within the proposed Project boundary. In 2006, petroleum stained soil was removed from each well irrigation location and transported to the McKittrick Waste Site in western Kern County. No diesel or waste-oil staining was observed on the ground surface at the time of the site reconnaissance. One well may be expected to supply water for dust suppression during construction of the proposed Project. If the wells are not to be used for irrigation or industrial purposes, they should be destroyed in accordance with California Well Standards as governed by the California Department of Water Resources, and permit requirements of the KCEHSD. The wells would have a less than significant impact on the proposed Project.

A domestic well is located north of the modular shop building and should be destroyed in accordance with California Well Standards as governed by the California Department of Water Resources, and permit requirements of the KCEHSD. If it is determined that the well be utilized as a water source, then the well does not need to be destroyed. The well would have a less than significant impact on the proposed Project.

Applications of pesticides and herbicides have been conducted according to RMPs obtained annually from the Kern County Agricultural Commissioner's Office. Agricultural chemicals are typically applied in dilute concentrations, and when used properly, degrade relatively quickly. However, it is not known if environmentally persistent pesticides and herbicides have been applied to the proposed Project in the past. Generally, sampling and analysis of surface soils from properties with similar pesticide and herbicide application histories has typically yielded non-detectable results for analyses of elevated concentrations of environmentally persistent pesticides and/or herbicides. The potential for elevated concentrations of environmentally-persistent pesticides and herbicides to exist in the near-surface soils of the proposed Project, which would require regulatory action, is low. Therefore, less than significant impacts would occur.

It is possible that asbestos-containing materials could be present in subsurface concrete irrigation (transite) pipe on-site. Concrete pipe was documented in information obtained from the Kern County Assessor-Recorder's Office. If subsurface concrete irrigation pipe is located on-site, the SJVAPCB shall be contacted for proper disposal procedures and requirements. If any subsurface concrete irrigation pipe is removed from the proposed Project site, it would be removed according to SJVAPCD regulations and would be considered to be a less than significant impact.

If Valley Fever spores occur within the boundaries of the proposed Project, with the absence of mitigation, there is potential for the infection of construction workers and surrounding residents, as well as within the proposed Project area. Mitigation measures designed to reduce the amount of fugitive dust during grading activities would reduce the likelihood of Valley Fever to a less than significant level; (refer to Section 4.3, *Air Quality*). Covering of portions of the Project site with landscaping material and/or with impervious roadway surfaces and buildings would reduce the long-term potential release of Valley Fever spores to a less than significant level.

Due to the scope and nature of the proposed Project, the level of risk associated with hazardous materials on the proposed Project site is considered significant. However, a less than significant impact would occur in this regard after compliance with State and applicable local regulations and the following mitigation measures.

Mitigation Measures

MM 4.9-34: Discovered/Spilled Hazardous Waste Materials. The Project proponent shall continuously comply with the following:

1. If suspect materials or wastes of unknown origin are discovered during construction on the project site, which is thought to include hazardous waste materials the following shall occur:

    a. All work shall immediately stop in the vicinity of the suspected contaminant;

    b. Project Construction Manager shall be notified;

    c. Area(s) shall be secured as directed by the Project Construction Manager;

    d. Notification shall be made to the Kern County Environmental Health Services Division/Hazardous Materials Section for consultation, assessment, and appropriate actions; and,

    e. Copies of all notifications and correspondence shall be submitted to the Kern County Planning and Natural Resources Department.

MM 4.9-45: Hazardous Materials Specialist. Prior to issuance of the grading permit, a qualified hazardous materials specialist shall inspect each power pole on-site with a transformer. Those containing polychlorinated biphenyls shall be removed by the hazardous specialist and disposed of at an appropriate hazardous materials disposal site to the satisfaction of Department of Toxic Substances Control. The hazardous materials specialist shall provide a short report to the Kern County Planning and Natural Resources Department and the Kern County Environmental Health Services Division/Hazardous Materials Section for review and approval.

Prior to construction, Pacific Gas and Electric Company (PG&E) shall be contacted regarding the disposition of pole-mounted transformers. In the event of a future release or leak of insulating fluids from any of the pole-mounted transformers, PG&E shall be contacted for their removal or replacement.

MM 4.9-56: Known/Discovered Well Remediation. Prior to start of construction, the abandoned petroleum prospect well shall be located, exposed, and re-abandoned, if required, to conform to the current abandonment requirements of the California

Department of Conservation, Division of Oil, Gas and Geothermal Resources and the Kern County Department of Environmental Health Services.

MM 4.9-6~~7~~: **Final Maps and Grading Plans, Notes.** The following note shall appear on all final maps and grading plans: "If during grading or construction, any plugged and abandoned or unrecorded wells are uncovered or damaged, the Department of Oil, Gas and Geothermal Resources will be contacted to inspect and approve any remediation required."

MM 4.9-7~~8~~: **Underground Service Alert One-call.** Prior to grading or excavating the Underground Service Alert One-call center shall be contacted at (800) 227-2600. The proposed excavation area shall be delineated with white marking paint or with other suitable markers such as flags or stakes at least two days prior to commencing any excavation work. A "Dig Alert" ticket number would be issued at the time Underground Service Alert is contacted. Excavating is not permitted without this ticket number and is valid for twenty-eight days. Underground Service Alert would notify its member utilities having underground facilities in the area. Underground Service Alert does not notify nonmember utilities or energy companies, or Caltrans.

MM 4.9-8~~9~~: **Ruptured Pipeline Safety.** If a rupturing of a pipeline should occur during excavation and construction activities the Kern County Fire Department and Pacific Gas and Electric Company should be contacted immediately. Natural gas transmission pipeline rupture most often indicates an emergency situation and 9-1-1 should be dialed. If an emergency is not indicated, the Kern County Fire Department-Greenfield Station 52, located at 312 Taft Highway, should be contacted at (661) 834-5144. Non-Emergency telephone numbers for the Kern County Fire Department number (661) 324-6551 and the project proponent shall follow all safety and cleanup regulations.

MM 4.9-9~~10~~: **On-site Water Wells.** If the on-site water wells are not to be used for irrigation or industrial purposes, they shall be destroyed in accordance with California Well Standards as governed by the California Department of Water Resources, and permit requirements of the Kern County Environmental Health Services Division.

MM 4.9-10~~11~~: **Herbicides.** Prior to the issuance of grading or building permits for the project, if herbicides are to be utilized, the contractor or personnel applying herbicides must have the appropriate State and local herbicide applicator licenses and comply with all State and local regulations regarding herbicide use.

1. Herbicides shall be mixed and applied in conformance with the product manufacturer's directions.

2. The herbicide applicator shall be equipped with splash protection clothing and gear, chemical resistant gloves, chemical spill/splash wash supplies, and material safety data sheets for all hazardous materials to be used.

3. To minimize harm to wildlife, vegetation, and waterbodies, herbicides shall not be applied directly to wildlife, products identified as non-toxic to birds and small mammals shall be used if nests or dens are observed.

4. Herbicides shall not be applied if it is raining at the site, rain is imminent, or the target area has puddles or standing water, and shall not be applied when wind velocity exceeds 10 miles per hour.

5. If spray is observed to be drifting to a non-target location, spraying shall be discontinued until conditions causing the drift have been abated.

MM 4.9-11~~12~~: Asbestos Containing Materials. If asbestos containing materials are identified during construction (particularly in the concrete irrigation (transite) pipe located on-site, then the San Joaquin Valley Air Pollution Control District shall be contacted for removal and disposal procedures. These procedures shall be followed in order to eliminate asbestos exposure to construction workers and surrounding workers and residents.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.9-3: The Project Would Emit Hazardous Emissions or Handle Hazardous or Acutely Hazardous, Substances, or Waste Within One-Quarter Mile of an Existing or Proposed School.

Due to the active agricultural uses of the proposed Project site, it is anticipated that pesticides have been used on-site, and that residues remain within the on-site soils. There are no existing schools located within one-quarter mile of the proposed Project. Currently, McKee Middle School and McKee Primary School are located approximately 1.5 miles north of the proposed Project and General Shafter Elementary School is located approximately 1.0 to the southwest. Additionally, the use, storage, and transportation of hazardous materials that would occur as part of construction and operation of the proposed Project would be more than 0.25 miles from these schools, thus potential impacts are considered less than significant in this regard.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.9-4: The Project Would Be Located on a Site That is Included on a List of Hazardous Materials Sites Compiled Pursuant to Government Code Section 65962.5 and, as a Result, Would Create a Significant Hazard to the Public or the Environment.

An EDR, Inc. radius search and written report for the proposed Project site and properties within one mile were completed in July 2008, in conjunction with the Hazardous Materials Evaluation (McIntosh and Associates 2008; refer to Appendix N). The search of Federal, State, and local agencies environmental records found no records for the proposed Project site. Three facilities were identified on one or more of the databases searched for the EDR report. These facilities are listed on the following databases: Solid Waste/Landfill-listed facility; CORTESE, LUST, HIST UST, CA FID UST; and SWEEPS UST. The facilities identified include Lamb Chops, YCT, and Limi Brothers Farm. In addition, five "orphan sites" were identified in the EDR report. "Orphan sites" are sites that the EDR report cannot map due to insufficient information. In addition, the Hazardous Materials Evaluation (McIntosh and Associates 2017; refer to Appendix F) included a more recent record search.

The proposed Project is not included on any hazardous materials sites lists. The proposed project would not create a hazard to the public or environment through the transport, disposal and/or use of hazardous materials, and it would not create a public hazard through emissions of hazardous materials, accidental or otherwise. Impacts are considered less than significant, and mitigation is not required.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.9-5: The Project Would Be Located Within an Within the Adopted Kern County Airport Land Use Compatibility Plan Resulting in a Safety Hazard for People Residing or Working in the Project Area.

The proposed Project site is not located within two miles of a public airport or public use airport as shown in the Kern County Airport Land Use Compatibility Plan (ALUCP).

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.9-6: The Project Would Result in a Safety Hazard for People Residing or Working in the Project Area from a Private Airstrip.

A private airstrip (Costerisan Farms Airport) was located two miles northwest of the proposed Project site; however, this private airstrip is no longer in use (pilotnav 2017). No other private airstrips are within two miles of the proposed Project site. Therefore, this airstrip is not expected to result in a safety hazard for the construction workers and future employees of the proposed Project site. Less than significant impacts are anticipated.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.9-7: The Project Would Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan.

There is no information in the record to date that indicates the proposed Project would interfere with the operation of any roadway, facility, or area that would be used as part of an emergency response plan or emergency evacuation plan. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.9-8: The Project Would Expose People or Structures to a Significant Risk of Loss, Injury or Death Involving Wildland Fires, Including Where Wildlands are Adjacent to Urbanized Areas or Where Residences Are Intermixed with Wildlands.

As discussed in Impact 4.18-1, the proposed Project is not located adjacent to a wildland area. The proposed Project site is located in an area with a mixture of agricultural, industrial, and residential land uses, which are not considered susceptible to wildland fires. Therefore, wildland fires do not have the potential to affect the site and no impacts would occur.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Impacts related to hazardous materials and hazardous substances are considered site-specific and are generally mitigated to less than significant levels on a project-by-project basis. Compliance with Federal, State, and local regulations would ensure that contamination or exposure to hazardous substances is avoided or controlled to minimize the risk to the public on a project-by-project basis, as the cumulative projects are constructed. For the proposed Project, all potential hazards and potentially hazardous materials or situations that could result from release of hazardous substances would be mitigated to less than significant levels following compliance with Federal, State, and local regulations. Therefore, implementation of the proposed Project in conjunction with future projects would result in less than significant cumulative impacts for hazards or hazardous materials.

Mitigation Measures

Implement Mitigation Measures MM 4.9-1 through MM 4.9-12.

Level of Significance after Mitigation

Impacts would be less than significant.

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Section 4.10

Hydrology and Water Quality

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Section 4.10
Hydrology and Water Quality

4.10.1 Introduction

The purpose of this section is to describe the hydrologic and water quality setting of the proposed Project and surrounding area. This section also evaluates the potential impacts the proposed Project will have on water resources. A Water Supply Assessment was prepared by Yarne & Associates in January 2019. See Appendix H, Water Supply Assessment.

4.10.2 Environmental Setting

Climate

The proposed Project lies within the southern Central Valley of California, which has rainy winters and dry summers, characteristic of a Mediterranean climate. The Central Valley has greater temperature extremes than the coastal areas because it is less affected by the moderating influence of the Pacific Ocean.

Ninety percent of annual rainfall in the southern Central Valley occurs during the period between November and April. Infrequent summer thunderstorms and showers from tropical depressions account for the remaining rainfall. Average annual precipitation is about 5.7 inches, which is a relatively small amount. By comparison, Los Angeles County receives an annual average of 14.8 inches, Sacramento receives an average of 17.5 inches per year, and Bishop, which is on the dry eastern side of the Sierra Nevada mountain range (near Death Valley), receives an annual average of 5.4 inches.

Hydrology

Metropolitan Bakersfield, located in a semi-arid region, relies on groundwater, the Kern River and two water importation projects for its water supply for agricultural and municipal usage. The region receives a normal annual precipitation of approximately 5 to 13 inches, which categorizes the area as a desert or steppe; most of the precipitation falls between November and April.

Regional Surface Water Resources

Kern River

The Kern River is the only significant stream in Metropolitan Bakersfield. From an elevation of 775 feet above mean sea level at the mouth of the Kern River Canyon, westward to an elevation of 325 feet at Interstate 5, the Kern River is a unique resource in a desert environment. The river begins on the western flank of Mount Whitney in the southern Sierra Nevada and flows in a southwest direction.

Several minor streams flow into the Kern River, which exists as a contained basin except during high runoff years. The Kern River Basin includes approximately 2,100 square miles of watershed area above Isabella Dam, about 300 square miles of foothill area below the dam, and about 600 square miles of alluvial fan below the mouth of the Kern River Canyon. The basin is fully diverted and used; however, during very wet years, the Kern River reaches the flood channel located on the west of the valley floor and carries water into the Tulare Lake bed. The river flows have been regulated since the completion of Isabella Dam in 1953.

Tulare Lake Basin

The proposed Project is located within the Central Valley's Tulare Lake Basin; the Diablo and Temblor Mountain Ranges are to the west, the San Emigdio and Tehachapi Mountains are to the south, and the Sierra Nevada Mountains are to the east and southeast. The Tulare Lake Basin encompasses approximately 10.5 million acres. The basin is approximately 170 miles long and 140 miles wide; the Central Valley floor comprises less than one-half of the total Basin area. The Tulare Lake Basin drains to the San Joaquin River Basin only during years of heavy rainfall. The Tulare Lake Basin is under the jurisdiction of the Central Valley Regional Water Quality Control Board (RWQCB), which is responsible for designing and implementing the Tulare Basin Plan.

Regional Surface Water Supply

There are three major sources of surface water available in the Metropolitan Bakersfield General Plan area: the Kern River, the Central Valley Project (CVP), and the State Water Project (SWP). Historically, the Kern River has been the primary source of surface water to Kern County. It originates in the southern Sierra Nevada and flows in a south and southwesterly direction to the Central Valley northeast of Bakersfield. SWP water is supplied from the Sacramento/San Joaquin Delta area and is delivered through the California Aqueduct to Kern County and other areas. CVP water is delivered to the Kern County area through the Friant-Kent Canal. This canal begins at Friant Dam and Millerton Lake and flows southerly to its terminus at the Kern River upstream of the Project area.

Of the three principal sources of water, Kern River and Friant-Kern Canal water are higher quality water producers than SWP water. The quality of Kern River water near Bakersfield is excellent, as is the water quality of the Friant-Kern Canal.

Local Surface Water Setting

The proposed Project is relatively level, sloping southwesterly at an average rate of approximately 7.5 feet per mile. Precipitation is rarely enough to cause flowing water from the site, as most of the water percolates into the soil. The proposed Project overlies the Kern County sub-basin of the San Joaquin Valley Groundwater basin within the Tulare Lake Hydrologic Region.

Physical Characteristics of Surface Water Quality

Standard parameters used to assess the quality of stormwater provide a method of measuring impairment. The backgrounds of these typical characteristics assist in understanding water quality requirements. The quantity of a material in the environment and its characteristics determine the

degree of availability as a pollutant in surface runoff. In an urban environment, the quantity of certain pollutants in the environment is a function of the intensity of the land use. For instance, high density of automobile traffic makes a number of potential pollutants (such as lead and hydrocarbons) more available. The availability of a material, such as a fertilizer, is a function of the quantity and the manner in which it is applied. Applying fertilizer in quantities that exceed plant needs leaves the excess nutrients available for loss to surface or ground water.

The physical properties and chemical constituents of water have traditionally served as the means for monitoring and evaluating water quality. Evaluating the condition of water through a water quality standard refers to its physical, chemical or biological characteristics. Water quality parameters for stormwater make up a long list and are classified in many ways. In many cases, the concentration of an urban pollutant, rather than the annual load of that pollutant, is needed to assess a water quality problem.

Flooding

The Kern River has been subject to severe flooding from storms and snowmelt in the upper portion of its watershed. According to the Kern River Floodway Draft Environmental Impact Report dated June 1988, a worst-case maximum precipitation possible storm for the climate of the Kern River area would have produced an estimated peak discharge above Bakersfield of 204,000 cubic feet per second (cfs). In 1867, levees were first constructed in Bakersfield to protect from flood damage. The annual average runoff for the Kern River is estimated at 700,000 acre-feet per year, of which most is diverted to agricultural uses. The flood of November 1950 had a peak flow of 36,000 cfs and led to the construction of the Isabella Dam and Reservoir in 1953, which significantly reduced flood hazards in the southern San Joaquin Valley and the greater Metropolitan Bakersfield area.

Flooding of the Kern River has resulted from high-intensity winter rainstorms which generally occur from November through April. Flooding can also be caused by snowmelt, which occurs in the late spring and early summer months. However, snowmelt is less damaging because it has a longer period of runoff and a lower peak than rain floods.

Within the past 40 years, seven major floods have occurred including, the 1998 flood caused by the El Niño weather pattern. These floods have been investigated by the Kern County Water Agency (KCWA) and the U.S. Army Corp of Engineers (USACE). Since 1971, the United States Department of Housing and Urban Development (HUD) has designated the unincorporated portions of Kern County as a special flood hazard area. In compliance with the Federal Flood Insurance Program, HUD has provided Kern County with a series of eighty-three Flood Hazard Boundary Maps. These maps delineate major areas of flooding throughout the County.

The proposed Project site is located within the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Zone X. According to FEMA, Zone X consists of: areas within and outside the 0.2 percent annual chance floodplain, areas of 1-percent annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1-percent annual chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1-percent annual chance flood by levees. Flood insurance purchase is not required in these zones.

Dam Inundation

Isabella Dam is located approximately 40 miles northeast of the City of Bakersfield, near a major fault line. Isabella Dam is earth-filled and is approximately 185 feet high, 1,725 feet long, and can hold 570,000-acre feet of water.

Because Isabella Dam is near an active fault line, the potential for seismic activity to cause dam failure exists. If the dam fails, the entire lake storage would be released and approximately 60 square miles of the Metropolitan Bakersfield area would be flooded. Flood levels have the potential to reach 30 feet, with peak inundation at the Project site having the potential to be 5 to 10 feet depending on the water level in the lake. The proposed Project is expected to be inundated within ten to twelve hours after dam failure. This lag time would provide adequate time for warning and would substantially decrease the number of deaths and injury; however, property damage would occur. The chance of dam failure occurring is approximately one day in 10,000 years when the lake is at maximum capacity.

Groundwater

Groundwater is subsurface water that occurs beneath the ground surface in fully saturated zones within soils and other geologic formations. Groundwater in a saturated geologic unit with sufficient permeability and thickness to store sufficient water to sustain a well or spring is defined as an aquifer. A groundwater basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers.

Metropolitan Bakersfield rests above a series of water aquifers that form part of a larger groundwater basin called the San Joaquin Groundwater Basin. The primary aquifer below Metropolitan Bakersfield is made up of unconsolidated sediments bordered by faults or mountain ranges to the east, west and south. Groundwater within the Basin occurs under unconfined, confined and semi-confined conditions.

Groundwater recharge in the basin consists primarily of the percolation of excess irrigation applications, with lesser contributions supplied by river and canal seepage, artificial recharge programs of water agencies, and municipal and industrial wastewater. Direct recharge from precipitation is only a minor source of supply.

Historically, water quality degradation has been noticed in many wells in Kern County. Groundwater contamination in the area includes nitrates, ethylene dibromide (EDB), and dibromochloropropane (DBCP). As a result of the historical use of the area as cultivated agriculture, a number of groundwater contaminants have been introduced over a period of years. In many cases, recent efforts to limit such discharge have led to a reduction or complete cessation of new sources of contamination. Many uses, however, continue to contribute significant quantities of contaminants to the groundwater.

Three principal sources for ongoing groundwater contamination exist in the area: septic systems, cultivated agriculture, and the petroleum industry. By design, septic systems discharge nitrified effluent into soils surrounding the systems. Cultivated agriculture contributes pollutants through nitrogen fertilizer application resulting in a measurable increase in groundwater nitrates throughout

the area. A past source of groundwater contamination was the application of EDB and DBCP to control crop damage.

Petroleum production and refining contributes contamination through direct application of spilled or leaked crude oil and petroleum products to the ground surface and through the use of corrosion inhibitors in the well development process. Pollutants resulting from this activity typically include hydrocarbons and phenols that have entered the subsurface soils through injection or by percolation.

Groundwater recharge in the Basin is currently obtained through the following sources:

Natural Recharge. Natural recharge of groundwater is provided by precipitation runoff, which is defined as the amount of melted snow and rainwater measured after evaporation, evapotranspiration, and percolation.

River and Canal Seepage. Canal seepage is defined as the amount of water that percolates into the ground from earthen canals.

Spreading and Banking. Percolation of water spread in open basins has been used to replenish the groundwater system. Fifteen agencies operate groundwater banking programs in Kern County, which can store up to 5.7 million-acre-feet of water during wet years. The largest is the Kern Water Bank (KWB), a 7,000-acre groundwater recharge facility located in and along the Kern River channel, in response to concerns regarding groundwater supplies. The City of Bakersfield operates the "2800 Acres" groundwater recharge facility, a 2,800-acre groundwater recharge facility located in and along the Kern River channel, in response to concerns regarding groundwater supplies. The facility receives water from the Kern River, the Central Valley Project, and the State Water Project when they have water surpluses. The six-mile long site is made up of river channels, overflow lands and constructed spreading basins. The groundwater is recharged in this facility by spreading water onto spreading basins, then allowing it to percolate. The recharge facility improves groundwater quality by recharging low- salinity water from the Kern River into the aquifers, which dilutes the high-salinity irrigation water that reaches the groundwater from adjacent farming operations.

To eliminate potential overdraft conditions in which more groundwater is used than is replenished, surface water was made available to former groundwater users via the Friant-Kern Canal and the State Water Project. These supplemental surface water supplies, in conjunction with the recharge facilities, have generated inflow into the groundwater basin that exceeds the outflow, as is indicated by the steady rise in groundwater levels since 1992.

Water Quality

Surface water quality is subject to Federal, State, and local water quality requirements that are administered and enforced by the U.S. Environmental Protection Agency (EPA), the California State Water Resources Control Board (SWRCB), and the California Regional Water Quality Control Board (RWQCB), with cooperation from each county.

The principal law governing pollution of the nation's surface waters is the Federal Water Pollution Control Act (Clean Water Act [CWA]). Originally enacted in 1948, it was amended in 1972 and has remained substantially the same since. The CWA consists of two major parts: provisions that

authorize federal financial assistance for municipal sewage treatment plant construction and regulatory requirements that apply to industrial and municipal dischargers. The CWA authorizes the establishment of effluent standards on an industry basis. The CWA also requires states to adopt water quality standards that "consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses".

To achieve its objectives, the CWA is based on the concept that all discharges into the nation's waters are unlawful, unless specifically authorized by a permit. The National Pollutant Discharge Elimination System (NPDES) is the permitting program for discharge of pollutants into surface waters of the United States under Section 402 of the CWA. Thus, industrial and municipal dischargers (point source discharges) must obtain NPDES permits from the Central Valley RWQCB. The existing NPDES (Phase I) stormwater program requires municipalities serving more than 100,000 persons to obtain a NPDES stormwater permit for any construction project larger than five acres. Proposed NPDES stormwater regulations (Phase II) expand this existing national program to smaller municipalities with populations of 10,000 persons or more and construction sites that disturb greater than one acre. For other dischargers, such as those affecting groundwater or from non-point sources, a Report of Waste Discharge must be filed with the RWQCB. For specified situations, some permits may be waived and some discharge activities may be handled through being included in an existing general permit.

While the EPA has two permitting options to meet NPDES requirements (individual permits and general permits), the SWRCB has elected to adopt one statewide General Permit for California that applies to all construction-related stormwater discharges, except for those on tribal lands, in the Lake Tahoe Hydrologic Unit, and under the control of the California Department of Transportation (Caltrans).

Construction activity subject to this General Permit includes any clearing, grading, stockpiling, or excavation that results in soil disturbances of at least one acre of total land area. Construction activities disturbing less than one acre are still subject to this permit if the activity is part of a large common plan of development or if significant water quality impairment will result from the activity.

The General Permit requires all dischargers whose construction activity disturbs one acre or more to:

- Develop and implement a Stormwater Pollution Prevention Plan (SWPPP) that specifies Best Management Practices (BMPs) to prevent all construction pollutants from contacting stormwater and with the intent of keeping all products of erosion from moving off-site into receiving waters;
- Eliminate or reduce non-stormwater discharge to storm sewer systems and other waters of the United States; and
- Inspect all BMPs.

Construction activities disturbing less than one acre are required to prevent the pollution of stormwater runoff from the construction activities with the usage of erosion and sediment control BMP's as specified in the site development sections of the California Green Code.

4.10.3 Regulatory Setting

Federal Regulations

Clean Water Act (CWA)

The CWA is a federal law that protects the nation's water quality for surface waters, including lakes, rivers, coastal wetlands, and "waters of the United States". The CWA specifies that discharges to waters are illegal, unless authorized by an appropriate permit. The permits regulate the discharge of dredged and fill materials, construction-related stormwater discharges, and activities that may result in discharges of pollutants to waters of the United States. If waters of the U.S. are located on a project site, a proposed project is likely to discharge to them, and if impacts on them are anticipated, the project must obtain a CWA Section 401 Water Quality Certification from the appropriate RWQCB.

National Pollutant Discharge Elimination System (NPDES)

The NPDES program is administered by the EPA, which delegates oversight in California to the Regional Water Quality Control Boards.

The NPDES program provides general permits and individual permits. The general permits are for construction projects that disturb more than one acre of land. The general permit requires the applicant to file a public notice of intent to discharge stormwater and to prepare and implement a SWPPP. The SWPPP includes a site map, description of proposed activities, demonstration of compliance with applicable ordinances and regulations, and a description of BMPs that would be implemented to reduce erosion and discharge of construction-related pollutants.

Stormwater Pollution Prevention Plan (SWPPP)

The SWPPP has two major objectives: to help identify the sources of sediment and other pollutants that affect the quality of stormwater discharges, and to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in both stormwater and in non-stormwater discharges.

BMPs include activities, practices, maintenance procedures, and other management practices that reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges. BMPs include treatment requirements, operation procedures, and practices to control site runoff, spillage, leaks, waste disposal and drainage from raw materials storage. BMP implementation must take into account changing weather conditions and construction activities, and various combinations of BMPs may be used over the life of the project to maintain compliance with the CWA. The General NPDES Permit gives the owner the discretion to determine the most economical, effective and innovative BMPs to achieve the performance-based goals of the General NPDES Permit.

There are two types of BMPs: structural and nonstructural. Structural BMPs are the specific construction, modification, operation, maintenance, or monitoring of facilities that would minimize the introduction of pollutants into the drainage system or would remove pollutants from the drainage system. Nonstructural BMPs are activities, programs and other nonphysical measures that help reduce

pollutants from nonpoint sources to the drainage system. In general, nonstructural BMPs are source control measures.

The issue of pollution in stormwater and urban runoff has been recognized by both Federal and State agencies, and there has been a growing concern regarding activities that discharge water affecting California's surface water, coastal waters, and groundwater. Discharges of water are classified as either point source or non-point source discharges. A point source discharge usually refers to waste emanating from a single, identifiable point. Regulated point sources include municipal wastewater, oil field wastewater, winery discharges, solid waste sites and other industrial discharges. Point source discharge must be actively managed to protect the state's waters. A nonpoint source discharge usually is a waste emanating from diffused locations. As a result, specific sources of nonpoint source pollution may be difficult to identify, treat, or regulate. The goal is to reduce the adverse impact of nonpoint source discharges on water resources through better management of these activities. Nonpoint sources include drainage and percolation from a variety of activities such as agriculture, forestry, recreation, and storm runoff.

Impaired Waterbodies

The CWA Section 303(d) and the California's Porter-Cologne Water Quality Control Act (described below) require the State to establish the beneficial uses of its State waters and to adopt water quality standards to protect those beneficial uses. Section 303(d) establishes a Total Maximum Daily Load (TMDL), which is the maximum quantity of a particular contaminant that a water body can maintain without experiencing adverse effects, to guide the application of State water quality standards. Section 303(d) also requires the State to identify "impaired" streams (water bodies affected by the presence of pollutants or contaminants) and to establish the TMDL for each stream.

State Regulations

Department of Water Resources

The California Department of Water Resources' (DWR's) major responsibilities include preparing and updating the California Water Plan to guide development and management of the State's water resources; planning, designing, constructing, operating, and maintaining the State Water Resources Development System; regulating dams; providing flood protection; assisting in emergency management to safeguard life and property; educating the public; and serving local water needs by providing technical assistance. In addition, DWR cooperates with local agencies on water resources investigations; supports watershed and river restoration programs; encourages water conservation; explores conjunctive use of ground and surface water; facilitates voluntary water transfers; and, when needed, operates a State drought water bank.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act acts in cooperation with the CWA to establish the State Water Resources Control Board (SWRCB). The SWRCB is divided into nine regions, each overseen by a RWQCB. The SWRCB, and thus each RWQCB, is responsible for protecting California's surface waters and groundwater supplies.

The Porter-Cologne Water Quality Control Act develops Basin Plans that designate the beneficial uses of California's rivers and groundwater basins. The Basin Plans also establish narrative and numerical water quality objectives for those waters. Basin Plans are updated every three years and provide the basis of determining waste discharge requirements, taking enforcement actions, and evaluating clean water grant proposals. The Porter-Cologne Water Quality Control Act is also responsible for implementing CWA Sections 401-402 and 303(d) to SWRCB and RWQCBs.

Senate Bills 610 (Chapter 643, Statutes of 2001) and 221 (Chapter 642, Statutes of 2001)

SB 610 and SB 221 are companion measures that seek to promote more collaborative planning among local water suppliers and cities and counties. They require that water supply assessments occur early in the land use planning process for all large-scale development projects. If groundwater is the supply source, the required assessments must include detailed analyses of historic, current, and projected groundwater pumping and an evaluation of the sufficiency of the groundwater basin to sustain a new project's demands. They also require an identification of existing water entitlements, rights, and contracts and a quantification of the prior year's water deliveries. In addition, the supply and demand analysis must address water supplies during single and multiple dry years presented in 5-year increments for a 20-year projection. Under SB 221, approval by a county of a subdivision of more than 500 homes requires an affirmative written verification of a sufficient water supply.

Sustainable Groundwater Management Act

In 2014, California enacted the Sustainable Groundwater Management Act (SGMA; Water Code Section 10720 et seq.). SGMA, and related amendments to California law, require that all groundwater basins designated as high or medium priority in the DWR California Statewide Groundwater Elevation Monitoring (CASGEM) Program, and that are subject to critical overdraft conditions, must be managed under a new Groundwater Sustainability Plan (GSP) or a coordinated set of GSPs, by January 31, 2020. High or medium priority basins that are not subject to a critical overdraft must be regulated under one or more GSPs by 2022. Where GSPs are required, one or more local Groundwater Sustainability Agencies (GSAs) must be formed to implement applicable GSPs. A GSA has the authority to require registration of groundwater wells, measure and manage extractions, require reports and assess fees, and to request revisions of basin boundaries, including establishing new subbasins. GSAs must have been formed for high and medium priority basins by June 2017. All of the Kern County Subbasin has been included in exclusive GSA's as mandated by SGMA.

The 2.8 million acres of valley portion of Kern County has been designated a high priority and the 250,000 acres of the Indian Wells Valley sub-basin which includes the City of Ridgecrest and China Lake Naval Weapons Station has been classified a medium priority basin. Both are under mandatory requirements to form a GSA and create a GSP that achieves sustainability in 20 years.

Each GSP must include a physical description of the covered basin, such as groundwater levels, groundwater quality, subsidence, information on groundwater-surface water interaction, data on historical and projected water demands and supplies, monitoring and management provisions, and a description of how the plan will affect other plans, including city and county general plans. Under the

Act, the GSA is authorized to restrict pumping, levy assessments and fees and undertake water quality and quantity projects to rebalance the basin. The DWR must adopt regulations for the preparation of a GSP by January 2016. Emergency regulations for the preparation of the GSP's were approved by the California Water Commission on May 18, 2016. As defined by the Act, "sustainable groundwater management" means that groundwater use within basins managed by a GSP will not cause any of the following "undesirable results:" (a) chronic lowering of groundwater levels (not including overdraft during a drought, if a basin is otherwise managed); (b) significant and unreasonable reductions in groundwater storage; (c) significant and unreasonable seawater intrusion; (d) significant and unreasonable degradation of water quality; (e) significant and unreasonable land subsidence; and (f) surface water depletions that have significant and unreasonable adverse impacts on beneficial uses (Water Code Section 10721(w)).

Kern County is a member of the following GSA's: Cuyama Basin Groundwater Sustainability Agency, Indian Wells Valley Groundwater Authority and Kern Groundwater Authority which manages a portion of the valley sub-basin. The Valley portion of Kern County also is managed by the Kern River Groundwater Sustainability Agency which is comprised of the City of Bakersfield, Kern Delta Water District and Improvement District No. 4 of the Kern County Water Agency. An additional nine GSA's have also been formed to sustainably manage their respective portions of the Kern County subbasin.

Note: Effective December 11, 2018, the County of Kern withdrew from the Kern Groundwater Authority. The Kern County Water Agency (KCWA) was brought in as a cooperative member of Joint Powers Agreement to manage the white spaces. Five GSA's are preparing GSP's to manage the Kern subbasin per a Kern County Subbasin Coordination Agreement.

Municipal Recycled Water Landscape Irrigation Use Permit

The General Waste Discharge Requirements for Landscape Irrigation Uses of Municipal Recycled Water (Water Quality Order No. 2009-0006-DWQ) (Landscape Irrigation General Permit) regulates landscape irrigation with recycled water. Specified uses of recycled water considered to be "landscape irrigation" include any of the following: (i) parks, greenbelts, and playgrounds; (ii) school yards; (iii) athletic fields; (iv) golf courses; (v) cemeteries; (vi) residential landscaping and common areas (not including individually owned residential areas); (vii) commercial landscaping, except eating areas; (viii) industrial landscaping, except eating areas; and (ix) freeway, highway, and street landscaping. Producers or distributors of recycled water must submit a Notice of Intent for coverage under the Landscape Irrigation General Permit. This permit is not required for individual recycled water users and does not cover use of harvested stormwater for irrigation.

Producer and Distributor Responsibilities

Producers must deliver disinfected tertiary recycled water as defined by California Code of Regulations (CCR) Title 22, sections 60301.230 and 60301.320, which address disinfection requirements and "filtered wastewater" requirements, respectively. Producers are responsible for ensuring that recycled water meets the quality standards for disinfected tertiary recycled water as described in Title 22 and any associated waste discharge requirement order for the water reclamation plant. Distributors are responsible for drafting and submitting an operations and maintenance plan to

the SWRCB. The operations and maintenance plan contents are contained in a permit, and include operation and maintenance/management of transport facilities and associated infrastructure necessary to convey and distribute recycled water from the point of production to the point of use. Additionally, distributors must designate a Recycled Water Use Supervisor for each use area. A permit also addresses best management practices, including general operations and maintenance, which producers and distributors must apply to manage recycled water and prevent water quality impacts.

Usage

A permit establishes terms and conditions of discharge to ensure that the discharge does not unreasonably affect beneficial uses of groundwater and surface water. This includes minimum setback distances, signage, application control, and use restrictions, along with other preventative measures, such as backflow prevention and cross-contamination programs.

California Green Building Standards Code (CALGreen Code)

The State of California enacted The California Green Building Standards Code (CALGreen Code) as part 11 of The California Building Standards Code (Title 24). The 2016 CALGreen Code, effective on January 1, 2017, contains measures that are designed to improve public health, safety, and general welfare by utilizing design and construction methods that reduce the negative environmental impact of development and encourage sustainable construction practices.

The CALGreen Code provides mandatory direction to developers of all new construction and renovations of residential and non-residential structures with regard to all aspects of design and construction, including but not limited to site drainage design, stormwater management, and water use efficiency. Required measures are accompanied by a set of voluntary standards that are designed to encourage developers and cities to aim for a higher standard of development.

Under the CALGreen Code, all residential and non-residential sites are required to be planned and developed to keep surface water from entering buildings and to incorporate efficient outdoor water use measures. Construction plans are required to show appropriate grading and surface water management methods, such as swales, water collection and disposal systems, French drains, and rain gardens. Plans should also include outdoor water use plans that utilize weather or soil moisture-controlled irrigation systems. In addition to the above-mentioned requirements, non-residential developments are also required to develop:

- A Stormwater soil loss prevention plan[1];
- An irrigation budget for landscapes greater than 2,500 square feet, and
- A quantified plan to reduce waste water by 20 percent through use of water-efficient fixtures or non-potable water systems, such as use of harvested rainwater, grey water, and/or recycled water.

CALGreen also offers a tiered set of voluntary measures to encourage residential and non-residential development that goes beyond the mandatory standards to reduce soil erosion, rainwater capture and infiltration, and use of recycled and/or grey water systems. Non-residential developers are further encouraged to integrate treatment BMPs that result in zero net increase in runoff due to development

[1] Kern County, 2016 Cal Green Stormwater BMP (January 2017).

and can treat runoff from the 85th percentile storms. Furthermore, by meeting overall environmental performance goals for the specified categories (e.g., planning and design, energy efficiency, water efficiency and conservation, etc.), buildings can be designated as CALGreen Tier 1 or Tier 2, with the Tier 2 designation having more stringent goals than the Tier 1 designation.

Assembly Bill (AB) 1750 (Rainwater Capture Act of 2012)

Assembly Bill (AB) 1750 (AB 1750), also known as the Rainwater Capture Act of 2012, allows residential, commercial, and government land owners to install, operate, and maintain rainwater collection systems that would not otherwise directly enter a saltwater body through a constructed conveyance and treatment system. Under AB 1750, rainwater is defined as precipitation on any public or private parcel that has not entered an off-site storm drain system or channel, a flood control channel, or any other stream channel, and has not previously been put to beneficial use. AB 1750 permits the following uses for rooftop runoff: rain barrel system for outdoor non-potable use, rain collection system for outdoor non-potable use or infiltration into groundwater, and rain collection system for indoor non-potable use. Additional requirements are included for indoor non-potable use. Compliance with any local rainwater or stormwater capture programs continues to be required under AB 1750.

California Water Conservation Executive Orders

Beginning in January 2014, Governor Jerry Brown issued three Executive Orders (EOs), B-26-14, B-28-14, B-29-15, B-37-16, and B-40-17 regarding water supply, water demand, and water use within the State during severe drought conditions. EO B-29-15, issued April 1, 2015, sets limitations not only for existing land uses and water supply systems, but also for new construction. Some of these restrictions include:

- The Water Board shall prohibit irrigation with potable water of ornamental turf on public street medians. (EO B-29-15, Save Water, Action #6)
- The Water Board shall prohibit irrigation with potable water outside of newly constructed homes and buildings that is not delivered by drip or microspray systems. (EO B-29-15, Save Water, Action #7)
- The California Energy Commission shall adopt emergency regulations establishing standards that improve the efficiency of water appliances, including toilets, urinals, and faucets available for sale and installation in new and existing buildings. (EO B-29-15, Increase Enforcement Against Water Waste, Action #16)

In addition, EO B-29-15 requires that DWR update the State Model Water Efficient Landscape Ordinance through expedited regulation by the end of 2015. This ordinance will increase water efficiency standards for new and existing landscapes through more efficient irrigation systems, greywater usage, onsite stormwater capture, and by limiting the portion of landscapes that can be covered in turf (EO B-29-15, Increase Enforcement Against Water Waste, Action #11).

On November 13, 2015, Governor Brown issued EO B-36-15, which upheld the previous EOs, and directs the SWRCB to extend of urban water use restrictions through October 31, 2016 based on drought conditions known through January 2016. The SWRCB issued Emergency Regulations on

February 2, 2016, in compliance with EO B-36-15. These emergency regulations maintain the current tiers of required water reductions; however, additional adjustments in response to stakeholders; equity concerns were included in the Emergency Regulations.

In addition, DWR and the U.S. Bureau of Reclamation have finalized the 2016 Drought Contingency Plan that outlines State Water Project and Central Valley Project operations from February through November 2016. The 2016 Drought Contingency Plan was developed in coordination with staff from State and federal agencies. The 2016 Drought Contingency Plan communicates overarching goals for 2016 water management and the potential operations needed to achieve those goals.

In May 2016, Governor Brown issued EO B-37-16, which upheld the previous EOs, and directs local agencies to provide new permanent water use targets for each urban water supplier and concrete improvements to drought preparedness. The order bolstered the State's drought resilience and preparedness by establishing longer-term water conservation measures that include permanent monthly water use reporting, new urban water use targets, reducing system leaks and eliminating clearly wasteful practices, strengthening urban drought contingency plans and improving agricultural water management and drought plans. Local agencies are required to publicly disclose the projections and calculations used to determine their conservation standards, and to continue monthly water conservation reporting. EO B-37-16 calls for wise water use and less water waste to become permanent changes to prepare for more frequent and persistent periods of limited water supply. On April 7, 2017, EO B-40-17 lifted the drought emergency in all California counties except Fresno, Kings, Tulare, and Tuolumne counties. EO B-40-17 builds on EO B-37-16, which continues to remain in effect, to continue to make water conservation a way of life in California.

Biosolids Regulations

Biosolids generated during wastewater treatment are regulated by the State under SWRCB Water Quality Order No. 2004-0012-DWQ, Final General Waste Discharge Requirements for Land Application of Biosolids for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and Land Reclamation Activities. This order, implemented under the federal biosolids rules (40 CFR Part 503), applies to all land application of Class A and Class B biosolids and "exceptional quality" biosolids-derived mixtures consisting of 50 percent or more biosolids. The order establishes permitting, monitoring, and reporting requirements. Local ordinances, described below, also regulate the disposal of biosolids in Kern County.

Local

Metropolitan Bakersfield General Plan

The goals and policies of the Metropolitan Bakersfield General Plan relating to water and water quality include water conservation, balancing competing demands for water, and protecting the quality of groundwater and surface water resources. The goals and policies that apply to the proposed Project are listed in Table 4.10-1, *Metropolitan Bakersfield General Plan Goals and Policies for Hydrology and Water Quality*, below.

Table 4.10-1. Metropolitan Bakersfield General Plan Goals and Policies for Hydrology and Water Quality
Goals and Policies: Hydrology and Water Quality
Goal #2: Assure that adequate groundwater resources remain available to the planning area.
Goal #3: Assure that adequate surface water supplies remain available to the planning area.
Goal #4: Continue cooperative planning for and implementation of programs and projects which will resolve water resource deficiencies and water quality problems.
Goal #5: Achieve a continuing balance between competing demands for water resource usage.
Goal #6: Maintain effective cooperative planning programs for water resource conservation and utilization in the planning area by involving all responsible water agencies in the planning process.

4.10.4 Impacts and Mitigation Measures

Methodology

The potential impacts associated with the proposed Project are evaluated on a qualitative basis through a comparison of the anticipated Project effects with the existing hydrologic environment. The change in the hydrologic environment is significant if the effect described under the criteria below occurs. The evaluation of Project impacts is based on professional judgment, analysis of the County's hydrology and water quality policies and the significance criteria established by Appendix G of the California Environmental Quality Act (CEQA) Guidelines, which the County has determined to be appropriate criteria for this Recirculated Draft EIR.

Thresholds of Significance

- The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:
- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

- Substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; and/or
- Be subject to inundation by seiche, tsunami, or mudflow.

Project Impacts

Impact 4.10-1: The Project Would Violate Any Water Quality Standards or Waste Discharge Requirements.

With future urban development of the site, the proposed Project would increase urban pollutant discharge, especially during short-term construction phases. The discharge of materials other than stormwater from a particular site is prohibited. With urban development projects, the pollutants of concern include silt and sediment, oil and grease, floatable trash, nutrients (including fertilizers), heavy metals, pathogens (such as coliform bacteria) and other substances. Discharge of these substances, referred to as "controlled pollutants," into waters of the United States is prohibited.

Future proposed developments that involve grading and construction would contribute to an increase in pollution discharge. Individual development projects would be required to mitigate short-term construction impacts pursuant to the NPDES criteria and standards on a project-by-project basis. The purpose of the NPDES permit is to ensure that the proposed Project area would eliminate or reduce construction-related sediments and pollutants during stormwater runoff. Construction sediment erosion can be adequately controlled through the application of standard construction BMPs. The goal of BMPs is to capture and treat "first flush" stormwater run-off generated by surrounding and on-site watersheds. Water quality management BMPs for grading and construction scenarios may include the use of sand bags and straw bales for run-off diversion and velocity reduction, mulch topping, hydro-seeding and siltation fencing to prevent soil loss and measures to minimize vehicular leaking and spilling. Additionally, within Kern County, post-development compliance with NPDES is regulated by the Kern County Standard Urban Water Mitigation Plan (SUSMP). Projects within the City are required to comply with the SUSMP through the implementation of the City's Drainage Manual. Implementation of the following mitigation measures, in addition to compliance with the NPDES requirements, would reduce construction-related impacts on water quality to a less than significant level. Implementation and compliance with the SUSMP would reduce post development impacts to less than significant levels.

Mitigation Measures

Implement Mitigation Measure MM 4.7-8, as described in Section 4.7, *Geologic and Seismic Hazards.*

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.10-2: The Project Would Substantially Deplete Groundwater Supplies or Interfere Substantially With Groundwater Recharge Such That There Would be a Net Deficit in Aquifer Volume or a Lowering of the Local Groundwater Table Level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

The agricultural uses on the Project site are irrigated using two existing on-site wells that supply groundwater to the existing agricultural uses. It is estimated that 50% of the irrigation supply is from the wells and the other 50% from Kern Delta Water District (KDWD) surface waters. The average annual irritation rate is 977.2-acre feet/year (AFY) and based on this volume, the existing agricultural uses would use approximately 488.6 AFY of groundwater.

Groundwater recharge from irrigated agricultural is a function of many variables which include weather, hydrologic conditions, irrigation practices, crops, soils, geologic conditions, etc. Recharge for the existing Project site was calculated using the total volume of irrigation and precipitation minus water losses associated with other factors. For the proposed Project a general estimate of agricultural recharge to groundwater was made by estimating that groundwater recharge at the existing site is on average 25% of the irrigated amount. Based on this percentage, the existing irrigated agricultural operations would result in approximately 122.15 AFY (25% of 488.6) of the pumped groundwater being returned to the water table with the balance, approximately 366.15 AFY of the pumped groundwater being lost through evapotranspiration.

The estimated water use for the proposed Project at build out in 2025 is approximately 544.5 AFY, which is approximately 432.7 AFY less than the existing agricultural operations and 187.5 AFY less than the water lost through evapotranspiration alone. The initial irrigation water requirement for landscaped areas of the proposed Project is estimated to be 39 AFY and 86.7 AFY at project build out. Water for on-site irrigation of Project landscaping will be provided by recycled water from the on-site wastewater treatment plant. The WSA conservatively estimated that total demand for landscape irrigation at 47.4 AFY. Considering this savings added to the overall reduction in demand as a result of the proposed Project, this results in a total reduction in water demand of approximately 480.12 AFY. This is illustrated in Table 4.10-2, *Different Between Existing and Proposed Water Usage*, below.

Table 4.10-2. Difference Between Existing and Proposed Water Usage

Type	Without Reclaimed Water (AFY)	With Reclaimed Water (AFY)
Avg. Existing Agricultural Use	977.2	977.22
Proposed Project Use	544.5	497.1
Difference	432.7	480.12

AFY = Acre-Feet Per Year
Source: Yarne & Associates, 2019.

Water for the proposed Project would be supplied by CalWater from the Bakersfield District. On average from 2011-2015 water to the District is 58% from groundwater, 16% from the Kern River purchased from the City of Bakersfield and treated by CalWater's North East Bakersfield Water Treatment Plant (NEBWTP); 5% from the Kern River purchased from the City treated at the North West Treatment Plant (NWWTP); and 21% from the Kern River or State Water Project (SWP) water from Improvement District No. 4 (ID-4) of the Kern County Water Agency (KCWA).

The groundwater sub-basin is not anticipated to be affected by the proposed Project, primarily due to the substantial reduction of water required between existing agricultural uses and proposed industrial and commercial uses. Additionally, the use of groundwater will be reduced because the on-site groundwater wells would no longer be used for water for the proposed Project. CalWater and other water suppliers including KDWD, KCWA and the City of Bakersfield also have ongoing and increasing programs to replenish the groundwater aquifers in normal and wet years with water banking programs to be used in future drought years and use of recharge basins. Additionally, groundwater sustainability plans and water conservation programs and best management practices continue to reduce overall water use including groundwater and increase efficiency and recharge. Lastly, according to the Water Supply Assessment, there would be an adequate supply of groundwater over the next 20 years, and there is a surplus groundwater production capacity. Therefore, impacts in this regard would be less than significant.

Because groundwater would no longer be pumped from under the Project site, adjacent water wells would not experience a drawdown effect of their existing supplies from the proposed Project. In addition, infiltration of surface water and lateral transfer of groundwater across the movement gradient would continue to replenish the aquifers beneath the proposed Project site. Please see Section 4.17, *Utilities*, Impact 4.17-4 for additional discussion regarding the proposed Project's impacts to groundwater supplies.

Mitigation Measures

Implementation of Mitigation Measure MM 4.17-1 through MM 4.17-5, as described in Section 4.17, *Utilities*.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.10-3: The Project Would Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream Or River, in a Manner Which Would Result in Substantial Erosion or Siltation On- or Off-Site.

The proposed Project site is relatively flat, with a low potential for runoff. Additionally, the topography of the Project site would remain similar to the existing conditions during site grading and construction. The development of industrial uses, landscaping, and roadways would alter the drainage pattern within the proposed Project through the introduction of impervious surfaces. Any water that is anticipated to drain off-site would be required by the County to drain into storm drain structures. The use of storm drain infrastructure reduces the amount of surface runoff and would potentially

reduce flooding impacts. Implementation of the following mitigation measures would reduce erosion or siltation impacts to less than significant levels.

Mitigation Measures

Implementation of Mitigation Measure MM 4.7-8, as described in Section 4.7, *Geology and Seismic Hazards*.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.10-4: The Project Would Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site.

The development of industrial uses, landscaping, and roadways would alter the drainage pattern within the proposed Project through the introduction of impervious surfaces. Any water that is anticipated to drain off-site would be required by the County to drain into an approved storm drain structure or be retained on site. The use of storm drain infrastructure reduces the amount of surface runoff and would potentially reduce flooding impacts.

Mitigation Measures

Implementation of Mitigation Measure MM 4.7-8, as described in Section 4.7, *Geologic and Seismic Hazards.*

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.10-5: The Project Would Create or Contribute Runoff Water Which Would Exceed the Capacity of Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff.

The proposed Project would add impervious surfaces to the Project site with the development of industrial uses and associated landscaping and roadways and potentially increase the amount of stormwater exiting the site. Surface runoff velocities, volumes and peak flow rates would increase as well and could flow off-site if not properly contained. Water that is anticipated to drain off-site would be required by the County to drain to storm drain structures, including detention or retention basins. Drainage collection facilities within the proposed Project would be constructed as development occurs and would be designed in accordance with local improvement standards and specifications. In addition, the Metropolitan Bakersfield General Plan has goals and policies to ensure that adequate storm drainage facilities are constructed to maintain a comprehensive storm drainage system to serve all urban development within Metropolitan Bakersfield. Pursuant to Kern County requirements, new

developments are required to provide their own on-site retention or illustrate that existing facilities have sufficient capacity to carry the additional runoff. If a stormwater drainage study is needed, the study would determine the size of retention basin(s) and optimal pipeline sizes that are needed to accommodate stormwater from the proposed project. These stormwater facility designs would be reviewed and approved by Kern County. Site improvement standards for drainage areas would be determined by the County of Kern as a function of the Precise Development Plan, Conditional Use Permit, or land division procedure. This would ensure that all drainage facilities are designed to accommodate runoff stormwater. With implementation and compliance with legal and regulatory requirements and the goals and policies of the Metropolitan Bakersfield General Plan and Kern County Ordinance Code, drainage impacts would be reduced to a less than significant level.

Mitigation Measures

Implementation of Mitigation Measure MM 4.7-8, as described in Section 4.7, *Geologic and Seismic Hazards*.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.10-6: The Project Would Otherwise Substantially Degrade Water Quality.

With the future urban development of the site, the proposed Project would result in an increase in urban pollutant discharge, especially during short-term construction phases. The discharge of materials other than stormwater from a particular site is prohibited. With urban development projects, the pollutants of concern include silt and sediment, oil and grease, floatable trash, nutrients (including fertilizers), heavy metals, pathogens (such as coliform bacteria), and other substances. Referred to as "controlled pollutants", discharge of these substances into waters of the United States is prohibited.

During construction of the proposed Project, pollutants from the site could potentially increase substantially as a result of soil disturbance and construction operations. Initial clearing and grading operations during construction would expose much of the surface soils and may release pollutants into runoff from the site that would result in an adverse water quality impact.

Erosion and sedimentation caused by construction activities are dependent upon climatic and site conditions, as well as the degree of disturbance and type of construction project. As indicated above sedimentation resulting from the excessive erosion of disturbed soils, is the primary pollutant of concern. Other pollutants of concern include phosphorous and nitrogen from fertilizers, pesticides, petroleum products, construction chemicals, soil additives and solid waste are often generated by construction projects. The following is a brief discussion of typical pollutants related to construction activities:

- Nutrients – Heavy use of commercial fertilizers can result in discharge of nutrients to water bodies where they may cause excessive algae growth. Nitrogen, phosphorous, and potassium are the major nutrients used for fertilizing new landscape and constriction sites.

- Trace Metals – Over half of the metal load carried in stormwater is associated with sediments as metals both absorb to solid particulate matter (total suspended solids) and are washed off in dissolved forms. Galvanized metals, paint, or preserved wood may contain metals which may, if uncontrolled, enter the stormwater and impact downstream receiving waters.
- Pesticides – The three most commonly used forms of pesticides at construction sites are herbicides, insecticides and rodenticides. Unnecessary or improper application of pesticides may directly or indirectly contaminate surface water bodies.
- Other Toxic Chemicals – If improperly stored and/or disposed of, synthetic organic compounds that may be used at construction sites (such as adhesives, cleaners, sealants, and solvents) may have an adverse impact on receiving waters.
- Miscellaneous Wastes – Miscellaneous wastes may include water from concrete mixers, paints and painting equipment cleaning activities, solid wastes from land clearing activities, wood and paper material from packaging of building material, and sanitary wastes. Improper disposal of construction wastes may directly or indirectly pollute runoff and receiving water bodies.

The proposed Project would be required to include a drainage system. Additionally, future proposed developments that involve grading and construction would contribute to an increase in pollution discharge. Individual development projects would be required to mitigate short-term construction impacts pursuant to the NPDES criteria and standards on a project-by-project basis. The purpose of the NPDES permit is to ensure the proposed Project area would eliminate or reduce construction related sediments and pollutants during stormwater runoff. Construction sediment erosion can be adequately controlled through the application of standard construction BMPs. The goal of BMPs is to capture and treat "first flush" stormwater run-off generated by surrounding and on-site watersheds. Water quality management BMPs for grading and construction scenarios may include the use of sand bags and straw bales for run-off diversion and velocity reduction, mulch topping, hydro-seeding and siltation fencing to prevent soil loss and measures to minimize vehicular leaking and spilling. Implementation and compliance with mitigation measures and the NPDES requirements would reduce construction-related impacts to water quality to a less than significant level.

Mitigation Measures

Implementation of Mitigation Measure MM 4.7-8, as described in Section 4.7, *Geology and Seismic Hazards.*

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.10-7: The Project Would Place Housing Within a 100-Year Flood Hazard Area as Mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or Other Flood Hazard Delineation Map.

No residences would be constructed in association with this proposed Project, and the Project is not located within a 100-year flood hazard area. The proposed Project is located within the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Zone X. According to FEMA,

Zone X consists of: areas within and outside the 0.2 percent annual chance floodplain, areas of 1-percent annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1-percent annual chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1-percent annual chance flood by levees. Flood insurance purchase is not required in these zones. Due to this small percentage, it is not anticipated that flooding hazards would occur within the Project site.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.10-8: The Project Would Place Within a 100-Year Flood Hazard Area Structures Which Would Impede or Redirect Flood Flows.

The proposed Project is not located within a 100-year flood hazard area. Refer to Impact 4.10-7, above.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.10-9: The Project Would Expose People or Structures to a Significant Risk of Loss, Injury or Death Involving Flooding, Including Flooding as a Result of the Failure of a Levee or Dam.

The closest dam to the proposed Project is the Isabella Dam. Isabella Dam is located approximately forty miles northeast of the proposed Project site and has a capacity to hold 570,000 acre-feet of water. If an earthquake were to occur in the vicinity, it could potentially result in a break in the dam. This could, under certain conditions, cause the entire lake storage to be released, which would result in flooding 60 square miles of the Metropolitan Bakersfield area (Kern County 2008). It would take approximately 10- 12 hours from the time the dam breaks for the water from Isabella Dam to reach the Project site, allowing adequate time for warning and to evacuate the area. The chance of the Isabella Dam failing entirely, with the lake at capacity, is approximately one day out of 10,000 years. The impacts to the proposed Project from dam failure are considered less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.10-10: The Project Would Be Subject to Inundation By Seiche, Tsunami, or Mudflow.

The proposed Project is located far enough from a large body of water that the site would not be impacted by seiche or tsunami. Additionally, as the Project site and surrounding area is relatively flat, the potential for a mudflow to occur is very low.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Cumulative effects related to hydrology resulting from implementation of the proposed Project and development in the vicinity and surrounding areas may expose more persons and property to potential water hazards. Cumulative development may also adversely affect downstream water quality, impacting surface and groundwater supplies. The potential cumulative impact is mitigated through required drainage studies to identify potential impacts, relationship to City and County drainage master plans, and implementation of appropriate on-site and off-site drainage improvements. Projects are also required to implement NPDES and BMP measures on a project basis to reduce potential water quality impacts. In addition, projects may require drainage improvements to be in compliance with the Metropolitan Bakersfield General Plan and Kern County Ordinance Code standards in addition to local and regional agency requirements, as part of the discretionary review process. There are no cumulative impacts associated with the proposed Project.

Mitigation Measures

Implementation of Mitigation Measure MM 4.7-8, as described in Section 4.7, *Geology and Seismic Hazards*, and Mitigation Measure MM 4.17-1 through MM 4.17-5, as described in Section 4.17, *Utilities*.

Level of Significance after Mitigation

Impacts would be less than significant.

Section 4.11

Land Use and Relevant Planning

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Section 4.11
Land Use and Relevant Planning

4.11.1 Introduction

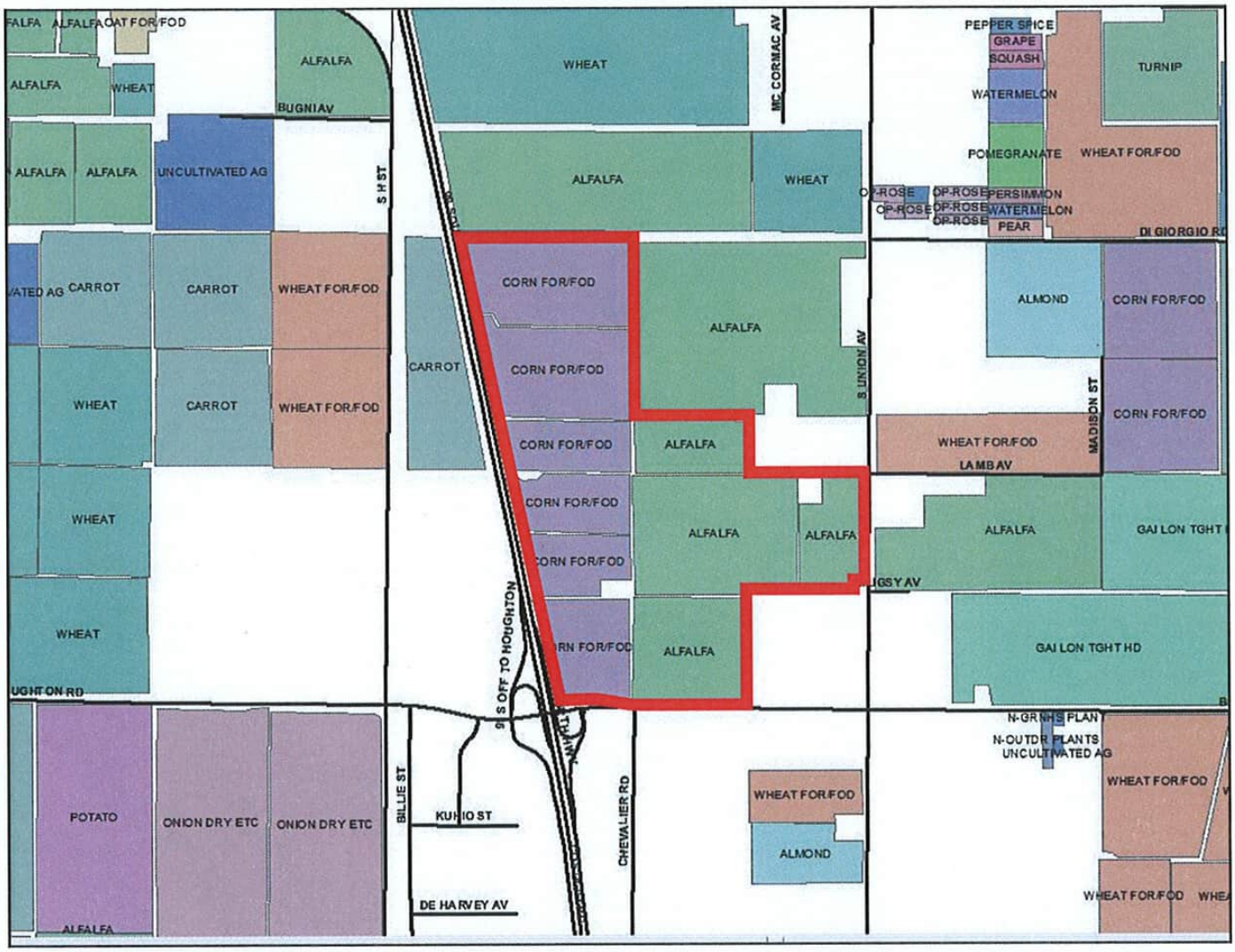
This section describes the environmental setting for land use and planning. Information in this section is based on information provided in the technical studies (refer to Appendices A through N). Ground and aerial photographs for the on-site and surrounding land use analysis as well as the following reference documents: Final Environmental Impact Report (EIR) for the Metropolitan Bakersfield General Plan, Metropolitan Bakersfield General Plan, Kern County General Plan, Title 16 of the Bakersfield Municipal Code, and the Kern County Ordinance Code. The purpose of this section is to identify the existing land use conditions, to analyze proposed Project compatibility with existing uses and consistency with relevant planning policies and to recommend mitigation measures to eliminate or reduce the significance of potential impacts.

4.11.2 Environmental Setting

The following section discusses the existing land uses in the Project area and land use conditions, such as type of use and densities adjacent to the Project site that would influence land use compatibility (refer to Figure 4.11-1, *On-Site and Surrounding Uses*). The environmental setting of the Project site consists of the physical conditions or existing land uses on the Project site and in the surrounding areas.

On-Site Land Use

The proposed Project site consists of disked land and has been utilized for agricultural purposes; primarily row-crop agriculture consisting of alfalfa, corn, wheat, and grain. A steel storage building associated with agricultural activities is located in the eastern portion of the site, near South Union Avenue (SR-204). There is one plugged and abandoned oil well located within the proposed Project boundaries (Big McKittrick Oil Company "Sea Cliff-Houghton" 1). In addition, two active, diesel-powered irrigation wells and one domestic well are located on-site.



Source: Kern County Geographic Information System Reported Crops

PROPOSED PROJECT

99 HOUGHTON INDUSTRIAL PARK PROJECT
CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07
AGRICULTURAL PRESERVE #13 EXCLUSION

On-Site and Surrounding Land Uses

Figure 4.11-1

Surrounding Land Use

Existing adjacent land uses include vacant land and agricultural uses to the north, agricultural uses and a small cluster of single-family residential homes to the east, SR-99 to the west, and agricultural uses and an automobile wrecking yard located south/southeast of proposed Project site. The following table, Table 4.11-1, *Surrounding Land Use*, provides a detailed description of the land uses for the properties adjacent to the site:

Table 4.11-1. Surrounding Land Use

Location	Land Use / Metropolitan Bakersfield General Plan Land Use Designations
North	Vacant / Agriculture: R-IA (Resource-Intensive Agriculture), LMR (Low Medium Density Residential, 4 to 10 units per acre), HMR (High Medium Density Residential, 7.26 to 17.42 units per acre), SR (Suburban, 4 units per acre), and GC (General Commercial)
East	Agriculture / Single-Family Residential / State Route 204: R-IA (Resource-Intensive Agriculture), RR (Rural Residential), and SI (Service Industrial)
South	Agriculture / Automobile Wrecking Yard: RI-A (Resource-Intensive Agriculture), RR (Rural Residential, 2½ acres per unit), and HC (Highway Commercial)
West	State Route 99 / Agriculture: PT (Public Transportation) and R-IA (Resource-Intensive Agriculture)

The area surrounding the proposed Project is undergoing various types of land use entitlements and development that will be consistent with the proposed Project.

4.11.3 Regulatory Setting

The proposed Project's relationships with the Metropolitan Bakersfield General Plan, the Kern County Zoning Ordinance, and other related policy planning documents are described below.

Local

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan is a policy document designed to give long-range guidance for decision-making affecting the future character of the Metropolitan Bakersfield planning area. The Metropolitan Bakersfield General Plan is a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division. It was last adopted on December 11, 2007, includes both City and unincorporated County lands, and is currently undergoing an update. It represents the official statement of the community's physical development as well as its economic, social and environmental goals. The Metropolitan Bakersfield General Plan contains goals and policies regarding the following Elements: Land Use, Circulation, Housing, Conservation, Open Space, Noise, Safety, Public Services and Facilities and Parks. An additional element includes the Kern River Plan, which helps to define goals and policies for issues unique to the Metropolitan Bakersfield area. The Metropolitan Bakersfield General Plan was utilized throughout this RDEIR as the fundamental planning document governing development on the Project site. Background information and policy information from the Metropolitan Bakersfield General Plan are cited in several sections of the RDEIR. Table 4.11-2, *Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies*, below, provides a list of policies applicable to the proposed Project.

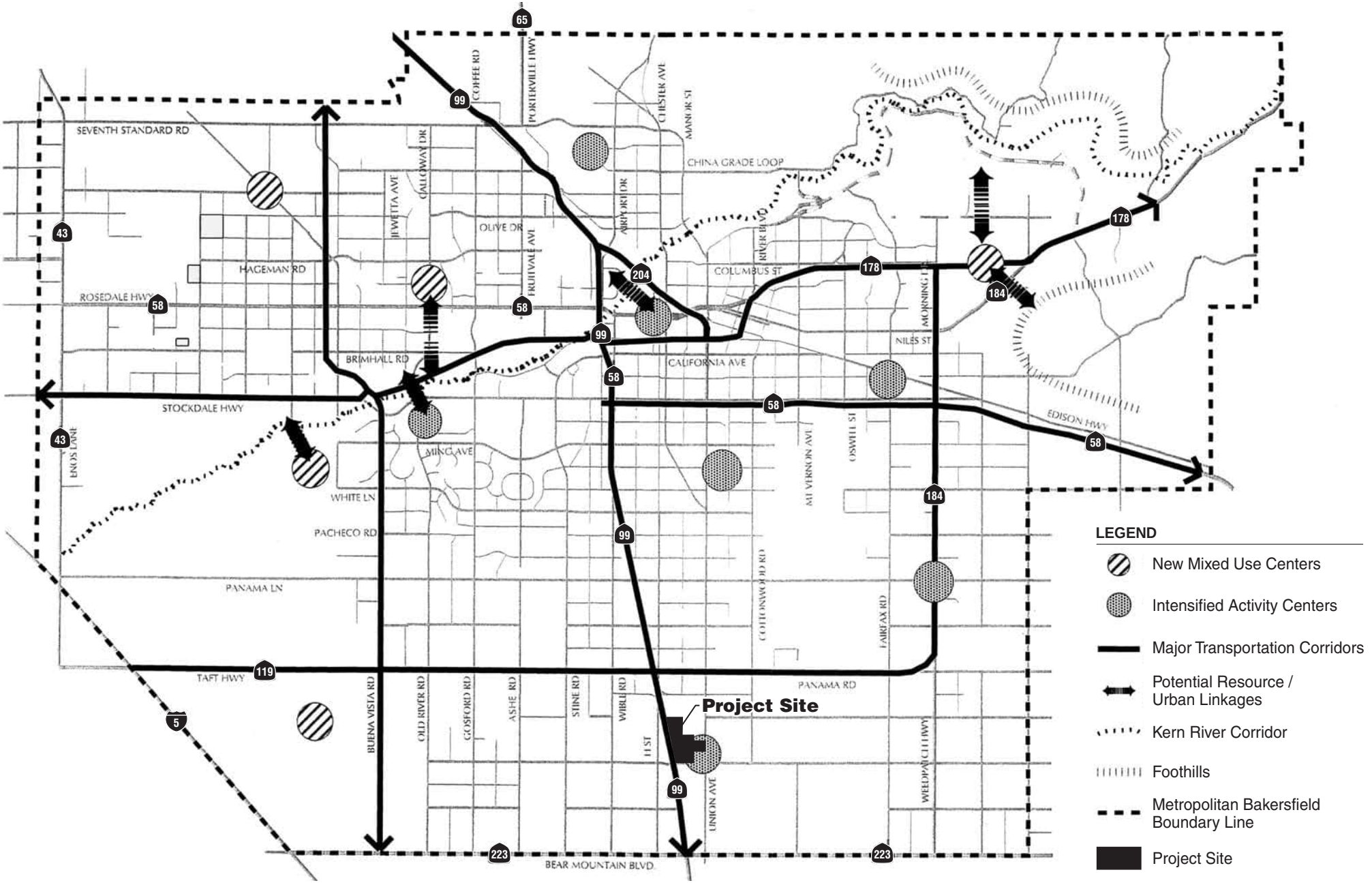
The proposed Project site and surrounding area are within the City of Bakersfield Sphere of Influence (SOI), defined as a plan for the probable physical boundary and service area of the City. This is the boundary in which all goals, policies and programs in the Metropolitan Bakersfield General Plan are applicable.

The Metropolitan Bakersfield General Plan has separated the City into four quadrants with State Route 99 (SR-99) serving as the north-south axis and Stockdale Highway (SR-58) serving as the east-west axis. These four quadrants are further subdivided into developed urban and rural-undeveloped areas. As a general rule, the City's SOI boundaries were utilized to help define the boundaries of planned urban growth. However, Pages II-2 through II-5 of the Metropolitan Bakersfield General Plan provide an overview of the basic principles for new urban areas and development in peripheral areas. The development concepts are referred to as "mixed-use activity centers." The following is an excerpt from Pages II-2 through II-5. Figure 4.11-2 *General Plan Land Use Policy Concept* Figure II-2 of the General Plan.

Overview of the General Plan Basic Principles for New Urban Areas

The Metropolitan Bakersfield General Plan Land Use Map is depicted in Figure II-1, located in the back of this document. The plan map provides a graphic depiction of the general plan's development policies and indicated that land use designations for which pertinent policies and standards have been established. Two basic principles govern the plan: the focusing of new development into distinctive centers which are separated by low land use densities and the siting of development to take advantage of the environmental setting. These principles are defined as the "centers" and "resource" concepts respectively. Figure II-2 conceptually illustrates these land use principles.

The "centers" concept provide for a land use pattern consisting of several concentrated mixed-use commercial and high density residential centers surrounded by medium density residential uses. Centers may be differentiated by functional activity, density/intensity, and physical character. Single-family residential uses are located between these mixed-use commercial/residential centers primarily.



LEGEND

- New Mixed Use Centers
- Intensified Activity Centers
- Major Transportation Corridors
- Potential Resource / Urban Linkages
- Kern River Corridor
- Foothills
- Metropolitan Bakersfield Boundary Line
- Project Site

Source: Metropolitan Bakersfield General Plan

0 15,000'
APPROXIMATE

99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07 • AGRICULTURAL PRESERVE #13 EXCLUSION

General Plan Land Use Policy Concept

Figure 4.11-2

This concept encourages people to live and work in the same area, thus, serves to minimize sprawl, reduce traffic, travel time, infrastructure costs, and air pollution. In addition to promoting the formation of several large concentrated mixed-use centers, the plan attempts to consolidate smaller, neighborhood-serving commercial development by prescribing minimum distances between commercial parcels and by discouraging strip commercial development.

The "resources" concept emphasizes the siting of development to reflect the planning area's natural and visual resources; its river, canals, and foothills. The "resources" concept uses as a point of departure, the 1984 Kern River Plan Element (as amended), which takes advantage of the recreational potential of the river while respecting the river's sensitive natural habitats and aesthetic resources. It is proposed that linkages to unique resources be encouraged. Policies have been included in the plan to promote utilization and sensitivity of natural and visual resources.

Basic Principles for Development of Peripheral Areas

New development on the periphery of urban Bakersfield will be focused in ten new mixed-use activity centers located in the southwest, northwest and northeast. It is expected that the southwest center would include a mix of professional office and retail uses, moderate density residential, and would filter outwards to lower suburban-type densities. Although depicted in Figure II-2 in policy concept form, actual land use designations for the southwest center and the area around it will be determined through a more detailed land use and environmental analysis. In depth analysis of the southwest center is warranted due to its growth potential and its related impacts, impact on prime agricultural lands, and potential to impact the Kern River corridor resource. The northwest center will contain retail commercial, light industrial, moderate and high density residential, and will be surrounded by low and estate residential densities. The center in the northeast will include retail commercial, professional office, moderate and high density residential, and will filter outwards to lower densities.

The plan encourages that each center: (a) focus on a major open space amenity, such as a park or water body; (b) link land uses to the Kern River where possible; and (c) exhibit pedestrian sensitivity with appropriate design applied to encourage pedestrian activity. In addition to these three activity centers, peripheral development will be focused in smaller community centers, such as in the Greenfield and Lamont areas, with local-serving commercial services and residential uses.

As a general rule, the sphere of influence boundary was utilized to help define the boundaries of planned urban growth. However, there are two exceptions to this. The most obvious exception is the southwest center. Here, while the commercial center lies within the sphere of influence, the single-family residential densities extend beyond the western boundary of the present sphere of influence. Justification for extending beyond the sphere of influence boundary includes the following: (a) rapid growth has already taken place in this direction in recent years and show no signs of slowing; (b) the area presents an opportunity to capitalize on the Kern River as a visual and aesthetic resource; and (c) the ease with which services may be extended. The second exception occurs in Oildale. In particular, a major new airport terminal with supporting commercial and industrial uses are master planned just north of the existing terminal at Meadows Field."

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Circulation Element - Streets	
Streets Policy #36: Prevent streets and intersections from degrading below Level of Service "C" where possible due to physical constraints (as defined in a Level of Service Ordinance) or when the existing Level of Service is below "C" prevent where possible further degradation due to new development with a three-part mitigation program: adjacent right-of-way dedication, access improvements and/or on area-wide impact fee. The area-wide impact fee would be used where the physical changes for mitigation are not possible due to existing development and/or the mitigation measures is part of a larger Project, such as freeways, which will be built at a later date.	Appropriate fees would be applied to the future development of the proposed Project in order to accommodate the expansion of required utilities, facilities, and infrastructure.
Streets Policy #37: Require new development and expansion of existing development to pay for necessary access improvements, such as street extensions, widenings, turn lanes, signals, etc., as identified in the transportation impact report as may be required for a Project.	Refer to analysis for Circulation/Streets Goal #3 and Policy #36.
Streets Policy #39: Require new development and expansion of existing development to pay or participate in its pro rata share of the costs of expansions in area-wide transportation facilities and services which it necessitates.	Refer to analysis for Circulation/Streets Goal #3 and Policy #36.
Streets Policy #40: Provide new local street systems that are logical and comprehensible and systems of street names and addresses that are simple, consistent, and understandable.	Future roadway extensions and improvements shall be implemented in accordance with Kern County Ordinance Code requirements.
Streets Policy #41: Plan alignments for local streets to permit economical and practical patterns, shapes, and sizes of development parcels.	Future roadway extensions and improvements shall be implemented in accordance with Kern County Ordinance Code requirements.
Circulation Element - Transit	
Transit Goal #2: Provide a street system and land development policies that support public transportation"	Refer to this section for a detailed description of available public transportation.
Transit Goal #3: Provide cost effective public transportation services.	Refer to analysis in Circulation/Transit Goal #2.
Transit Goal #4: Reduce traffic congestion and parking requirements and improve air quality through improved transportation services.	Refer to analysis in Circulation/Transit Goal #2.
Transit Policy #1: Consider transit service issues in the design of the arterial and collector street system.	Future roadway extensions and improvements shall be implemented in accordance with Kern County Ordinance Code requirements.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Transit Policy #4: Coordinate with GET [Golden Empire Transit] to locate bus stops as close as possible to the facilities they serve.	The Project Applicant shall work with the GET to locate bus stops as close as possible to the proposed Project site in an effort to provide residents with sufficient access to public transit service.
Circulation Element - Bikeways	
Bikeways Goal #1: Provide a circulation system which recognizes and responds to the needs of bicycle travel.	Future roadway extensions and improvements shall be implemented in accordance with Kern County Ordinance Code requirements.
Bikeways Goal #2: Provide a circulation system that minimizes cyclist/motorist conflicts.	Refer to analysis in Bikeways Goal #1.
Bikeways Policy #5: Consider bicycle safety when implementing improvements for automobile traffic operations.	Refer to analysis in Bikeways Goal #1.
Bikeways Policy #7: Provide bicycle parking facilities at activity centers such as shopping centers, employment sites, and public buildings.	Refer to analysis in Bikeways Goal #1.
Circulation/Bikeways Policy #9: Require new subdivisions to provide bike lanes on collector and arterial streets in accordance with the Bikeway Master Plan.	Refer to analysis in Bikeways Goal #1.
Circulation Element - Parking	
Circulation/Parking Goal #1: Provide an efficient parking system to respond to the needs of motorists.	Future parking improvements shall be implemented in accordance with Kern County Ordinance Code requirements.
Circulation/Parking Goal #2: Satisfy parking requirements in all new developments (residential, commercial, industrial, etc.) through off-street facilities.	Refer to analysis in Circulation/Parking Goal #1.
Circulation/Pedestrian Ways Element Goals	
Circulation/Pedestrian Ways Goal #2: Provide adequate sidewalks throughout the planning area.	Development on-site shall be subject to County design review, Kern County Ordinance Code, and Metropolitan Bakersfield General Plan requirements.
Circulation/Pedestrian Ways Element Policies	
Safety Element Goal #2: Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development of metropolitan police and fire facilities and services.	The proposed Project site is within fire and sheriff/police service areas and is not anticipated to create and additional need for police and fire services. Any potential increase in the cost to maintain and staff additional fire or sheriff/police protection services would be paid for by property tax revenues generated by the proposed Project.
PSF School Policy #1: New development will be required to pay its proportional share of the cost of school impact fees within the Plan area.	The Project Applicant/Developer is required to pay developer fees to mitigate impacts to elementary and middle schools.
PSF Park Policy #3: "Require developers to dedicate land, provide improvements and/or in lieu fees to serve the needs of the population in newly developing areas."	Appropriate fees would be applied to the future development of the proposed Project.
Conservation Element – Biological Resources	

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Biological Resources Goal #1: "Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources."	A Biota Report was performed for the proposed Project. Due to the site's location within the Metropolitan Bakersfield Habitat Conservation Plan (MBHCP) boundary, the proposed Project would be required to pay biological impact mitigation fees. Additional mitigation measures are also required.
Biological Resources Goal #2: "To conserve and enhance habitat areas for designated 'sensitive' animal and plant species."	Refer to analysis for Biological Resources Goal #1.
Biological Resources Policy #1: "Direct development away from 'sensitive biological resource' areas, unless effective mitigation measures can be implemented."	Refer to analysis for Conservation/Biological Resources Goal #1.
Biological Resources Policy #2: "Preserve areas of riparian vegetation and wildlife habitat within floodways along rivers and streams, in accordance with the Kern River Plan Element and channel maintenance programs designed to maintain flood flow discharge capacity."	No riparian habitat is located within the proposed Project site.
Biological Resources Policy #3: "Discourage, where appropriate, the use of off-road vehicles to protect designated sensitive biological and natural resources."	Upon construction of the proposed Project, the Project site would not be vacant nor available for off-road vehicle use.
Biological Resources Policy #4: "Determine the feasibility of enhancing sensitive biological habitat and establishing additional wildlife habitat in the study area with State and/or Federal assistance."	Refer to the analysis for Conservation/Biological Resources Goal #1.
Biological Resources Policy #5: "Determine the locations and extent of suitable habitat areas required for the effective conservation management of designated "sensitive" plant and animal species."	No sensitive plant species occur on-site. Refer to the analysis for Conservation/Biological Resources Goal #1.
Biological Resources Policy #6: "Investigate the feasibility of including natural areas selected for the habitat conservation plan as a component of the regional park system."	Refer to the analysis for Conservation/Biological Resources Goal #1.
Conservation Element - Mineral Resources	
Mineral Goal #1: Protect areas of significant resources potential for future use.	The proposed Project site is not located within an oil or gas administrative boundary. The prospect well on the northwest portion of the site had no oil shows and one natural gas show and was abandoned in 1935. One natural gas pipeline traverses the proposed Project area. The proposed Project would be required to comply with appropriate setbacks for the on-site abandoned wells and natural gas pipelines in accordance with the Kern County Ordinance Code, Chapter 19.98, Oil and Gas Production, and Kern County Fire Department Pipeline Development Policies.
Mineral Goal #2: Document areas of current mineral and energy resource extraction, as a basis for land use and conservation policies and programs.	No mineral and energy resource extraction areas occur on-site.
Mineral Goal #3: Avoid conflicts between the productive use of mineral and energy resource lands and urban growth.	The proposed Project would be required to comply with the Kern County Ordinance Code, Chapter 19.98, Oil and Gas Production. No productive mineral and energy resource lands are within, or adjacent to, the proposed Project site. Therefore, development of

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
	the proposed Project would avoid conflicts between the productive use of mineral and energy resource lands and urban growth.
Mineral Goal #4: Protect land, water, air and visual resources from environmental damage resulting from mineral and energy resource development.	Mineral and energy resource development would not occur as part of the proposed Project. Because the site is outside any oil or gas administrative boundary, future development of mineral and energy resources would be unlikely; however, should future development occur, it shall be evaluated for environmental impacts at the time the development is proposed.
Mineral Policy #1: Maintain maps and descriptions of potential mineral and energy resources as a basis for policy and program implementation.	This RDEIR provides information, including maps, on mineral and energy resources for the proposed Project and adjacent properties. Refer to the analysis for Mineral Goal #1, above.
Mineral Policy #2: Document the location, status and long-term viability of sand and gravel quarries and petroleum drilling sites for purposes of avoiding near and long-term land use conflicts and provide a basis of compliance monitoring.	The proposed Project does not contain sand and gravel extraction areas or petroleum drilling sites.
Mineral Policy #3: Encourage and support the exchange of information on mineral and energy resources between private industry, City of Bakersfield and Kern County.	This RDEIR provides information on mineral and energy resources for the proposed Project site and adjacent properties.
Mineral Policy #4: Land use decisions shall recognize the importance of identified mineral resources and need for conservation of resources identified by the State Mining and Geology Board.	The proposed Project will undergo discretionary review by Kern County. This RDEIR evaluates the presence and absence of mineral resources on the Project site and any potential impacts the proposed Project may have on the proposed mineral resources. This RDEIR will be utilized by decision makers to help them make an educated decision on the proposed Project.
Mineral Policy #5: Protect significant mineral and petroleum resource areas, including potential sand and gravel extraction areas.	Refer to the analysis for Mineral Goals #2 and #3 and Mineral Policy #2, above.
Mineral Policy #6: Continue implementation of the Kern River Channel Maintenance Program for extraction of river sand and gravel.	The proposed Project is not located within the Kern River Channel Maintenance Program.
Mineral Policy #7: Promote development of compatible uses adjacent to mineral extraction areas.	Refer to the analysis for Mineral Goal #3, above.
Mineral Policy #8: Allow development of resource extraction sites subject to the conditional use permit procedure in zones where such uses are not prohibited by right and where it can be shown that the proposed extraction uses are compatible with surrounding areas.	Resource extraction sites are not proposed as part of this Project. Any future development of mineral and energy resources shall be evaluated for environmental impacts at the time the development is proposed.
Mineral Policy #9: Encourage preservation of any known deposits of gemstones and fossils.	The proposed Project has not been identified as a potential quarry. Additionally, according to the Phase I Cultural Resources Survey prepared for the proposed Project, fossils are not anticipated to be encountered within the Project site.
Mineral Policy #10: Implement, as appropriate, the California Environmental Quality Act to minimize land use conflicts and reduce extraction operations.	Refer to the analysis for Mineral Goal #3 and Mineral Policies #1 and #3, above.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Mineral Policy #11: Prohibit incompatible development in areas, which have a significant potential to harm public health, safety and welfare due to mineral and petroleum extraction and processing.	Refer to the analysis for Mineral Goal #3, Mineral Policies #1 and #3, above, and Section 4.9, *Hazards/Hazardous Materials*.
Mineral Policy #12: Design resource extraction operations subject to discretionary permits to maintain the integrity of areas of "high environmental quality" and unique scenic value.	Resource extraction operations are not proposed as part of the proposed Project; therefore, discretionary permits would not be required. Any future development of mineral and energy resources shall be evaluated for environmental impacts at the time the development is proposed.
Mineral Policy #13: Require surface mineral resource extraction sites to have plans and procedures for land reclamation, conforming with the requirements of the State Mining and Geology Board, to be implemented upon completion of extraction operations at each site or portion thereof.	Refer to the analysis for Mineral Resource Goals #2 and 3, above and Mineral Policy #12, above.
Mineral Policy #14: Review all discretionary mineral or petroleum development including renewal of existing authorizations, under the policies and procedures of the California Environmental Quality Act.	Mineral or petroleum development is not proposed as part of this proposed Project. Refer to the analysis for Mineral Goal #3 and Mineral Policies #1 and #3, above.
Mineral Policy #15: Require petroleum production sites in urban areas, which are subject to discretionary permits to install peripheral landscaping to help reduce the noise, dust and visual impacts to adjacent sensitive receptors and public ways.	Resource extraction operations are not proposed as part of this Project. The proposed Project would be subject to the appropriate setbacks and landscaping for the abandoned well and the natural gas pipelines as required by the Kern County Ordinance Code, Chapter 19.98, Oil and Gas Production, and Kern County Fire Department Pipeline Development Policies.
Mineral Policy #16: Require all mineral development to be predicated on appropriate reclamation plans that meet the standards of the State Surface Mining and Reclamation Act and the implementing guidelines of the State Mines and Geology Board, and/or the standards of the State Division of Oil and Gas. Reclamation/ restoration of the sites shall be done at each phase of development or as extraction is completed.	Refer to the analysis for Mineral Goal #4, above. It is unlikely that mineral development would occur on-site. Any mineral development shall be required to comply with the standards of the State Surface Mining and Reclamation Act and the implementing guidelines of the State Mines and Geology Board, and/or the standards of the DOGGR.
Conservation Element – Soils and Agriculture	
Soils and Agriculture Goal #1: "Provide for the planned management, conservation, and wise utilization of agricultural land in the planning area."	The proposed Project is not consistent with this goal and will result in an unavoidable adverse impact.
Soils and Agriculture Goal #2: "Promote soil conservation and minimize development of prime agricultural land as defined by the following criteria: Capability Class I and/or II irrigated soils, 80-100 Storie Index rating, Gross crop return of $200 or more per acre per year, and Annual carrying capacity of one animal per acre per year."	As defined by the California Land Conservation Act (G.C. Section 51202) and the Metropolitan Bakersfield General Plan, prime agricultural soils comprise Class I and Class II soils, Storie index 80-100 soils, vineyards and orchards and soil that yields a minimum of $200 an acre per year. According to these standards, the proposed Project consists of prime soils.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Soils and Agriculture Goal #3: "Establish urban development patterns and practices that promote soil conservation and that protect areas of agricultural production of food and fiber crops, and nursery products."	Refer to analysis for Soils and Agriculture Element Goal #1.
Soils and Agriculture Policy #1: "Determine the extent and location of all prime agricultural land within the study area."	Approximately 314.30 acres of the proposed Project are located within an area designated prime agricultural land. Additionally, approximately 257.57 acres of the proposed Project are included in Agricultural Preserve No. 13. Therefore, implementation of the proposed Project would result in a significant and unavoidable impact. A Farmland Conversion Study has been prepared for the RDEIR and is included as Appendix B.
Soils and Agriculture Policy #2: "Review projects that propose subdividing or urbanizing prime agricultural land to ascertain how continued commercial agricultural production in the project vicinity would be affected."	Phased development of the proposed Project would allow for the continued use of prime agricultural land until buildout of the Project site occurs.
Soils and Agriculture Policy #3: "Protect areas designated for agricultural use, which includes Class I and II agricultural soils having surface delivery water systems, from the encroachment of residential and commercial subdivision development activities."	The proposed Project has Class II and III agricultural soils. Based on the California Land Conservation Act and the Metropolitan Bakersfield General Plan criteria for prime farmland, the proposed Project consists of 314.30 acres of prime agricultural lands. However, the proposed Project was identified for urbanization within the Metropolitan Bakersfield General Plan. Therefore, the proposed Project would not be considered an encroachment of commercial uses.
Soils and Agriculture Policy #4: "Monitor the amount of prime agricultural land taken out of production for urban uses or added within the plan area."	A Farmland Conversion Study has been prepared for the RDEIR and is included as Appendix B.
Soils and Agriculture Policy #6: "Continue implementing land grading ordinances that reduce soil erosion/siltation commonly associated with land development."	Project grading shall be conducted in accordance with applicable local grading ordinances, standards, and practices to minimize soil erosion and siltation.
Soils and Agriculture Policy #7: "Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible."	Natural watercourses are not present within the proposed Project site. However, with implementation of mitigation measures in Section 4.7, *Geologic and Seismic Hazards*, and Section 4.10, *Hydrology and Water Quality*, impacts would be reduced to less than significant levels.
Soils and Agriculture Policy #9: "Protect prime agricultural lands against unplanned urban development by adopting agricultural zoning, general plan agriculture designation, and by encouraging use of the Williamson Act and supporting programs and policies that provide tax and economic incentives to ensure the long-term retention of agricultural lands."	The proposed Project is not situated on land under an existing Williamson Act Contract; however, it is identified as prime farmland. In addition, approximately 257.57 acres of the proposed Project are located in Agricultural Preserve No. 13. Approval and implementation of the proposed Project would result in a significant impact from the conversion of approximately 314.30 acres of soil that meet the requirements for prime farmland if water for irrigation were available.
Soils and Agriculture Policy #10: "Encourage landowners to retain their lands in agricultural production."	The proposed Project will remain under agricultural production as the various phases of the Project are constructed.
Soils and Agriculture Policy #12: "Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction."	Refer to analysis for Soils and Agriculture Policy #6.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Soils and Agriculture Policy #13: "Minimize the alteration of natural drainage and require development plans to include necessary construction to stabilize runoff and silt deposition through enforcement of grading and flood protection ordinances."	Refer to analysis for Soils and Agricultural Policy #7.
Soils and Agriculture Policy #14: "When considering proposal to convert designated agricultural lands to non-agricultural use, the decision-making body of the city and County shall evaluate the following factors to determine the appropriateness of the proposal: Soil quality; Availability of irrigation water; Proximity to non-agricultural uses; Proximity to intensive parcelization; Effect on properties subject to "Williamson Act" land use contracts; Ability to be provided with urban services (sewer, water, roads, etc.); Ability to effect the application of agricultural chemicals on nearby agricultural properties; Ability to create a precedent-setting situation that leads to the premature conversion of prime agricultural lands; Demonstrated project need; and Necessity of buffers such as lower densities, setbacks, etc.	Refer to analysis for Soils and Agricultural Policy #3 and #9.
Conservation Element – Water Resources	
Water Quality Goal #2: Assure that adequate groundwater resources remain available to the planning area.	Based on the Water Supply Assessment, the proposed Project will withdraw 287.11 acre-feet of groundwater annually regardless of single or sequential dry years. The groundwater sub-basin will not be affected by the proposed Project primarily due to a large reduction of water required between existing agricultural uses and proposed industrial uses.
Water Quality Goal #3: Assure that adequate surface water supplies remain available to the planning area.	No surface water sources will be utilized for the proposed Project except as groundwater recharge.
Conservation Element - Air Quality	
Air Quality Goal #1: "Promote air quality that is compatible with health, well-being, and enjoyment of life by controlling point sources and minimizing vehicular trips to reduce air pollutants."	Stationary point sources (i.e., mechanical equipment) would be subject to applicable regulatory requirements. With regard to mobile emissions, the proposed Project would strive to reduce the number of vehicular trips to the site by the provisions of sidewalks, bicycle lanes and bicycle racks.
Air Quality Goal #2: Continue working toward attainment of Federal, State and Local standards as enforced by the San Joaquin Valley Air Pollution Control District."	Refer to analysis for Conservation/Air Quality Goal #1.
Air Quality Goal #3: "Reduce the amount of vehicular emissions in the planning area."	Refer to analysis for Conservation/Air Quality Goal #1.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Air Quality Policy #1: "Comply with and promote San Joaquin Valley Unified Air Pollution Control District (SJVAPCD) control measures regarding Reactive Organic Gases (ROG). Such measures are focused on: (a) steam driven well vents, (b) Pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test stations, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance."	Air Quality impacts have been analyzed and concluded to be significant and unavoidable since operational and cumulative ROG emissions would exceed San Joaquin Valle Air Pollution Control District (SJVAPCD) thresholds.
Air Quality Policy #2: "Encourage land uses and land use practices which do not contribute significantly to air quality degradation."	The proposed Project would provide development consistent with existing and approved development on nearby parcels, and would be located in an area of relatively lesser environmental sensitivity accommodating growth while balancing environmental considerations.
Air Quality Policy #3: "Require dust abatement measures during significant grading and construction operations."	As discussed in Section 4.3, *Air Quality*, the proposed Project would implement dust control techniques during construction activities in conformance with SJVAPCD Regulation VIII, the Kern County Ordinance Code, and required Mitigation Measures.
Air Quality Policy #4: Consider air pollution impacts when evaluating discretionary permits for land use proposals. Considerations should include: a) Alternative access routes to reduce traffic congestion, b) Development phasing to match road capacities, c) Buffers including increase vegetation to increase emission dispersion and reduce impacts of gaseous or particulate matter on sensitive uses."	The rate of development would proceed based largely on economic considerations, infrastructure improvements, market demands and other planning considerations. All plans are subject to review and approval by the Planning Department as part of the final Development Plan review process.
Air Quality Policy #11: "Improve the capacity of the existing road system through improved signalization and traffic control systems."	Refer to analysis for Circulation/Streets Policy #1 and #3.
Air Quality Policy #12: "Encourage the use of mass transit, carpooling and other transportation options to reduce vehicle miles traveled."	Refer to analysis for Circulation/Streets Policy #4.
Air Quality Policy #13: "Consider establishing priority parking areas for carpoolers in projects with relatively large numbers of employees to reduce vehicle miles traveled and improve air quality."	Refer to analysis for Circulation/Parking Element Goal #1 and #4.
Air Quality Policy #14: "Establish park and ride facilities to encourage carpooling and the use of mass transit."	Refer to analysis for Circulation/Streets Policy #4.
Air Quality Policy #16: "Cooperate with Golden Empire Transit [GET] and Kern Regional Transit to provide a comprehensive mass transit system for Bakersfield; require large-scale new development to provide related improvements, such as bus stop shelters and turnouts."	Refer to analysis for Circulation/Streets Policy #4.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Air Quality Policy #18: "Encourage walking for short distance trips through the creation of pedestrian friendly sidewalks and street crossings."	Refer to analysis for Circulation/Pedestrian Ways Goal #1 and #2.
Air Quality Policy #19: "Promote a pattern of land uses which locates residential uses in close proximity to employment and commercial services to minimize vehicular travel."	Refer to analysis for Circulation/Pedestrian Ways Goal #1.
Land Use Element - Aesthetics	
Land Use Goal #3: Accommodate new development which is compatible with and complements existing land uses.	The proposed Project has been evaluated with respect to potential impacts pertaining to the degradation of existing visual character/quality. The Project site is located in close proximity to agricultural farms, orchards, light industrial activities, and single-family residences. However, the Project area is slated for development, which would be subject to County design review standards and regulations that would ensure functional and visual compatibility of both the Project and surrounding projects.
Land Use Goal #7: Establish a built environment which achieves a compatible functional and visual relationship among individual buildings and sites.	Development on-site shall be subject to County design review, Kern County Ordinance Code, and Metropolitan Bakersfield General Plan requirements.
Land Use Policy #26: Encourage adjacent commercial uses to be of compatible height, setback, color and materials.	The Project would be designed with unified materials and colors and would be compatible with the surrounding land uses. Future uses are subject to the development standards of the Kern County Ordinance Code, which regulates all aspects of development including building heights, building massing, setbacks, parking, landscaping, lighting, and signage.
Land Use Policy #28: Require that commercial development provide design features such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to noise, traffic, parking, and differences in scale.	Refer to the analysis for Land Use Policy #26. The proposed Project's lighting plans would also be reviewed by Kern County on a project-by-project basis to ensure uniformity and adequate public lighting without adding to the light and glare in the proposed Project area.
Land Use Policy #30: Street frontages along all new commercial development shall be landscaped.	Refer to the analysis for Land Use Policy #26.
Land Use Policy #34: Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors.	The proposed Project would provide approximately 314.30 acres of industrial development within the southern Metropolitan Bakersfield area, at the Houghton Road and SR-99 interchange.
Land Use Policy #36: Require that industrial uses provide design features, such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration.	Development on-site shall be subject to County design review, Kern County Ordinance Code, and Metropolitan Bakersfield General Plan requirements.
Land Use Policy #37: Street frontages along all new industrial development shall be landscaped.	Refer to the analysis for Land Use Policy #26.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Land Use Policy #63: Encourage the use of creative and distinctive signage which establishes a distinctive image for the planning area and identifies principal entries to the metropolitan area, unique districts, neighborhoods and locations.	Signage plans have not been submitted for the proposed Project. Should signage be proposed in the future, signage plans shall be reviewed and approved by the County's Planning Department as part of the final Development Plan review process.
Land Use Policy #72: Promote the establishment of attractive entrances into communities, major districts, and transportation terminals, centers, and corridors within the planning area.	Refer to analysis for Land Use Policy #26.
Land Use Policy #74: Encourage the establishment of design programs which may include signage, street furniture, landscape, lighting, pavement treatments, public art, and architectural design.	Refer to analysis for Land Use Policy #26.
Land Use Element – Cultural Resources	
Land Use Element Goal #6: Accommodate new development that is sensitive to the natural environment, and accounts for environmental hazards.	According to the Phase I Cultural Resource Survey, the proposed Project is not located within an area of significant cultural resources.
Land Use Element Policy #105: Development on land containing known archaeological resources (i.e., high sensitivity areas) shall utilize methodology set forth as described necessary by a qualified archaeologist to locate proposed structures, paving, landscaping and fill dirt in such a way as to preserve these resources undamaged for future generations when it is the recommendation of a qualified archaeologist that said resources be preserved in situ.	Refer to Goal #6.
Land Use Element Policy #107: The preservation of historical resources shall be promoted, and other public agencies or private organizations shall be encouraged to assist in the purchase and/or relocation of sites, buildings, and structures deemed to be of historical significance.	Refer to Goal #6.
Land Use Element - Land Use and Planning	
Land Use Goal #1: Accommodate new development which captures the economic demands generated by the marketplace and establishes Bakersfield's role as the capital of the southern San Joaquin Valley.	The proposed Project would provide industrial and commercial uses that would meet the substantial and unmet service demands of the residents within the southern portion of the City.
Land Use Goal #2: Accommodate new development which provides a full mix of uses to support its population.	Refer to the analysis for Land Use Goal #1.
Land Use Goal #3: Accommodate new development which is compatible with and complements existing land uses.	The proposed Project is located in close proximity to agricultural farms, orchards, light industrial activities, and single-family residences. Development of the proposed Project would be subject to Metropolitan Bakersfield and County requirements, to ensure functional and visual compatibility both internally within the proposed Project and with surrounding uses.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Land Use Goal #4: Accommodate new development which channels land uses in phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.	The Project site is adjacent to other proposed projects, and the proposed Project is located within the logical pathway of continued urbanization, south of the City of Bakersfield. The rate of on-site development would correspond with the availability of appropriate infrastructure.
Land Use Goal #6: Accommodate new development that is sensitive to the natural environment, and accounts for environmental hazards.	The Project site is located within the adopted MBHCP and will be subject to the payment of HCP fees. Upon payment of this fee, a development permit application would become a sub-permittee and would be allowed the "incidental take" of species in accordance with state and federal endangered species laws. Pesticide contamination was deemed not to be a major concern at the site.
Land Use Goal #7: Establish a built environment which achieves a compatible functional and visual relationship among individual buildings and sites.	Development on-site shall be subject to County design review and Kern County Ordinance Code and Metropolitan Bakersfield General Plan requirements.
Land Use Policy #15: Allow for the development of a variety of commercial centers/corridors which are differentiated by their function, intended users and level of intensity, including convenience centers service local residential neighborhoods, subregional centers which serve groupings of neighborhoods, and major regional centers which serve the planning area and surrounding areas.	The proposed Project is located in an urbanizing area and is near existing residential and industrial development. The proposed Project would provide industrial uses that would capture the economic demands generated by the marketplace.
Land Use Policy #16: Allow for development of a variety of commercial uses, including those which serve residents (groceries, clothing, etc.), highway users, and tourists-visitors.	Refer to the analysis for Land Use Policy #15.
Land Use Policy #26: Encourage adjacent commercial uses to be of compatible height, setback, color and materials.	The Project would be designed with unified materials and colors and would be compatible with the surrounding land uses. Future uses are subject to the development standards of the Kern County Ordinance Code, which regulates all aspects of development including building heights, building massing, setbacks, parking, landscaping, lighting, and signage.
Land Use Policy #28: Require that commercial development provide design features such as screen walls, landscaping and height, setback, and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to noise, traffic, parking, and differences in scale.	Refer to the analysis for Land Use Policy #26.
Land Use Policy #30: Street frontages along all new commercial development shall be landscaped (I-1).	Refer to the analysis for Land Use Policy #26.
Land Use Policy #30B: Require perimeter street(s) around new commercial office, retail, mixed-use, and industrial business park land uses where they will enhance pedestrian and vehicular access from adjacent residential neighborhoods or promote convenient access to public transit services, and where anticipated traffic will	Perimeter street(s) will be considered during the development review process upon receipt of definitive site plans.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
not detrimentally impact local streets. Exceptions may be allowed if natural or artificial barriers such as, but not limited to, railroads, utility corridors, canals, or other watercourses, or topographic features exist that create a logical separation between the uses, or to encourage infill development.	
Land Use Policy #31: Allow for a variety of industrial uses, including land-extensive mineral extraction and processing, heavy manufacturing, light manufacturing, warehousing and distribution, transportation-related, and research and development uses (I-1).	Approximately 107.72 acres of LI (Light Industrial), 159 acres of SI (Service Industrial), 22 acres of GC (General Commercial), and 9.01 acres if HC (Highway Commercial) uses are proposed.
Land Use Policy #34: Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors.	SR-99 is adjacent to the west and SR-204 is adjacent to the east of the proposed Project.
Land Use Policy #36: Require that industrial uses provide design features, such as screen walls, landscaping and height, setback, and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration.	Refer to the analysis for Land Use Policy #26.
Land Use Policy #37: Street frontages along all new industrial development shall be landscaped.	Refer to the analysis for Land Use Policy #26.
Land Use Policy #38: Minimize impacts of industrial traffic on adjacent residential parcels through the use of site plan review and improvement standards.	Refer to the analysis for Land Use Policy #26.
Land Use Policy #52: Locate new development where infrastructure is available or can be expanded to serve the proposed development.	As discussed in Section 4.17, *Utilities*, utility infrastructure is either currently, or will be available for the Project site at build-out, or improvements to the existing infrastructure are planned in order to provide the Project site and other future developments with adequate utilities.
Land Use Policy #53: Ensure that land use and infrastructure development are coordinated.	The development of the Project site will be coordinated with infrastructure improvements.
Land Use Policy #54: The developer shall be responsible for all on-site costs incurred as a result of the proposed project, in addition to a proportional share of off-site costs incurred in service extension or improvements. The availability of public or private services or resources shall be evaluated during discretionary project consideration. Availability may affect project approval or result in a reduction in size, density, or intensity otherwise indicated in the general plan's map provisions.	Refer to analysis for Land Use Policy #52.
Land Use Policy #55: Provide for the mitigation of significant noise impacts on adjacent sensitive uses from transportation corridor improvements.	An Acoustical Analysis was conducted for the proposed Project. Refer to Section 4.13, *Noise*, for impacts and mitigation measures associated with noise impacts of the Project.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Land Use Policy #61: Coordinate a consistent design vocabulary between city and county for all public signage, including fixture type, lettering, colors, symbols, and logos.	Signage plans have not been submitted for the proposed Project. Should signage be proposed in the future, signage plans shall be reviewed and approved by the County's Planning Department as part of the final Development Plan review process.
Land Use Policy #62: Provide signage which is adequately spaced and clearly visible during the day and night to control vehicular traffic, bicycles, and pedestrians.	Refer to the analysis for Land Use Policy #61.
Land Use Policy #63: "Encourage the use of creative and distinctive signage which establishes a distinctive image for the Planning area and identifies principal entries to the metropolitan area, unique districts, neighborhoods and locations."	Refer to the analysis for Land Use Policy #61.
Land Use Policy #65: Encourage that signs be designed and placed on buildings to be visible to pedestrians in areas designated for pedestrian activity.	Refer to the analysis for Land Use Policy #61.
Land Use Policy #72: Promote the establishment of attractive entrances into communities, major districts, and transportation terminals, centers, and corridors within the Planning area.	Refer to analysis for Land Use Policy #26.
Land Use Policy #74: Encourage the establishment of design programs which may include signage, street furniture, landscape, lighting, pavement treatments, public art, and architectural design.	Refer to analysis for Land Use Policy #26.
Land Use Policy #75: Provide adequate land area for the expansion of existing uses and development of new uses consistent with the policies of the general plan.	The proposed Project will be constructed consistent with the policies of the Metropolitan Bakersfield General Plan.
Land Use Policy #76: Provide for a mix of land uses which meets the diverse needs of residents; offers a variety of employment opportunities; capitalizes, enhances, and expands upon existing physical and economic assets; and allows for the capture of regional growth.	The proposed Project will provide light and medium industrial uses at the Houghton Road and SR-99 interchange in the southern metropolitan area adjacent to the City of Bakersfield. The proposed Project will provide a broad range of goods and services to serve the regional market area.
Land Use Policy #77: Allow for the continuance of agricultural uses in areas designated for future urban growth.	Currently, the Project site consists of active agricultural land and fallow land. The proposed Project involves a GPA and zone change to allow for the phased development of the entire property with industrial and commercial uses. Portions of the Project site not under development will remain agricultural land until such time development is approved.
Land Use Policy #79: "Provide for an orderly outward expansion of new "urban" development (any commercial, industrial, and residential development having a density greater than one unit per acre) so that it maintains continuity of existing development, allows for the incremental expansion of infrastructure and public services, minimizes impacts on natural environmental	Refer to analysis for Land Use Goals #1, #3, #4, #6, and #7.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
resources, and provides a high quality environment for living and business."	
Land Use Policy #80: Assure that General Plan Amendment proposals for the conversion of designated agricultural lands to urban development occur in an orderly and logical manner giving full consideration to the effect on existing agricultural uses.	A Farmland Conversion Study was prepared for the proposed Project to evaluate the conversion for the existing on-site farmland to industrial uses. Refer to Section 4.2, *Agriculture*, for a detailed analysis of compatibility of the proposed Project and surrounding land uses.
Land Use Policy #82: "Preserve existing significant sound residential neighborhoods, commercial districts, and industrial areas."	Refer to the analysis for Land Use Goals #1, #3, #4, #6, and #7.
Land Use Policy #99: Develop a plan to ensure that all parking lots are 40 percent shaded at maturity to help alleviate "heat island effect."	Future development phases would be subject to the Kern County Ordinance Code and design review requirements. Final development plans will be reviewed by the County Planning Department on a project-by-project basis.
Land Use Policy #100: "Encourage the use of reflective roofing material and other measures that reduce the "heat island effect."	Refer to the analysis for Land Use Policy #99.
Noise Element	
Noise Goal #1: "Ensure that residents of the Bakersfield Metropolitan Area are protected from excessive noise and existing moderate levels of noise are maintained."	As stated in Section 4.13, *Noise*, the proposed Project would be subject to compliance with the Metropolitan Bakersfield General Plan and County's noise standards during construction and Project operation.
Noise Goal #2: "Protect the citizens of the Planning area from the harmful effects of exposure to excessive noise and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports and other sources."	As stated in Section 4.13, *Noise*, the proposed Project would be subject to compliance with the Metropolitan Bakersfield General Plan and County's noise standards during short-term construction and Project operation. Construction activities would adhere to the Kern County Noise Ordinance with respect to hours of operation and all equipment would be fitted with factory equipped mufflers and be in good working order; refer to Mitigation Measures 4.13-1 through 4.13-5.
Noise Policy #1: "Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in Table VII-4. The noise exposure contour maps on file at the City of Bakersfield and County of Kern indicate areas where existing and projected noise exposures exceed 65 dB CNEL (exterior) for the major noise sources identified."	The proposed Project would not exceed the Kern County's 65-dBA-CNEL (exterior) criterion for long-term vehicular-related noise.
Noise Policy #2: "Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into project design to acceptable levels."	As indicated within the Noise Impact Assessment, on-site noise levels would be below the 65 dBA exterior noise standards. Therefore, implementation of the proposed Project would comply with the Goals and Policies of the Metropolitan Bakersfield General Plan.
Noise Policy #3: Review discretionary industrial, commercial or other noise generating land use projects for compatibility with nearby noise-sensitive land uses. Additionally, the development of new noise generating	Not applicable. The proposed Project would not be located adjacent to incompatible land uses such as industries, railroads, and airports, that generate high levels of noise.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
land uses which are not preempted from local noise regulation will be reviewed if resulting noise levels will exceed the performance standards contained within Table VII-4 in areas containing residential or other noise-sensitive land uses.	
Noise Policy #4: Require noise level criteria applied to land uses other than residential or other noise-sensitive uses to be consistent with the recommendations of the California Office of Noise Control (see Figure VII-3)	Refer to Noise Policy #2.
Noise Policy #5: Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise.	Future development would comply with County Ordinances requiring setbacks from roadways and landscaping along arterial and collector roads.
Noise Policy #6: Encourage interjurisdictional coordination and cooperation with regard to noise impact issues.	Refer to Noise Goals #1 and #2, and Noise Policy #1, #2, and #5. As stated in Section 4.13, *Noise*, the proposed Project was evaluated against thresholds based on standards set forth by federal, State, and local agencies. In addition, the Project applicant will work with Kern County to implement Mitigation Measures 4.13-1 through 4.13-5.
Noise Policy #7: Establish threshold standards for the determination of the existence of cumulative noise impacts that are significant and will therefore require mitigation to achieve acceptable noise standards that do not exceed the standards contained in this element.	Refer to the consistency analysis for Noise Policy #6.
Safety Element – Public - Hazards/Hazardous Materials	
Safety Goal #1: Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry.	The proposed Project would be required to adhere to the Metropolitan Bakersfield General Plan Safety Element, compliance with the County of Kern Department Codes, the Kern County Ordinance Code, DOGGR regulations, and compliance with the CBC and UBC to ensure safety for citizens.
Safety Goal #3: Provide for the coordinated planning and development of service areas for police and fire protection to ensure an equitable burden of responsibility between County and City in Metropolitan Bakersfield.	The proposed Project would be serviced by the Kern County Fire and Sheriff's Departments. Refer to Section 4.15, *Public Services* and Section 4.17, *Utilities*, for additional information.
Safety Policy #4: Monitor, enforce and update as appropriate all emergency plans as needs and conditions in the Planning area change, including the California Earthquake Response Plan, the Kern County Evacuation Plan, and the City of Bakersfield Disaster Plan.	Section 4.15, *Public Services* and Section 4.17, *Utilities*, addresses the potential impacts of the proposed Project on fire and emergency response. Additionally, all emergency plans applicable to the proposed Project would be updated as needed.
Safety Policy #6: Promote fire prevention methods to reduce service protection costs and costs to the taxpayer.	The proposed Project would be reviewed by the Kern County Fire Department. The proposed Project would be designed to comply and/or incorporate the Kern County Fire Department fire prevention requirements.
Safety Policy #7: Enforce ordinances regulating the use/manufacture/sale/transport/disposal of hazardous substances and require compliance with state and federal laws regulating such substances.	The proposed Project is subject to discretionary approval and would be required to comply with and/or adhere to all applicable State, Federal and local laws and regulations related to the use, manufacture, sale, transport and/or disposal of hazardous substances. A Hazardous Materials Evaluation was prepared for

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
	the Project to identify potential hazardous materials present within the proposed Project site and provide mitigation measures to reduce impacts. If hazardous materials are used during site construction, the materials shall be properly handled and disposed.
Safety Policy #8: The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste.	The proposed Project would be required to adhere to all applicable standards and requirements of the Kern County and Incorporated Cities Hazardous Waste Management Plan (HWMP). Any hazardous waste created during construction of the proposed Project will be disposed in accordance with the HWMP.
Safety Policy #9: Restrict, after appropriate public hearings, the use of fire-prone building materials in areas defined by the fire services as presenting high-conflagration risk.	As stated in Section 4.15, *Public Services* and Section 4.17, *Utilities* of this DREIR, future development of the proposed Project will be serviced by the Kern County Fire Department. The proposed Project would be reviewed by the Kern County Fire Department and would be required to comply with Kern County Fire Department requirements that prohibit the use of fire-prone building materials, where appropriate.
Safety Element - Seismic	
Seismic Goal #1: Substantially reduce the level of death, injury, property damage, economic and social dislocation and disruption of vital services that would result from earthquake damage.	The proposed Project design would be required to undergo review by the County of Kern. Adherence to and incorporation of the goals and policies of the Metropolitan Bakersfield General Plan Safety Element, compliance with the Kern County Ordinance Code, and compliance with the CBC and UBC would reduce impacts of earthquakes.
Seismic Goal #2: Ensure the availability and effective response of emergency services following an earthquake.	Refer to the analysis for Seismic Goal #1.
Seismic Goal #3: Prepare the Planning area for effective response to, and rapid, services following an earthquake.	Refer to the analysis for Seismic Goal #1.
Seismic Goal #7: Protect land uses from the risk of dam failure inundation including the assurances that: the functional capabilities of essential facilities are available in the event of a flood; hazardous materials are not released; effective measures for mitigation of dam failure inundation are incorporated into the design of critical facilities; and the rapid and orderly evacuation of populations in the inundation area will occur.	Isabella Dam is located approximately 40 miles northeast of Bakersfield, approximately 45 miles from the proposed Project site. The Safety Element of the Metropolitan Bakersfield General Plan has identified policies including a response plan for dam failure as well as the maintenance of disaster response plans and development of discretionary approval procedures for critical facilities for compatibility with evacuation plans. The proposed Project design would be required to undergo review by the County of Kern. The Project would be designed and constructed in strict adherence and incorporation with the goals and policies of the Metropolitan Bakersfield General Plan Safety Element, compliance with the Kern County Ordinance Code, and compliance with the CBC and UBC would reduce impacts related to dam failure.
Seismic Policy #7: Continue to address seismically hazardous buildings pursuant to Chapter 12.2 (8875 et. Seq.), Division 1 of Title 2 of the Government Code.	The proposed Project would be required to comply with the most current seismic standards of the UBC.
Seismic Policy #8: Require seismic review of other potentially hazardous buildings upon any change in their use or occupancy status.	The proposed Project design would be required to undergo review by the County of Kern.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Seismic Policy #9: Adopt and maintain high standards for seismic performance of buildings, through prompt adoption and careful enforcement of the most current seismic standards of the Uniform Building Code.	Refer to the analysis for Seismic Safety Policy #7.
Seismic Policy #10: Prohibit development designed for human occupancy within 50 feet of a known active fault and prohibit any building from being placed astride an active fault.	The proposed Project is not located within 50 feet of a known active fault. Additionally, implementation of the proposed Project would result in light to medium industrial land uses. Buildings associated with the proposed Project would not be intended for human occupancy. Adherence to and incorporation with the goals and policies of the Metropolitan Bakersfield General Plan Safety Element, compliance with the Kern County Ordinance Code, and compliance with the CBC and UBC would reduce impacts of fault rupture.
Seismic Policy #11: Require site-specific studies to locate and characterize specific fault traces within an Alquist-Priolo Earthquake Fault Zone for all construction designed for human occupancy.	The proposed Project is not located within an Alquist-Priolo Earthquake Fault Zone. Therefore, no site-specific study is required.
Seismic Policy #12: Design significant lifeline installations such as highway, utilities and petrochemical pipelines which cross an active fault, to accommodate potential fault movement without prolonged disruption of an essential service or creating threat to health and safety.	No active faults traverse the proposed Project and it is not located within an Alquist-Priolo Earthquake Fault Zone.
Seismic Policy #13: Determine the liquefaction potential at sites in areas of high groundwater prior to development and determine specific mitigation to be incorporated into the foundation design, as necessary to prevent or reduce damage from liquefaction in an earthquake.	The proposed Project is not located within an area of high groundwater. Therefore, the Project site is not susceptible to liquefaction. However, conformance with standard construction and design parameters set forth in the CBC would reduce potential impacts.
Seismic Policy #14: Route major lifeline installations around potential liquefaction areas or otherwise protect them against significant damage from liquefaction in an earthquake.	Refer to the analysis for Seismic Policy #13.
Seismic Policy #15: Compile information on areas of potential hazards and field information developed as part of CEQA investigations and geologic reports and keep geologic reviews and policy development current and accessible for use in report preparation.	The County of Kern will review the proposed Project and will be able to obtain information regarding seismic and geologic hazards on-site from this RDEIR.
Seismic Policy #18: Design discretionary critical facilities located within the potential inundation area for dam failure in order to: mitigate the effects of inundation on the facility; promote orderly shut-down and evacuation (as appropriate); and, prevent on-site hazards from affecting building occupants and the surrounding communities in the event of dam failure.	Isabella Dam is located approximately 40 miles northeast of Bakersfield, approximately 45 miles from the proposed Project. The Safety Element of the Metropolitan Bakersfield General Plan has identified policies including a response plan for dam failure as well as the maintenance of disaster response plans and development of discretionary approval procedures for critical facilities for compatibility with evacuation plans. The proposed Project design would be required to undergo review by the County of Kern. The Project would be designed and constructed in strict adherence and incorporation with the goals and policies of the Metropolitan Bakersfield General Plan Safety Element, compliance with the Kern County Ordinance Code, and compliance with the

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
	CBC and UBC would reduce impacts related to dam failure.
Seismic Policy #19: Design discretionary facilities in the potential dam inundation area used for the manufacture, storage or use of hazardous materials to prevent on-site hazards from affecting surrounding communities in the event of inundation.	Refer to the analysis for Seismic Policy #18.
Seismic Policy #20: Require emergency response plans for the Planning area to include specific procedures for the sequential and orderly evacuation of the potential dam inundation area.	Refer to the analysis for Seismic Policy #18.
Seismic Policy #21: Encourage critical and high-occupancy facilities as well as facilities for elderly, handicapped and other special care occupants located in the potential inundation area below the dam to develop and maintain plans for the orderly evacuation of their occupants.	Refer to the analysis for Seismic Policy #18.
Safety Element - Flooding	
Flooding Goal #1: Minimize hazards to planning area residents resulting from flooding.	The proposed Project would result in light and medium industrial facilities, and commercial uses. No residential land uses would be provided by the proposed Project. Future employees of the Project site are not likely to be impacted as a result of flooding within the proposed Project. The 8 to 12-hour lag time between failure of the Isabella Dam and inundation of the Project site reduces the risks to residents. Additionally, the proposed Project is located within Flood Zone X, which indicates that no flooding would be expected.
Flooding Goal #2: Reduce the risk of flooding to land uses.	Refer to the analysis for Flooding Safety Goal #1.
Flooding Policy #1: Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry.	The proposed Project would be required to adhere to and incorporate the goals and policies of the Metropolitan Bakersfield General Plan Safety Element, comply with the Kern County Ordinance Code, and comply with the CBC and UBC to ensure safety for citizens. Refer to Sections 4.9, *Hazards and Hazardous Materials*, of this RDEIR.
Flooding Policy #2: Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development or metropolitan police and fire facilities and services.	The proposed Project would be required to comply with the provisions of the Uniform Fire Code and local amendment; Title 19, 22, and 27 of the California Safety Code Regulation; the Kern County Ordinance Code; and the National Fire Prevention Association Standards. Implementation of the recommended mitigation measures identified in Section 4.15, *Public Services*, of this RDEIR, would serve to ensure adequate levels of police and fire services are provided to meet existing and future demands associated with implementation of the proposed Project.
Public Services and Facilities Element - Aesthetics	
Street Lighting Goal #2: Develop uniform Planning area street light location and design standards.	The proposed Project includes the installation of streetlights and entry lighting that would conform to the intent of the Kern County Ordinance Code and Development Standards.

Table 4.11-2. Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies

GOALS AND POLICIES	PROJECT CONSISTENCY
Street Lighting Policy #4: Require developers to install street lighting in all new developments in accord with adopted city standards and county policies.	The proposed Project includes the installation of streetlights in conformance with adopted County standards and regulations.
Public Services and Facilities Element – General Utilities	
General Utilities Policy #5: Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent.	Appropriate fees would be applied to the future development of the Project site in order to accommodate the expansion of required utilities, facilities, and infrastructure.
Public Services and Facilities Element - Water Distribution	
Water Distribution Goal #1: Ensure the provision of adequate water service to all developed and developing portions of the planning area.	The existing water purveyor, who provides irrigation water solely for agricultural purposes, will not service the proposed Project with domestic water. Instead, the domestic water will be provided by an on-site private well with water treatment and distribution facilities.
Water Distribution Policy #3: Require that all new development proposals have an adequate water supply available.	Refer to Public Services and Facilities - Water Distribution Goal #1, above.
Public Services and Facilities Element – Sewers	
Sewer Services Goal #3: Provide trunk sewer availability to and treatment/disposal capacity for all metropolitan urban areas, to enable cessation or prevention of the use of septic tanks where such usage crates potential public health hazards or may impair groundwater quality, and to assist in the consolidation of sewerage systems. Provide sewer service for urban development regardless of jurisdiction.	The proposed Project site has never been served by a sewer system. A new private package sewer treatment plant is proposed to provide services for the Project site.
Public Services and Facilities Element - Storm Drainage	
Storm Drainage Goal #1: "Ensure the provision of adequate storm drainage facilities to protect Planning area residents from flooding resulting from stormwater excess."	Stormwater facilities would be incorporated into the design of the infrastructure of the Project site. Additionally, future development phases would be subject to the Kern County Ordinance Code and design review requirements. Final development plans would be reviewed by the Kern County Planning Commission on a project-by-project basis.
Public Services and Facilities Element - Street Lighting	
Street Lighting Goal #1: "Provide uniform and adequate public lighting for all developed and developing portions of the Planning area."	Future development phases would be subject to the Kern County Ordinance Code and design review requirements. Final development plans would be reviewed by the Kern County Planning Commission on a project-by-project basis.
Street Lighting Policy #4: "Require developers to install street lighting in all new development in accord with adopted city standards and county policies."	Refer to analysis for PSF Street Lighting Goal #1.
Public Services and Facilities Element - Solid Waste	
Solid Waste Goal #1: "Ensure the provision of adequate solid waste disposal services to meet the demand for these services in the Planning area."	The County has adequate capacity in the Bena Landfill and the Shafter-Wasco Landfill to support the proposed Project.

Zoning Designations

Title 19 of the Kern County Ordinance Code provides a description of permitted uses, building height, yard and distance between buildings for the various zoning designations within the County. The Ordinance consists of two primary parts: a map that delineates the boundaries of zoning districts; and text that explains the purpose of the district, specifies permitted and conditional uses and establishes development and performance standards.

On- and Off-Site Zoning Designations

The proposed Project site is zoned A (Exclusive Agriculture). Zoning designations for properties surrounding the proposed Project include: A (Exclusive Agriculture), A-1 (Limited Agriculture), CH (Highway Commercial), C-2 PD (General Commercial, Precise Development Combining), E(1) RS MH (Estate 1 Acre, Residential Suburban Combining, Mobile Home Combining), E(2 ½) RS (Estate 2.5 Acres, Residential Suburban Combining), E(1/2) RS (Estate 0.5 Acres, Residential Suburban Combining), E(10) RS (Estate 10 Acres, Residential Suburban Combining), R-2 (Medium Density Residential, 16 units per acre), and M-2 PD (Medium Industrial, Precise Development Combining).

Metropolitan Bakersfield Habitat Conservation Plan

The Metropolitan Bakersfield Habitat Conservation Plan (MBHCP), adopted in March 1990, and its implementing agreements and ordinances provide a method of collecting funds for the acquisition and perpetual management of habitat land for the purpose of creating preserves. The MBHCP provides descriptions of species of concern and habitat areas within the Metropolitan Bakersfield General Plan Area. Development projects within Metropolitan Bakersfield pay mitigation fees, which are used to buy habitat lands. These lands are managed by wildlife agencies or entities they approve. Take avoidance measures are also listed in the MBHCP. Implementation of habitat preservation must always occur before project development. The boundaries of the MBHCP study area match the boundaries of the Metropolitan Bakersfield General Plan, which consists of 408 square miles. Refer to Section 4.4, *Biological Resources*, for a detailed discussion and Project consistency with the MBHCP.

Air Quality Attainment Plan

The Air Quality Attainment Plan (AQAP) prepared for the San Joaquin Valley Air Basin (Basin) calls for overall reduction in air quality emissions in the Valley to comply with California Ambient Air Quality Standards (CAAQS) for ozone and carbon monoxide (CO). Stationary and mobile source emission control recommendations and regulations have been developed by the San Joaquin Valley Air Pollution Control District (SJVAPCD) to implement the AQAP.

Metropolitan Bakersfield General Plan Bikeway Master Plan

This Plan includes the location and extent of bikeways within the greater Bakersfield Metropolitan area. The Metropolitan Bakersfield General Plan Bikeway Master Plan, included in the Circulation Element of the General Plan, was prepared by the City of Bakersfield and Kern County.

Emergency Response Plan

This Plan, prepared by the City of Bakersfield, indicates emergency evacuation routes that would be used in emergency situations, as well as other specific measures related to emergency preparedness.

Regional Transportation Plan

The Regional Transportation Plan (RTP) for Kern County identifies future transportation improvements needed to serve the projected transportation needs of the County. The RTP details the existing transportation systems, sets goals, policies, and projects, and identifies funding mechanisms for these projects. Transportation projects identified in the RTP include highway, street, and roadway projects; mass transportation; railroad; and other programs and projects related to the transportation needs of the County.

Solid Waste Management Plan

This plan is a comprehensive guide for all solid waste management activities in the County. The plan identifies the existing solid waste generation and disposal facilities in Kern County, estimates future solid waste disposal demand and identifies programs to meet this future need.

Hazardous Waste Management Plan (HWMP)

This Plan focuses on the siting of hazardous waste disposal facilities, the transport of hazardous waste in the County, protection of water resources from hazardous waste contamination and public education concerning the use and disposal of hazardous waste.

4.11.4 Impacts and Mitigation Measures

Methodology

The potential impacts associated with the proposed Project are evaluated on a qualitative basis through a comparison of the existing land use and the proposed land uses. The change in the land use on the Project site is significant if the effect described under the Thresholds of Significance below occurs as a result of the proposed actions. The evaluation of Project impacts is based on professional judgment, analysis of the County's visual resources policies and the significance criteria established in Appendix G of the State CEQA Guidelines, which the County has determined appropriate for this RDEIR.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:

- Physically divide an existing community or contribute to the decline of an existing community (a physical change that interrupts the cohesiveness of the neighborhood);

- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; and/or

- Conflict with any applicable habitat conservation plan or natural community conservation plan.

The analysis of the existing environmental and impact analysis indicate that this proposed Project could not result in a significant environmental impact to land use.

Project Impacts

Impact 4.11-1: The Project Would Physically Divide an Existing Community or Contribute to the Decline of an Existing Community.

The proposed Project currently consists of land under agricultural production or fallow agricultural land. A steel storage building associated with agricultural activities is located in the eastern portion of the site, near South Union Avenue. The majority of the Project site is currently designated R-IA (Resource-Intensive Agriculture) and HC (Highway Commercial), with the HC (Highway Commercial) designation located in the southwestern area of the Project site. The proposed Project has a zoning classification of A (Exclusive Agriculture).

Existing land uses surrounding the proposed Project site include agricultural, residential, and industrial uses. The residential uses consist of a small cluster of single-family homes located to the east of the proposed Project. However, areas south and east of the proposed Project are designated for service industrial and highway commercial uses. Given that the proposed Project would develop industrial and commercial facilities in an area with an existing land use mix of industrial and residential, the proposed Project would not physically divide an already established community or neighborhood. Implementation of the proposed Project would not drastically alter the community characteristics in such a manner that would physically divide or contribute to the decline of an established community or neighborhood.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.11-2: The Project Would Conflict with Applicable Land Use Plan, Policy or Regulation of an Agency with Jurisdiction Over the Project.

The proposed Project would require an amendment to the Metropolitan Bakersfield General Plan and a concurrent change to the County of Kern zoning classification. This would result in a conversion of approximately 314.30 acres of agricultural uses and vacant land to industrial uses. The proposed Project has been reviewed for consistency with goals and policies as set forth in the Metropolitan Bakersfield General Plan.

As described in Section 3.0, *Project Description*, the proposed Project includes an amendment to the Land Use Element of the Metropolitan Bakersfield General Plan, amending the existing land use designation from R-IA (Resource – Intensive Agriculture) to LI (Light Industrial), SI (Service Industrial), GC (General Commercial), and HC (Highway Commercial). The subsequent zone change would consist of the removal of the existing A (Exclusive Agriculture) zoning classification and rezone the Project site M-1 PD (Light Industrial, Precise Development Combining), M-2 PD (Medium Industrial, Precise Development Combining), CH PD (Highway Commercial, Precise Development Combining), and C-2 PD (General Commercial, Precise Development Combining). The General Plan Amendment (GPA) and zone change (ZCC) would permit development of a light to medium industrial park containing approximately 4,613,004 square feet (net building area) of warehousing, distribution, and retail showroom uses. In addition, two conditional use permits (CUPs) would permit the development of a sewer treatment plant and a water treatment plant.

Table 4.11-2, *Consistency Analysis with Metropolitan Bakersfield General Plan Goals and Policies for Land Use* (above), assesses the proposed Project's relationship to pertinent goals and policies of the Metropolitan Bakersfield General Plan. Note that goals and policies not included in the assessment are omitted because they have either a negligible relationship or no relationship to the proposed Project or surrounding area. The analysis contained in Table 4.11-2 concludes that there would be no significant consistency impacts of the proposed Project associated with the Metropolitan Bakersfield General Plan goals and policies.

The proposed Project was reviewed and determined to be consistent with the following regional plans: Air Quality Attainment Plan, Metropolitan Bakersfield General Plan Bikeway Master Plan, Regional Transportation Plan, Solid Waste Management Plan, Metropolitan Bakersfield Habitat Conservation Plan and Hazardous Waste Management Plan.

Air Quality Attainment Plan

As the Project proposes to amend the Metropolitan Bakersfield General Plan land use designation to allow industrial uses as opposed to agricultural uses (the current land use and zoning designations), the AQAP anticipated growth of the population and economy within the Basin. The AQAP predicted the workforce in Kern County to increase along with a 2.2 percent population increase between 2002 and 2030. Thus, the proposed Project is viewed as continued growth anticipated by the AQAP (refer to Section 4.3, *Air Quality*, for further discussion). The proposed Project's consistency with the San Joaquin Valley Air Pollution Control District (SJVAPCD) AQAP is also addressed in this Recirculated Draft EIR in Section 4.3, *Air Quality*.

Metropolitan Bakersfield General Plan Bikeway Master Plan

The proposed Project would not affect the City's Metropolitan Bakersfield General Plan Bikeway Master Plan. Bike lanes would be implemented as appropriate along roadways when full improvements are completed.

Regional Transportation Plan

The proposed Project would implement roadway improvements, such as installation of traffic signals and the widening of roadway segments and/or improve intersections on a fair-share basis. These improvements would be consistent with the policies or planned projects of the RTP (refer to Section 4.16, *Transportation and Traffic*, for further information).

Solid Waste Management Plan

Solid waste disposal would be in accordance with the County's Solid Waste Management Plan. Refer to Section 4.15, *Public Services*, and Section 4.17, *Utilities*.

Hazardous Waste Management Plan

Due to the previous oil drilling and gas production activities on-site, the proposed Project would be required to properly dispose of any contaminated soil within the Project site prior to construction. The proposed Project is located on a site that has been historically used for agricultural uses. Therefore, there is potential for contaminated soil to be encountered during construction. In addition, although the Project site has not been identified as being located in an area that has been designated as a candidate site or facility for hazardous materials disposal, removal of hazardous materials on the Project site is required prior to construction. In addition, the proposed Project may result in increased risks from hazardous materials and appropriate rules and regulations would adhere to the completed Project. Therefore, the proposed Project is subject to the Kern County and Incorporated Cities Hazardous Waste Management Plan as discussed in detail in Section 4.9, *Hazards and Hazardous Materials*.

Mitigation Measures

MM 4.11-1: **Master Precise Development Plan.** Prior to the issuance of any grading or building permit issued on the proposed project site, the project proponent shall process through the Kern County Planning and Natural Resources Department a Master Precise Development Plan in accordance with the requirements identified in Chapter 19.56 of the Kern County Zoning Ordinance.

1. All future changes to the physical environment of the site and or the specific characteristics of the existing uses of the site, either by a Master Developer or subsequent future land owners shall require revision and/or modification of the Master Precise Development Plan in accordance with Chapter 19.56 of the Kern County Zoning Ordinance.

2. The following thresholds have been established for the project site.

a. The proposed uses on the site shall not exceed a maximum of 4,613,0045~~,134,253~~ square feet of industrial and/or commercial use as determined by the Kern County Planning Director.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.11-3: The Project Would Conflict with Applicable Habitat Conservation Plan or Natural Community Conservation Plans.

The Project site is located within the permitted area of the MBHCP. The MBHCP addresses mitigation and compensation for the loss of endangered species habitat and impacts on endangered species within the Metropolitan Bakersfield area. The development of the site would require the payment of mitigation fees for the preservation of natural habitat areas in the area (refer to Section 4.4, *Biological Resources*).

Mitigation Measures

No mitigation measures beyond compliance with the Metropolitan Bakersfield Habitat Conservation Plan is required. No additional mitigation measures are proposed.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

The area influenced by cumulative land use effects related to adjacent parcels and the surrounding planned development areas is described in Table 3-5, *Cumulative Projects List* (refer to Chapter 3, *Project Description*). Related land use projects in the surrounding areas have been: (1) submitted for plan processing; (2) approved by the County of Kern and City of Bakersfield; and/or (3) engaged in active construction programs. While the surrounding area is not at buildout, and as yet is relatively rural in nature, the proposed Project would contribute to a cumulative influence on proposed land uses in and around the Project area.

The anticipated proposed Project impacts in conjunction with cumulative development in the site vicinity would increase industrial uses and result in the loss of open space and mineral petroleum uses in the local vicinity. Potential land use impacts are site-specific and require evaluation on a case-by-case basis. This is true with regard to land use compatibility impacts, which are generally a function of the relationship between the interactive effects of a specific development site and those of its immediate environment. Development of the proposed Project site and surrounding planning area is anticipated to occur in accordance with the Metropolitan Bakersfield General Plan, and in accordance with zoning classifications. Potential cumulative effects upon land use and planning are not anticipated to be significant.

Mitigation Measures

No mitigation beyond compliance with the goals, policies, and implementation measures of the Metropolitan Bakersfield General Plan and the Metropolitan Bakersfield Habitat Conservation Plan is required. No additional mitigation measures are proposed.

Level of Significance after Mitigation

Impacts would be less than significant.

Section 4.12

Mineral Resources

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Section 4.12
Mineral Resources

4.12.1 Introduction

The purpose of this section is to evaluate existing mineral resources and the potential impacts on mineral resources, oil and gas, sand and gravel, and any other mineral resources of the proposed Project. This section also describes the environmental and regulatory settings. Mitigation measures are recommended to avoid or lessen impacts, as necessary. Information within this section is based on California Geological Survey (CGS, formerly the Department of Conservation Division of Mines and Geology [DMG]), California Division of Oil, Gas & Geothermal Resources (DOGGR) and Kern County publications and maps, in addition to the Hazardous Materials Evaluation prepared for the proposed Project. A Hazardous Materials Evaluation (2008 HME) was prepared by McIntosh & Associates in November 2008 (refer to Appendix N). A second HME (2017 HME) was prepared by McIntosh & Associates in July 2017. See Appendix F, *Hazardous Materials Evaluation*, and Appendix N, *Original Technical Studies*.

4.12.2 Environmental Setting

Local Character

Metropolitan Bakersfield General Plan

There are approximately 25 oil fields either partially or completely within the Metropolitan Bakersfield General Plan area. The closest oil fields to the proposed Project include Stockdale and Mountain View oil fields. In addition, there are three sand and gravel extraction areas within the Metropolitan Bakersfield General Plan area, primarily along the floodplain and alluvial fan of the Kern River.

Project Site

According to the State Division of Oil, Gas, and Geothermal Resources (DOGGR), the proposed Project is not located within an oil or gas field. One abandoned well, "Sea Cliff-Houghton" 1, is located in the northwest portion of the proposed Project. This well was drilled by Big McKittrick Oil Company of California between November 1934 and June 1935. No oils shows were reported during the drilling period; one gas show was reported at a depth interval from 2,077 feet to 2,079 feet. The well was abandoned in October 1935.

Regional Character

Kern County

Kern County is one of the largest producers of mineral products in California with a production value of almost one-quarter of the State's total. The principal County mineral product is petroleum (an organic derivative material) and related products, which contribute about 75 percent of the total valuation of all County mineral products. The remainder is comprised of sand and gravel, borax, cement products and other construction and gem-like minerals including gold. The majority of the proposed Project is currently designated as Map Code R-IA (Resource - Intensive Agriculture) and a small portion of the southwest corner of the site as Map Code HC (Highway Commercial) by the Metropolitan Bakersfield General Plan.

Kern County produces more oil than any other county in California and is one of the nation's leading petroleum-producing counties. Mineral and petroleum resources are basic to Kern County's economy. As new recovery technologies come into use, petroleum extraction should continue in economic importance. And as long as new urbanization is restricted in areas having important mineral and petroleum resources, the future production of these resources remains promising.

The history of the oil industry in Kern County dates back to the 19th century. The Lakeview Gusher near Taft (of the Midway-Sunset Oil Field) was literally a lake of oil held back by check dams, resulting in the accumulation of nine million barrels of oil in the ground. The Kern River Oil Field was established in 1899 when a 43-foot well dug by hand, by Tom Means, resulted in another sudden stream flow of oil. By 1903, 796 wells produced almost 17 million barrels of oil from the Kern River field. Over the next decade, the Kern River and West Side oil fields set production records and pioneered improvements in oil extraction. In the mid-1930s, several valley oil fields were found in large anticlines in Miocene oil sands beneath the valley floor. These discoveries were made following the advent of the reflection seismograph. Discoveries included the Ten Section, Greeley, Rio Bravo North, Coles Levee, South Coles Levee and Strand oil fields. Today, 71 active fields still continue to produce from the originally established 98 oilfields.

Oil Resources

In order to locate oil, companies drill through the earth to the deposits deep below the surface. The oil is then pumped from below the ground by oilrigs. Typically, oil then travels through pipelines and is stored in large tanks until it is sent to various places to be used for the production of thousands of products. Oil must be changed or refined into other products before it can be used. At oil refineries, crude oil is split into various types of products by heating the thick black oil (crude). Some of the products include gasoline, diesel fuel, aviation fuel, home heating oil, oil for ships and oil to burn in power plants to make electricity. In California, approximately 74 percent of our oil is used for transportation (i.e., cars, planes, trucks, etc.). Oil is found in 18 of the 58 counties in California.

Kern County crude oil is known as "heavy" oil. It is very thick and is difficult to pump from the ground. One of the innovations of the industry is to inject steam into the well, heating up the crude and making it easier to pump. This extends the life of the oil field but is also expensive. Drilling

activity in Kern County hit its peak in the 1950's, and the number of new wells being drilled has since stabilized.

The vast majority of the state's oil activity occurs in the County of Kern where four of the nation's seven most productive oil fields are located. Several of the County's "giant" oil fields are located entirely or partially within the City of Bakersfield. According to the 2016 Annual Report of the State Oil and Gas Supervisor, Kern County produced approximately 134,114,693 oil barrels (bbl) from 42,045 active producing wells (DOGGR 2017). Mineral resources in Kern County include numerous mining operations that extract a variety of materials, including sand and gravel, stone, gold, dimensional stone, limestone, clay, shale, gypsum, pumice, decorative rock, silica, and specialty sand. The State Geologist has classified 2,971 square miles of land in Kern County as Mineral Resource Zones (MRZs) of varying significance.

Natural Gas

Natural gas is lighter than air and is produced in two basic forms, associated gas and non-associated gas. Associated gas is produced along with crude oil while non-associated gas is produced from gas fields that do not produce any crude oil. Natural gas is found underground and then pumped from below ground and transported in large pipelines. Because natural gas usually has no odor and can't be seen, it is mixed with a chemical that gives it an easy to detect smell in the event of an accidental leak. From the storage tanks, natural gas is sent through underground pipelines to its destination (consumer) to be used for cooking, heating, manufacturing and to power plants to make electricity. California's net natural gas production in the year 2016 totaled 156,005,114 million cubic feet (including Outer Continental Shelf). Kern County accounted for 113,014,940 million cubic feet of this natural gas, representing approximately 72 percent of the total natural gas produced statewide.

Project Site

Pacific Gas and Electric Company (PG&E) natural-gas transmission pipeline *No. L-300B*, is located within the proposed Project boundaries. This pipeline was installed in 1954, is 34 inches in diameter, and operates at 700 pounds per square inch (psi). It traverses southeasterly across the property from SR-99 in the northwest to the south line bordering the easternmost portion of the site. The pipeline then traverses due east for one-quarter-mile, passing through PG&E valve station 269B and the original PG&E station situated at South Union Avenue. Refer to Figure 4.12-1, *Natural Gas Pipeline Map*, for an illustration of the location of the on-site pipeline. A 4-inch-diameter, steel, subsurface natural gas distribution line operating at 60 psi was also identified that traverses the west side of South Union Avenue.

Sand and Gravel

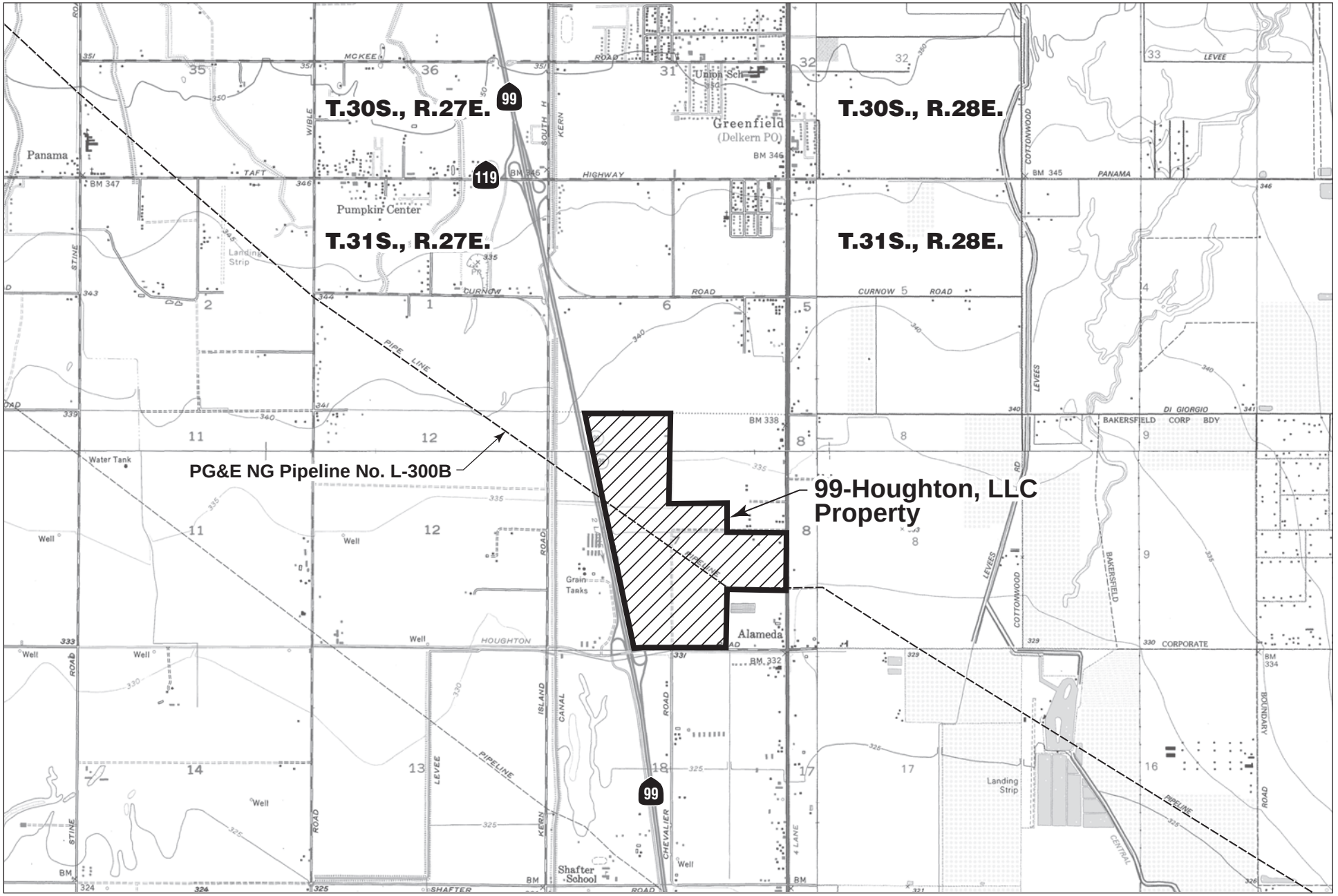
Sand and gravel have been determined to be important resources for construction, development and physical maintenance, from highways and bridges to swimming pools and playgrounds. The availability of sand and gravel affects construction costs, tax rates and affordability of housing and commodities. The State of California has statutorily required the protection of sand and gravel operations. Because transportation costs are a significant portion of the cost of sand and gravel, the

long-term availability of local sources of this resource is an important factor in maintaining the economic attractiveness of a community to residents, business, and industry.

Project Site

The proposed Project does not contain sand and gravel resources. There is no evidence of past or current sand and gravel extraction operations occurring within the site or immediate Project vicinity.

The major resources of sand and gravel in Kern County are in stream deposits along the eastern side of the San Joaquin Valley and in the Sierra Nevada foothills, and in alluvial fan deposits along the north flank of the San Emigdio and Tehachapi Mountains at the southern end of the County. Most of the recent alluvium in the San Joaquin Valley floor is composed of sand used as a source of road base material. According to the Metropolitan Bakersfield General Plan, there are three sand and gravel extraction areas within the Metropolitan Bakersfield General Plan area, primarily along the floodplain and alluvial fan of the Kern River. None of these sand and gravel extraction areas are within or in close proximity to the proposed Project site.



SOURCE: USGS California Quadrangles; Conner, Photorevised 1973, Gosford, Photorevised 1973, Lamont, 1992, Weed Patch, 1992,

0 3000'
APPROXIMATE

99 HOUGHTON INDUSTRIAL PARK PROJECT
CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07
AGRICULTURAL PRESERVE #13 EXCLUSION

Natural Gas Pipeline Map

Figure 4.12-1

Other Mineral Resources

The following section describes additional mineral resources relevant to local and regional character.

Gold has been the most important metallic mineral mined in Kern County in terms of total dollar value. It has been recovered by both placer and lode mining mainly in the Sierra Nevada and desert regions. While fluctuation in gold prices has caused a reactivation of interest in the commodity over the last two decades, continuous mining activity has been somewhat limited. Placer gold was mined before 1900, with the greatest number of deposits being mined during the late 1920s and 1930s. Principal placer deposits are in the Rand District, El Paso Mountains and along the Kern River. Approximately 1,500 gold claims have been registered in Kern County with approximately 280 of those claims activated as either lode or placer mines. Total amount of gold extracted from Kern County sites is not available since records were not kept during the more active lode mining activities prior to 1900. Placer yields are in excess of 32,000 fine ounces, a 1957 figure, but not likely to be much more since that date.

The Metropolitan Bakersfield General Plan EIR (Section 4.14, *Mineral and Energy Resources*) identifies the foothills of the Sierra Nevada's as having some potential as fossil and gemstone sites. These mineral resources, although possessing scientific and cultural value, are not considered a major economic resource.

Project Site

There is no evidence of other mineral resources being located within the proposed Project site and/or of mining operations occurring within the site or immediate Project vicinity.

4.12.3 Regulatory Setting

Oil, gas, and minerals, like land, are considered forms of property. The mineral resources that are beneath a tract of land (i.e., the mineral estate or subsurface estate) can be owned, and the ownership provides the holder with the mineral rights or subsurface rights, whereas, surface rights refer to ownership of the land (i.e., the surface estate) and the right to use the surface. When different parties own the surface and subsurface estates, it is referred to as split estate or severed estate lands.

The separation of surface and subsurface rights can occur through a mineral reservation. Severance by mineral reservation may occur if a party owning both surface and subsurface rights sells the land, but retains (or reserves) all or a portion of the mineral, oil and/or gas rights. To preserve title to the subsurface estate, the mineral owner has to record their mineral reservation with the county clerk and recorder's office or other government land title office. Mineral reservations often occur when lands are originally patented (e.g., the federal government sells the land but holds onto the mineral rights).

The following regulatory discussion provides applicable Federal, State, local goals, policies, regulations, codes and acts pertinent to development and operation of the proposed Project.

Federal

Bureau of Land Management

The Bureau of Land Management (BLM), an agency within the United States Department of the Interior, administers 261 million surface acres of America's public lands, located primarily in two Western States. The BLM sustains the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations. The public lands provide a myriad of opportunities for commercial activities. Commercially valuable natural resources include energy and mineral commodities, forest products, grazing forage, and special uses such as rights-of-way for pipelines and transmission lines.

BLM is responsible for managing commercial energy and mineral production from the public lands in an environmentally sound and responsible manner. BLM is responsible for the leasing of Federal oil, gas, and geothermal minerals. BLM is also responsible for supervising the exploration, development, and production operations of these resources on both Federal and Indian lands. The proposed Project is privately owned and is not, in part or in total, under ownership of the BLM.

State

Surface Mining and Reclamation Act of 1975

The mineral resources addressed in this report pertain to those resources that are classified under the State Mining and Reclamation Act of 1975 (SMARA). The SMARA mandated the initiation by the State Geologist of mineral land classification in order to help identify and protect mineral resources in areas within the State subject to urban expansion and other irreversible land uses which would preclude mineral extraction. SMARA also allowed the designation of lands containing mineral deposits of regional or statewide significance. SMARA was amended (1980) to provide for the classification of non-urban area subject to land-use threats incompatible with mining. The classification of land within California takes place according to a priority list that was established by the State Mining and Geology Board (SMGB) in 1982, or when the SMGB is petitioned to classify a specific area. Currently, the State Geologist's SMARA classification activities are carried out under a single program for urban and non-urban areas of the state. Mineral lands are mapped using the California Mineral Land Classification System according to jurisdictional boundaries, mapping all mineral commodities at one time in the area, including aggregate, common clay and dimensions stone. Priority is given to areas where future mineral resource extraction could be precluded by incompatible land use or to mineral resources likely to be mined during the 50-year period following their classification. Detailed mineral land classification and designation reports provided by the State Mining and Geology Board are on file at the City of Bakersfield and County of Kern.

The SMGB established Mineral Resources Zones to designate lands that contain mineral deposits. Accordingly, the Mineral Resource Zone (MRZ) classification system is used to evaluate an area's mineral resources pursuant to SMARA. A "resource" is a concentration of naturally occurring solid, liquid, or gaseous material in such form and amount that economic extraction of a commodity from the concentrations is currently potentially feasible. A "reserve" is that part of the resource base which

could be economically extracted or produced within the foreseeable future. For any given mineral resource, an area may be classified as MRZ-1, MRZ-2, MRZ-3, or MRZ-4, as follows:

- MRZ-1: Areas where the available geologic information indicates that no significant mineral deposits are present, or where it is judged that no significant likelihood exists for their presence.
- MRZ-2a: Areas where the available geologic information indicates that significant mineral deposits are present.
- MRZ-2b: Areas where the available geologic information indicates that there is likelihood for the presence of significant mineral deposits.
- MRZ-3a: Areas where the available geologic information indicates that mineral deposits exist, the significance of which cannot be determined from available data.
- MRZ-3b: Areas where the available geologic information indicates that mineral deposits are likely to exist, the significance of which cannot be determined from available data.
- MRZ-4: Areas where available geologic information is inadequate for assignment into any other MRZ, or where there is not enough information available to determine the presence or absence of mineral deposits.

The MRZ classifications are applied based on available geologic information and upon geologic appraisal of the mineral resource potential of the land, including geologic mapping and other information on surface exposures, drilling records, and mine data; and on socioeconomic factors such as market conditions and urban development patterns.

Division of Oil, Gas, and Geothermal Resources (DOGGR)

DOGGR is responsible for supervising the drilling, operation, maintenance, plugging, and abandonment of oil, gas, and geothermal wells. DOGGR's regulatory program promotes the sensitive development of oil, natural gas, and geothermal resources in California through sound engineering practices, prevention of pollution, and implementation of public safety programs. To implement this regulatory program, DOGGR requires avoidance of building over or near plugged or abandoned oil and gas wells or requires the remediation of wells to current DOGGR standards.

All oil and gas wells drilled and constructed in California must adhere to strict requirements. These requirements include general laws and regulations regarding the protection of underground and surface water, and specific regulations regarding the integrity of the well casing, the cement used to secure the well casing inside the bore hole, and the cement and equipment used to seal off the well from underground zones bearing fresh water and other hydrocarbon resources. (See California Public Resources Code sections 3106, 3203, 3211, 3220, 3222, 3224, 3255; Title 14 of the California Code of Regulations, sections 1722.2, 1722.3, 1722.4, etc.). In addition, the DOGGR requires avoidance of building over or near plugged or abandoned oil and gas wells or requires the remediation of wells to current DOGGR standards.

DOGGR also has the authority under the CCR to adopt field rules for oil and gas pools or zones in a field when sufficient geologic and engineering data is available from previous drilling operations. The administrative boundaries of each pool or zone for which field rules have been adopted and geologic and engineering information is available to accurately describe subsurface conditions are designated through a ministerial process by DOGGR. Applicable field rules identify down hole conditions and well construction information that oil and gas operators should consider when drilling and completing onshore oil and gas wells. In addition to DOGGR facilities regulations, operators that have facilities in designated areas must have Spill Prevention, Control and Countermeasure Plans per U.S. Environmental Protection Agency (EPA) requirements.

In California, wells that inject fluids associated with oil and natural gas production operations (Class II injection wells) are regulated by the DOGGR under the Underground Injection Control (UIC) Program. Injection operations regulated under the UIC Program include water flood, steam flood, cyclic steam, water disposal, gas storage, and other enhanced oil recovery projects. DOGGR's UIC program is monitored and audited by the EPA because in 1982 DOGGR entered into a primacy agreement with the EPA for regulation of Class II injection wells under the federal Safe Drinking Water Act (SDWA). The requirements of DOGGR's UIC Program are found in the Public Resources Code (PRC), the Safe Drinking Water Act, and in the state and federal regulations. The main features of the UIC Program include permitting, inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach.

On November 15, 2013, the DOGGR began the formal rulemaking process for Well Stimulation Treatment Regulations, which, at that time were to go into effect no later than January 1, 2015. Interim regulations went into effect on January 1, 2014, which require oil and gas well operators to submit notification of well stimulation treatments and various types of data associated with well stimulation operations, including chemical disclosure of well stimulation fluids, to the DOGGR. In addition, the DOGGR is required to compile submitted information regarding these activities and make it available to the public in a format that is easily searchable.

On June 20, 2014, Governor Brown signed into law Senate Bill (SB) 861 (Committee on Budget and Fiscal Review, Chapter 35, Statutes of 2014), which took effect immediately. SB 861 amended DOGGR's authority to use emergency rulemaking to establish interim regulations for implementation of SB 4. As allowed under the new law, the readopted SB 4 interim well stimulation treatment regulations will remain in effect until the most current version and status if the final well stimulation regulations went into effect July 1, 2015 (DOGGR 2017).

California Geological Survey (Formerly California Division of Mines and Geology)

The California Geological Survey (formerly the California Division of Mines and Geology within the State Department of Conservation) has responsibility to identify and assist in the utilization of mineral deposits, and to identify geological hazards, including fault locations.

Local

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan lists the issues, goals, policies, and implementation measures related to oil, natural gas, sand and gravel, as other minerals and energy resources in the County, as contained in the Energy Element. Project implementation would be guided in part by the goals, policies, and implementation programs, which are presented in Table 4.12-1, *Metropolitan Bakersfield General Plan Goals and Policies for Mineral Resources*.

Table 4.12-1. Metropolitan Bakersfield General Plan Goals and Policies for Mineral Resources

Goals and Policies: Mineral Resources Element
Goal #1: Protect areas of significant resources potential for future use.
Goal #2: Document areas of current mineral and energy resource extraction, as a basis for land use and conservation policies and programs.
Goal #3: Avoid conflicts between the productive use of mineral and energy resource lands and urban growth.
Goal #4: Protect land, water, air and visual resources from environmental damage resulting from mineral and energy resource development.
Policy #1: Maintain maps and descriptions of potential mineral and energy resources as a basis for policy and program implementation.
Policy #2: Document the location, status and long-term viability of sand and gravel quarries and petroleum drilling sites for purposes of avoiding near and long-term land use conflicts and provide a basis of compliance monitoring.
Policy #3: Encourage and support the exchange of information on mineral and energy resources between private industry, City of Bakersfield and Kern County.
Policy #4: Land use decisions shall recognize the importance of identified mineral resources and need for conservation of resources identified by the State Mining and Geology Board.
Policy #5: Protect significant mineral and petroleum resource areas, including potential sand and gravel extraction areas.
Policy #6: Continue implementation of the Kern River Channel Maintenance Program for extraction of river sand and gravel.
Policy #7: Promote development of compatible uses adjacent to mineral extraction areas.
Policy #8: Allow development of resource extraction sites subject to the conditional use permit procedure in zones where such uses are not prohibited by right and where it can be shown that the proposed extraction uses are compatible with surrounding areas.
Policy #9: Encourage preservation of any known deposits of gemstones and fossils.
Policy #10: Implement, as appropriate, the California Environmental Quality Act to minimize land use conflicts and reduce extraction operations.
Policy #11: Prohibit incompatible development in areas, which have a significant potential to harm public health, safety and welfare due to mineral and petroleum extraction and processing.
Policy #12: Design resource extraction operations subject to discretionary permits to maintain the integrity of areas of "high environmental quality" and unique scenic value.
Policy #13: Require surface mineral resource extraction sites to have plans and procedures for land reclamation, conforming with the requirements of the State Mining and Geology Board, to be implemented upon completion of extraction operations at each site or portion thereof.

Table 4.12-1. Metropolitan Bakersfield General Plan Goals and Policies for Mineral Resources
Goals and Policies: Mineral Resources Element
Policy #14: Review all discretionary mineral or petroleum development including renewal of existing authorizations, under the policies and procedures of the California Environmental Quality Act.
Policy #15: Require petroleum production sites in urban areas, which are subject to discretionary permits to install peripheral landscaping to help reduce the noise, dust and visual impacts to adjacent sensitive receptors and public ways.
Policy #16: Require all mineral development to be predicated on appropriate reclamation plans that meet the standards of the State Surface Mining and Reclamation Act and the implementing guidelines of the State Mines and Geology Board, and/or the standards of the State Division of Oil and Gas. Reclamation/restoration of the sites shall be done at each phase of development or as extraction is completed.

Kern County Zoning Ordinance (Title 19 of the Ordinance Code of Kern County)

Chapter 19.98 Oil and Gas Production

This chapter of the Kern County Zoning Ordinance contains the procedures and standards that apply to all exploration drilling and production activities related to oil, gas, and other hydrocarbon substances carried out in unincorporated Kern County. The purpose of this chapter is to promote the economic recovery of oil, gas, and other hydrocarbon substances in a manner compatible with surrounding land uses and protection of the public health and safety.

This chapter, along with related parts of the zoning ordinance, was amended by the Kern County Board of Supervisors on November 9, 2015 to require a ministerial permit for all oil and gas operations along with updated implementation standards and mitigation measures. A comprehensive project level oil and gas activities EIR was certified and includes mitigation measures to address environmental impacts of pre-drilling exploration, well drilling, and the operation of wells and other oil and gas production–related equipment and facilities, including exploration, production, completion, stimulation, reworking, injection, monitoring and plugging and abandonment. This required permit is in conjunction with and coordinated with the permit issued by DOGGR.

Kern County Fire Department

A set back is a minimum distance required by zoning to be maintained between structures or between structures and property lines. Kern County does not currently have any adopted zoning ordinance specifically addressing set back distances for petroleum and natural gas pipelines. However, the Kern County Fire Department has set back distance requirements for buildings constructed adjacent to transmission pipelines that transport petroleum and natural gas. The Pipeline Development Policies of the Kern County Fire Department are as follows:

- No habitable portion of a structure shall be construction within 50 feet of a gas main, or transmission line, or refined liquid product line with 36 inches of cover;

- No structure may be within 40 feet of a hazardous liquids pipeline bearing refined product, with 48 inches or more of cover;
- No habitable portion of a structure shall be built within 30 feet of a crude oil pipeline operating at 20 percent of its design strength;
- Prior to or concurrent with filing of a final map, a covenant shall be recorded on all lots of this tract, or portion thereof, which are within 250 feet of any gas transmission line. Covenant shall acknowledge proximity of pipeline easement to said property and describe the name, type and dimension of the pipelines. Prior to recordation, the subdivider shall submit and obtain approval covenant wording with the City Attorney, Office of Environmental services and City Engineer.

4.12.4 Impacts and Mitigation Measures

Methodology

In accordance with the California Environmental Quality Act (CEQA), the effects of a project are evaluated to determine if they will result in a significant adverse impact on the environment. An EIR is required to focus on these effects and offer mitigation measures to reduce or avoid any significant impacts that are identified. The criteria, or standards, used to determine the significance of impacts may vary depending on the nature of the proposed Project. Mineral Resource impacts resulting from the implementation of the proposed Project could be considered significant if they cause any of the following results.

Thresholds of Significance

- The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; and/or
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

The analysis of the existing environment and the impact analysis indicate that this proposed Project could result in a significant environmental impact if it would result in a loss of mineral resources, if not mitigated.

Project Impacts

Impact 4.12-1: The Project Would Not Result in the Loss of Availability of a Known Mineral Resource That Would be of Value to the Region and the Residents of the State

The proposed Project is not located within the administrative boundary of an oil or gas field. One previously abandoned exploration well, "Sea Cliff-Houghton" 1, is located in the northwest corner of

the Project site. The well was installed in November 1934 and drilled to approximately 6,756 feet, where it had no oil shows and one gas show at a depth interval of 2,077 to 2,079 feet. The well was abandoned as a dry hole with mud in the casing in October 1934 (refer to Appendix F, *Hazardous Materials Evaluation*). No other mineral resources or mineral resource facilities are known to occur on the Project site.

The lack of oil shows in prospect well "Sea Cliff-Houghton" 1 indicates that commercial quantities of oil and/or natural gas are not likely to underlie the proposed Project. As discussed in Section 4.9, *Hazards/Hazardous Materials*, the well must be reabandoned to current DOGGR and Kern County standards. Impacts would be less than significant because no known or potential mineral resources are present within, or in close proximity to, the proposed Project.

The Project does not propose mineral and/or energy resource development. However, PG&E currently operates a natural gas pipeline, number L-300B, that traverses the Project site (refer to Figure 4.12-1, *Natural Gas Pipeline Map*). Transport of natural gas through this pipeline would not be impeded by the proposed Project implementation. Mitigation would be required in order to maintain PG&E access to the pipeline. In addition, development on-site, would, also be required to comply with applicable State and local regulations in order to reduce potential impacts on health and safety related to this pipeline to less than significant levels (refer to Section 4.9, *Hazards/Hazardous Materials*). Impacts would be less than significant.

Mitigation Measures

Implementation of MM 4.9-6, 4.9-7, 5.9-9, and 4.9-10.

MM 4.12-1: **Natural Gas Pipeline Easements.** The Pacific Gas and Electric (PG&E) natural gas pipeline easement shall be included on all maps and grading plans to allow for continuous PG&E access for all maintenance activities.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.12-2: The Project Would Result in the Loss of Availability of a Locally Important Mineral Resource Recovery Site Delineated on a Local General Plan, Specific Plan or Other Land Use Plan.

Extraction and use of mineral resources is a significant economic and social value in Kern County. Challenges occur when oil production and mineral extraction activities are located in close proximity to incompatible land uses, such as residential. As discussed in Impact 4.12-1, above, the Project site is not located within the administrative boundaries of an oil or gas field. No oil shows were observed, and one natural gas show was observed at a depth interval or 2,077 to 2,079 feet in 1934-35. The DOGGR requires reabandonment of the prospect well "Sea Cliff-Houghton" 1.

There is no property within the proposed Project that is contained within an MRZ. Therefore, the proposed Project is not anticipated to result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Extraction and use of mineral resources is a significant economic and social value in Kern County. Challenges occur when oil production and mineral extraction activities are located in close proximity to incompatible land uses, such as residential. As discussed in Impact 4.12-1, above, the proposed Project is not located within the administrative boundary of an oil or gas field. No commercial shows of oil or natural gas have been withdrawn from prospect well "Sea Cliff-Houghton" 1. This prospect well is currently abandoned.

The proposed Project in not within an MRZ. Therefore, the proposed Project is not anticipated to result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Cumulative impacts to mineral resources would occur if the cumulative projects would result in the loss of oil or aggregate mineral resources. This proposed Project is not within an administrative boundary for oil or gas fields and is not within an area of aggregate mineral resources. Other projects in the Metropolitan Bakersfield area may occur within or near existing oil fields, as well as sand and gravel mining operations. However, where these resources have substantial remnant supplies, none of the cumulative projects would preclude continued extraction or production of these resources. In addition, because the proposed Project has a less than significant impact on mineral resources, it would not add to a cumulative loss of resources within Kern County. Therefore, cumulative impacts would not result.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Section 4.13

Noise

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Section 4.13
Noise

4.13.1 Introduction

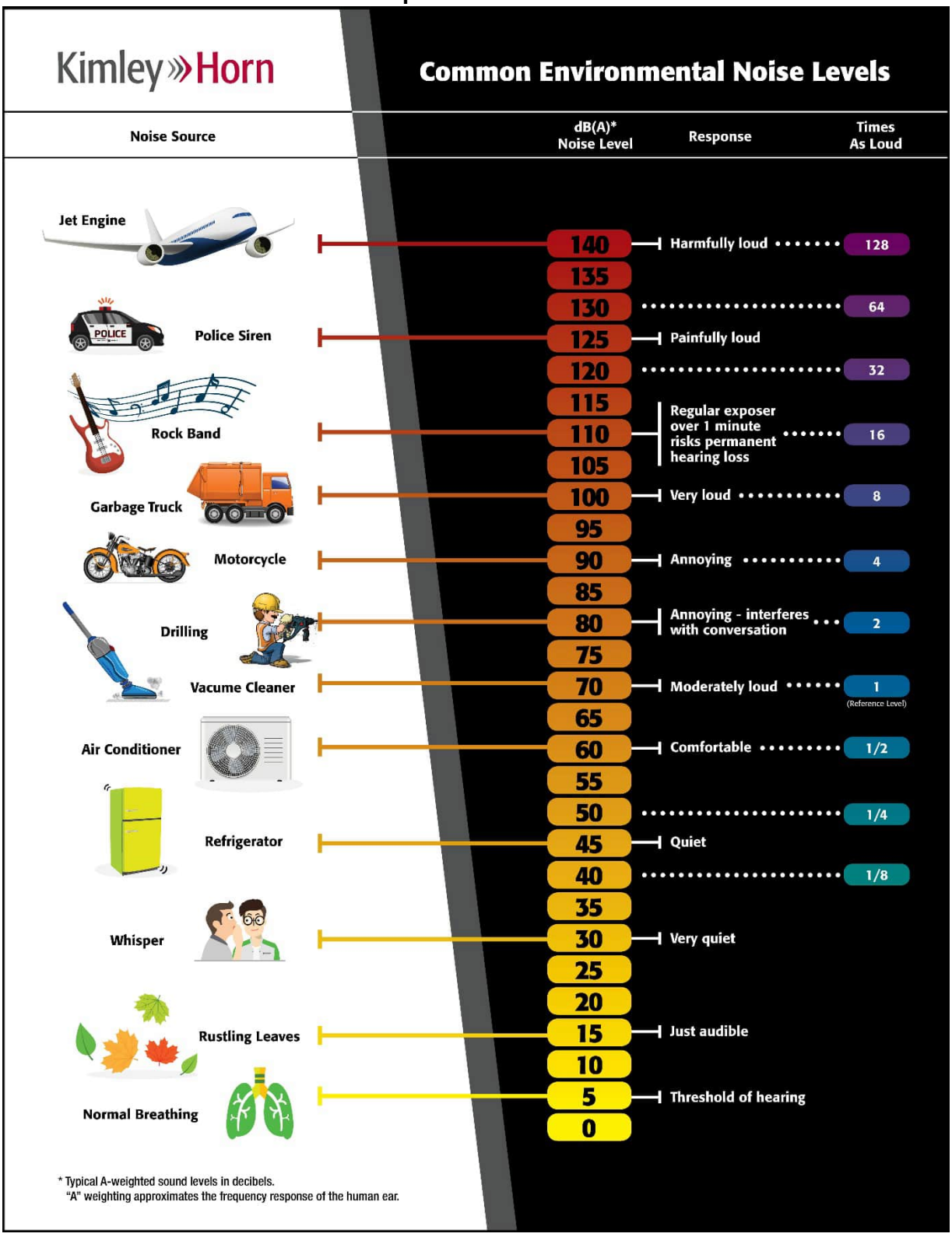
This section of the Recirculated Draft EIR addresses the potential noise impacts associated with construction and operation of the proposed Project. The noise section describes the existing conditions on the proposed Project site, the regulatory setting, the impacts of the proposed Project, and feasible mitigation measures to reduce impacts. An Environmental Noise Assessment was prepared by Bollard Acoustical Consultants, Inc. in April 2009. A second Environmental Noise Assessment was prepared by Bollard Acoustical Consultants, Inc. in May 2016 and an updated Environmental Noise Assessment was prepared in July 2017. See Appendix I, *Environmental Noise Assessment*, and Appendix N, *Original Technical Studies*.

Acoustical Terminology

Sound is technically described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. Noise is typically described as any unwanted or objectionable sound. The standard unit of measurement of the loudness of sound is the decibel (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against sound frequencies in a manner approximating the sensitivity of the human ear. The A-weighted sound level of traffic and other long-term noise-producing activities within and around a community varies considerably with time. Measurements of this varying noise level are accomplished by recording values of the A-weighted level during representative periods during the day.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range similar to how the Richter scale measures earthquake magnitudes. In terms of human response to noise, a sound 10 dBA higher than another is perceived to be twice as loud; 20 dBA higher, four times as loud; and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Examples of various sound levels in different environments are shown in Figure 4.13-1, *Sound Levels and Human Response*.

Figure 4.13-1 Sound Levels and Human Response



In most situations, a three-dBA change in sound pressure level is considered a "just-detectable" difference. A five-dBA change (either louder or quieter) is readily noticeable and a 10-dBA change is a doubling (if louder) or a halving (if quieter) of the subjective loudness. Sound from a small localized source (approximating a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates or drops-off at a rate of six dBA for each doubling of the distance (six dBA/DD). This decrease, due to the geometric spreading of the energy over an ever- increasing area, is referred to as the inverse square law. However, highway traffic noise is not a single, stationary point source of sound. The movement of the vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. Since the change in surface area of a cylinder only increases by two times for each doubling of the radius instead of the four times associated with spheres, the change in sound level is three dBA per doubling of distance. Numerous methods have been developed to measure sound over a period of time. These methods include (1) the community noise equivalent level (CNEL); (2) the equivalent sound level (L_{eq}); and (3) the day/night average sound level (L_{dn}). These methods and additional noise related terminology is described below.

Community Noise Equivalent Level (CNEL)

Cumulative noise metrics were developed to assess community response to noise. They are useful because they attempt to take into account the loudness and duration of the noise, the total number of noise events and the time of day these events occur in one single-number rating scale. They are designed to account for the known health effects of noise on people. CNEL is a 24-hour, time-weighted energy-average noise level based on dBA that measures the overall noise during an entire day. Noise that occurs during certain sensitive time periods is penalized for occurring at these times by adding decibels to its L_{eq} measurement. On the CNEL scale, noise between 7:00 AM and 10:00 PM is penalized by approximately five dB, to account for the greater potential for noise to interfere during these hours, as well as typically lower ambient (background) noise levels during these hours. Noise during the night (from 10:00 PM to 7:00 AM) is penalized by ten dB to attempt to account for our higher sensitivity to noise in the nighttime and the expected further decrease in ambient noise levels that typically occur in the night.

Equivalent Sound Level (Leq)

The equivalent sound level, abbreviated L_{eq}, is a measure of the exposure resulting from the accumulation of A-weighted sound levels over a particular time period (e.g., one-hour, eight-hour school day, nighttime or a full 24-hour day). However, because the length of the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric. Such durations are often identified through a subscript, for example $L_{eq(24)}$.

Conceptually, L_{eq} may be thought of as a constant sound level over the period of interest that contains as much sound energy as the actual time-varying sound level with its normal peaks and valleys. It is important to recognize, however, that the two signals (the constant one and the time-varying one) would sound very different from each other if compared in real life. Variations in the "average" sound level suggested by L_{eq} are not an arithmetic value, but a logarithmic ("energy-averaged") sound level. Thus, loud events clearly dominate any noise environment described by the metric.

Day/Night Average Sound Level (L_{dn})

The day/night average sound level (L_{dn}) is a measure of the 24-hour average noise level at a given location. It was adopted by the U.S. Environmental Protection Agency (EPA) for developing criteria for the evaluation of community noise exposure. L_{dn} is based on a measure of the average noise level over a given time period. The L_{dn} is calculated by averaging the L_{eq} for each hour of the day at a given location after penalizing the sleeping hours (from 10:00 PM to 7:00 AM) by 10 dBA to take into account the increased sensitivity of people to noises that occur at night. The sound level exceeded over a specified timeframe can be expressed as L_n (i.e., L_{90}, L_{50}, L_{10}, etc.). L_{50} equals the level exceeded 50 percent of the time; $L_{10,}$ ten percent of the time; etc.

Maximum Sound Level (Lmax)

The maximum sound level recorded during a noise event.

Noise (Exposure) Contours

Noise (exposure) contours illustrate (typical a line drawn on a diagram/map) a noise source indicating constant levels of noise exposure. CNEL contours are frequently utilized to describe a community's exposure to noise.

Sound Propagation and Attenuation

For purposes of sound propagation, noise sources may be classified as point sources or line sources. Point sources usually are localized, such as a piece of machinery, and at a distance, sound from such sources will propagate in a spherical pattern. Sound levels from point sources will attenuate or drop-off at the rate of six dB for each doubling of distance. Sound from line sources, such as a highway, propagates in a cylindrical pattern. Sound from line sources will attenuate at a rate of three dB per doubling of distance.

Additionally, sound levels also may be attenuated by air and ground absorption, and from shielding by natural or man-made obstacles in the sound path. Noise barriers (walls or earth berms) are features that are commonly constructed to interrupt noise propagation and reduce noise levels. Wind and atmospheric temperature inversions also influence sound propagation.

Vibration Characteristics

Vibration is a unique form of noise. It is unique because its energy is carried through structures and the earth, whereas, noise is simply carried through the air. Thus, vibration is generally felt rather than heard. Some vibration effects can be caused by noise; e.g., the rattling of windows from truck pass-bys. This phenomenon is related to the coupling of the acoustic energy at frequencies that are close to the resonant frequency of the material being vibrated. Typically, ground-borne vibration generated by man-made activities attenuates rapidly as distance from the source of the vibration increases. Vibration, which spreads through the ground rapidly, diminishes in amplitude with distance from the source. The ground motion caused by vibration is measured as particle velocity in inches per second and, in the U.S. is referenced as vibration decibels (VdB).

The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Sources within buildings such as operation of mechanical equipment, movement of people or the slamming of doors causes most perceptible indoor vibration. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel wheeled trains and traffic on rough roads. Ground type, distance between source and receptor, duration, and the number of perceived vibration events can all influence human and structural responses to vibration. The range of interest is from approximately 50 VdB, which is the typically background vibration velocity, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

4.13.2 Environmental Setting

Noise-Sensitive Land Uses

Certain land uses are particularly sensitive to noise, including schools, hospitals, rest homes, long-term medical and mental care facilities, and parks and recreation areas. Residential areas are also considered noise sensitive, especially during the nighttime hours.

The proposed Project is mostly vacant and used for agricultural purposes. Noise sensitive land uses in the immediate vicinity of the proposed Project include existing single-family residences to the east of the proposed Project. These uses may be affected by increased Project-related traffic noise on local area roadways and on-site noise sources.

Existing Noise Environment

The proposed Project consists of approximately 314.30 acres of fallow agricultural land. The topography of the site is relatively flat, sloping slightly from the northwest to the southeast. Elevations range from approximately 331 feet above mean sea level (msl) to 340 feet above msl. Existing noise sources located in the immediate vicinity of the proposed Project include traffic on local roadways and agricultural equipment.

Ambient Noise Measurements

The existing ambient noise environment in the immediate project vicinity is defined primarily by SR-99 traffic, local traffic, and commercial/light industrial operations. In order to quantify existing ambient noise levels in the proposed Project area, a 24-hour ambient noise level measurement survey was completed at the closest residential property to the proposed Project site on December 18-19, 2008 and additional short-term ambient noise measurements were collected in July 10, 2017 (Bollard Acoustical Consultants 2017) at three locations. Figure 4.13-2, *Location of Existing Noise Level Measurements*, shows the location where noise measurements were taken in 2017.

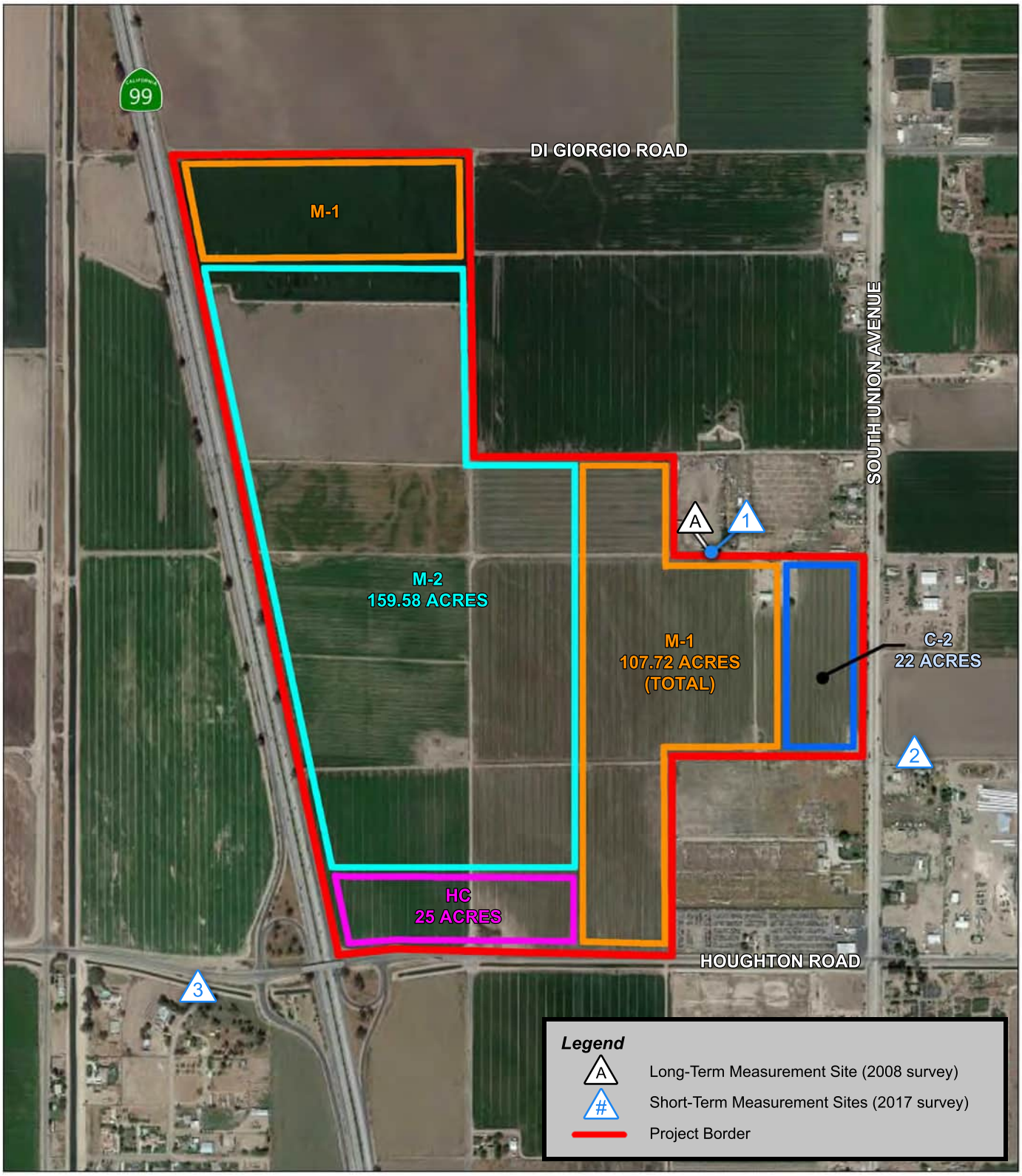
Noise monitoring equipment used for the study consisted of a Larson-Davis Laboratories (LDL) Model 820 precision integrating sound level meter equipped with an LDL Model 2560 1/2" microphone. The instrumentation complies with applicable requirements of the American National

Standards Institute (ANSI) for Type 1 (precision) sound level meters, and was calibrated prior to use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements (Bollard Acoustical Consultants 2017).

Existing Traffic Noise Levels

Vehicular noise along major roadways in the vicinity of the proposed Project was modeled to estimate existing noise levels from mobile sources. The existing and future roadway noise levels were projected using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model, together with several roadway and site parameters. The FHWA Traffic Noise Prediction Model's Lookup Table provides a reference of pre-calculated TNPM results for simple highway geometries, which is adequate for the purposes of this analysis.

Traffic volumes used in the FHWA TNPM were obtained from the Traffic Study prepared by McIntosh & Associates, January 2016. Existing modeled traffic noise levels are shown in Table 4.13-1, *Existing Traffic Noise Levels*. Table 4.13-1 shows existing traffic noise levels at a reference distance of 100 feet from the centerlines of existing Project-area roadways. As illustrated in Table 4.13-1, existing traffic noise levels range from 30 to 70 dBA CNEL. Several roadway segments currently exceed the Metropolitan Bakersfield General Plan noise standard of 65 dBA CNEL standard at 100 feet from the centerline.



SOURCE: Bollard Acoustical Consultants, Inc.,
99 Houghton General Plan Amendment EIR

Noise Measurement Location

0 1000'
APPROXIMATE

99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07 • AGRICULTURAL PRESERVE #13 EXCLUSION

Location of Existing Noise Level Measurements

Figure 4.13-2

Table 4.13-1. Existing Traffic Noise Levels

Roadway	Segment	L_{dn} (dB) @ 100 feet
Panama Lane	West of 99 SB Ramp	70
	99 SB Ramp to 99 NB Ramp	67
	99 NB Ramp to South H St.	69
	South H St. to South Union Ave.	65
	South Union Ave. to Cottonwood Rd.	64
	East of Cottonwood Rd.	64
Hosking Ave.	West of Hughes Ln.	55
	Hughes Ln. to 99 SB Ramp	54
	99 SB Ramp to 99 NB Ramp	54
	99 NB Ramp to South H St.	54
	South H St. to South Union Ave.	56
	South Union Ave. to Cottonwood Rd.	30
Taft Hwy.	West of Wible Rd.	63
	Wible Rd. to Compangnoni St.	62
	Compangnoni St. to 99 NB Ramp	65
	99 NB Ramp to South H St. (2015)	69
	South H St. to South Union Ave.	69
	South Union Ave. to Cottonwood Rd.	68
	East of Cottonwood Rd.	68
Di Giorgio Rd.	West of Chevalier Rd. (Entrance #1)	n/a
	Chevalier Rd. (Entrance #1) to South Union Ave.	n/a
	South Union Ave. to Cottonwood Rd.	33
	East of Cottonwood Rd.	46
Curnow Rd.	West of South Union Ave.	44
	South Union Ave. to Cottonwood Rd.	38
Houghton Rd.	West of Stine Rd.	60
	Stine Rd. to Wible Rd.	58
	Wible Rd. to South H St.	53
	South H St. to 99 SB Ramp	58
	99 SB Ramp to 99 NB Ramp	62
	99 NB Ramp to Entrance #7	64
	Entrance #7 to Chevalier Rd. (Entrance #6)	64
	Chevalier Rd. (Entrance #6) to Entrance #5	64
	Entrance #5 to South Union Ave.	64
	South Union Ave. to Cottonwood Rd.	65
	Cottonwood Rd. to Adobe Rd.	65
	East of Adobe Rd.	64
Shafter Rd.	Chevalier Rd. to South Union Ave.	39
	East of South Union Ave.	43
Bear Mountain Blvd.	West of Costajo Rd.	60
	Costajo Rd. to 99 NB Ramp	67
	99 NB Ramp o South Union Ave.	69
	East of South Union Ave.	69
Stine Road	North of Houghton Rd.	50
	South of Houghton Rd.	48

Table 4.13-1. Existing Traffic Noise Levels

Roadway	Segment	L_{dn} (dB) @ 100 feet
Wible Road	North of Taft Hwy.	55
	Taft Hwy to Houghton Rd.	54
	South of Houghton Rd.	49
Hughes Lane	South of Hosking Ave.	54
Compangnoni St.	South of Taft Hwy.	50
South H St.	North of Panama Ln.	59
	Panama Ln. to Hosking Ave.	62
	Hosking Ave. to Taft Hwy.	57
	South of Taft Hwy.	46
	North of Houghton Rd. (2015)	48
	South of Houghton Rd. (2015)	49
Chevalier Rd.	Di Giorgio Rd. to Houghton Rd.	n/a
	Houghton Rd. to Shafter Rd. (2015)	40
South Union Ave.	North of Panama Ln.	70
	Panama Ln. to Hosking Ave.	67
	Hosking Ave. to Taft Hwy.	64
	Taft Hwy. to Curnow Rd.	60
	Curnow Rd. to Di Giorgio Rd.	59
	Di Giorgio Rd. to Lamb Ave. (Entrance #2)	59
	Lamb. Ave. (Entrance #2) to Entrance #3	59
	Entrance #3 to Mugsy Ave. (Entrance #4)	59
	Mugsy Ave. (Entrance #4) to Houghton Rd.	59
	Houghton Rd. to Shafter Rd.	58
	Shafter Rd. to Bear Mountain Blvd.	57
	South of Bear Mountain Blvd.	55
Cottonwood Rd.	North of Panama Ln.	53
	Panama Ln. to Hosking Ave.	42
	Hosking Ave. to Taft Hwy.	42
	Taft Hwy. to Curnow Rd.	47
	Curnow Rd. to Di Giorgio Rd.	47
	Di Giorgio Rd. to Houghton Rd.	36
Adobe Rd.	North of Buena Vista Blvd.	36
	South of Buena Vista Blvd. (2015)	51

Notes: SR = State Route
Where "N/A" appears in the table, the particular roadway segment does not have traffic data because the road is not yet constructed.
Source: Bollard Acoustical Consultants, Inc., 2016, Bollard Acoustical Consultants, Inc., 2017.

Stationary Sources

The proposed Project is located in a primarily agricultural area. Transient noise generation from agricultural operations and equipment occurs within the Project vicinity on a seasonal basis. There are no other sources of stationary noise in the vicinity of the proposed Project.

4.13.3 Regulatory Setting

Federal

There are a number of laws and guidelines at the Federal level that direct the consideration of a broad range of noise and vibration issues. Because the project does not require action by Federal agencies, at this time, the project is not directly subject to Federal noise regulations other than those of the Federal Occupational Safety and Health Administration (OSHA). For perspective, several of the more significant noise-related Federal regulations and guidelines are described below.

Noise Control Act of 1972 (42 USC 4910)

This act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. To accomplish this, the act establishes a means for the coordination of Federal research and activities in noise control, authorizes the establishment of Federal noise emissions standards for products distributed in commerce, and provides information to the public with respect to the noise-emission and noise-reduction characteristics of such products.

USEPA Recommendations in "Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety" (NTIS 550\9-74-004, USEPA, Washington, D.C., March 1974)

In response to a Federal mandate, U.S. Environmental Protection Agency (EPA) provided guidance in Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety (National Technical Information Service [NTIS], 550\9-74-004, EPA, Washington, D.C., March 1974). Commonly referenced as the "Levels Document," it establishes an Ldn of 55 dBA as the requisite level, with an adequate margin of safety, for areas with outdoor uses, including residential and recreational areas. This document does not constitute EPA regulations or standards but identifies safe levels of environmental noise exposure without consideration of costs for achieving these levels or other potentially relevant considerations. It is intended to "provide State and local governments, as well as the Federal government and the private sector, with an informational point of departure for the purpose of decision-making." The agency is careful to stress that the recommendations contain a factor of safety and do not consider technical or economic feasibility issues and, therefore, should not be construed as standards or regulations.

Federal Highway Administration

The purpose of the Federal Highway Administration (FHWA) Noise Abatement Procedures (23 CFR 772) is to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, supply noise abatement criteria, and establish requirements for information to be given to local officials for use in the planning and design of highways. The purpose of this regulation is to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria (NAC), and to establish requirements for information to be given to local officials for use in the planning and design of highways. It establishes five categories of noise-sensitive receptors and prescribes the use of the hourly L_{eq} as the criterion metric for evaluating traffic noise impacts.

All highway projects that are developed in conformance with this regulation shall be deemed to be in conformance with the Department of Transportation-FHWA Noise Standards. Title 23 establishes an NAC of 67 dBA $L_{eq(h)}$ applicable to federal highway projects for evaluating impacts to land uses including residences, recreational uses, hotels, hospitals, and libraries (23 CFR Chapter 1, Part 772, Section 772.19). Additionally, FHWA requires that individual states establish an allowable noise level increase (at or above which the increase is deemed to be "substantial" (between 5 and 15 dB) and abatement should be considered) for Type 1 highway projects. Type I projects include projects that would: construct a highway in a new location; physically alter and existing highway where there is a substantial horizontal or vertical alteration; add through-traffic lane(s); add auxiliary lane(s); add or relocate interchange lands or ramps; restripe pavement for the purposes of adding lane(s); and add a new, or substantially altering and existing, weigh station, rest stop, ride-share lot, or toll plaza.

Occupational Safety and Health Administration

The OSHA Occupational Noise Exposure: Hearing Conservation Amendment (Federal Register 48 [46], 9738–9785, 1983) stipulates that protection against the effects of noise exposure shall be provided for employees when sound levels exceed 90 dBA over an 8-hour exposure period. Protection shall consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to acceptable levels, personal protective equipment shall be provided and used to reduce exposure of the employee. Additionally, a hearing conservation program must be instituted by the employers whenever employee noise exposure equals or exceeds the action level of an 8-hour, time-weighted average sound level of 85 dBA. The hearing conservation program requirements consider periodic area and personal noise monitoring, the performance and evaluation of audiograms, the provision of hearing protection, annual employee training, and record keeping.

State

California Environmental Quality Act (CEQA) Guidelines

The California Environmental Quality Act (CEQA) was enacted in 1970 and requires that all known environmental effects of a project be analyzed, including environmental noise impacts. Under CEQA, a project has a potentially significant impact if the project exposes people to noise levels in excess of standards established in the local general plan or noise ordinance. Additionally, under CEQA, a project has a potentially significant impact if the project creates a substantial increase in the ambient noise levels in the project vicinity above levels existing without the proposed Project. If a project has a potentially significant impact, mitigation measures must be considered. If mitigation measures to reduce the impact to less than significant are not feasible due to economic, social, environmental, legal, or other conditions, the most feasible mitigation measures must be considered.

California Government Code

The California Department of Health Services has studied the correlation of noise levels and their effects on various land uses and established guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. The State requires all municipalities to prepare and adopt a comprehensive long-range general plan. General plans must contain a noise element (California Government Code Section 65302[f] and Section 46050.1 of the Health and Safety Code). The requirements for the noise element of the general plan include describing the noise environment

quantitatively using a cumulative noise metric, such as CNEL or DNL, establishing noise/land use compatibility criteria, and establishing programs for achieving and/or maintaining land use compatibility. Noise elements should address all major noise sources in the community, including mobile and stationary noise sources.

The State Office of Planning and Research (OPR) Noise Element Guidelines include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The Noise Element Guidelines contain a land use compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the CNEL. Table 4.13-2, *California Land Use Compatibility Noise Guidelines*, presents guidelines for determining acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

Table 4.13-2. California Land Use Compatibility Noise Guidelines

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE (dBA CNEL)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low Density, Single-Family, Duplex, Mobile Homes	50 - 60	55 - 70	70 – 75	75 – 85
Residential – Multiple Family	50 - 65	60 - 70	70 – 75	70 – 85
Transient Lodging – Motels, Hotels	50 - 65	60 - 70	70 – 80	80 – 85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 - 70	60 - 70	70 – 80	80 – 85
Auditoriums, Concert Halls, Amphitheaters	NA	50 - 70	NA	65 – 85
Sports Arenas, Outdoor Spectator Sports	NA	50 – 75	NA	70 – 85
Playgrounds, Neighborhood Parks	50 - 70	NA	67.5 – 75	72.5 – 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 - 70	NA	70 – 80	80 – 85
Office Buildings, Business Commercial and Professional	50 - 70	67.5 – 77.5	75 – 85	NA
Industrial, Manufacturing, Utilities, Agriculture	50 - 75	70 - 80	75 – 85	NA

Table 4.13-2. California Land Use Compatibility Noise Guidelines

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE (dBA CNEL)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable

Source: General Plan Guidelines, Office of Planning and Research, California, October 2003, page 250.

CNEL = community noise equivalent level; NA = not applicable.

Notes:

Normally Acceptable – Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable – New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable – New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable – New construction or development should generally not be undertaken.

California Division of OSHA

Occupational exposure to noise is regulated by the California Division of OSHA in Title 8, Group 15, Article 105, Sections 5095–5100. As mentioned above, the agency's standards stipulate that protection against the effects of noise exposure shall be provided when sound levels exceed 90 dBA over an 8-hour exposure period. Protection shall consist of feasible administrative and/or engineering controls. If such controls fail to reduce sound levels to acceptable levels, personal protective equipment shall be provided and used to reduce exposure of the employee. In addition, a hearing conservation program must be instituted by employers whenever employee noise exposure equals or exceeds the action level of an 8-hour time-weighted average sound level of 85 dBA. The hearing conservation program requirements consider periodic area and personal noise monitoring, the performance and evaluation of audiograms, the provisions of hearing protection, annual employee training, and record keeping. The California Environmental Quality Act (CEQA) (PRC Section 21000 et seq.) requires the identification of "significant" environmental impacts and their feasible mitigation.

Section XI of Appendix G to the CEQA Guidelines (CCR Title 14, Appendix G) lists some indicators of potentially significant impacts, which are included below under "Thresholds of Significance."

CEQA does not define a threshold for "significant increase" with respect to noise exposure; however, based on human response and commonly applied industry standards, the following thresholds of significance would be applied to the project, as set forth by the CEQA Guidelines:

- The project causes the ambient noise level measured at the property line of affected uses to increase by 3 dBA in CNEL, to a level at or within the "normally unacceptable" or "clearly unacceptable" noise/land use compatibility category; or
- The project causes any 5-dBA or greater noise increase.

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declares that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also identifies a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

California Noise Insulation Standards

In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for hotels, motels, dormitories, and multifamily residential buildings (Title 24, Part 2, California Code of Regulations [CCR]). Title 24 establishes standards for interior room noise (attributable to outside noise sources). The regulations also specify that acoustical studies must be prepared whenever a multifamily residential building or structure is proposed to be located near an existing or adopted freeway route, expressway, parkway, major street, thoroughfare, rail line, rapid transit line, or industrial noise source, and where such noise source(s) create an exterior CNEL (or L_{dn}) of 60 dBA or greater. Such acoustical analysis must demonstrate that the residence has been designed to limit intruding noise to an interior CNEL (or L_{dn}) of at least 45 dBA (California's Title 24 Noise Standards, Chap. 2-35).

California Department of Transportation

The California Department of Transportations (Caltrans) has oversees the traffic noise analysis protocol for new highway construction and reconstruction projects. This protocol specifies the policies, procedures, and practices that are to be used by agencies that sponsor federal or federal-aid highway projects involving new construction or reconstruction. The NAC specified in the protocol are the same as those specified in 23 CFR 772. The protocol defines a noise increase as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dBA. The protocol also states that a sound level is considered to approach an NAC level when the sound level is within 1 dB of the NAC identified in 23 CFR 772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).

Local

Most jurisdictions have unique standards and guidelines regarding noise and nuisance. These are set out in county and municipal codes and general plans. Each noise ordinance or noise element within a municipal/county code will address noise levels that create a nuisance in surrounding communities. Noise ordinances and noise elements occasionally classify different areas within these communities according to zoning standards. Such zones can include residential areas, which are analyzed further according to the density of the population; industrial areas; commercial areas; agricultural areas; and rural areas. The possible adverse effects of construction noise are included within the noise standards. The ambient noise level, type of noise source, distance to the noise source, time of day, duration of the noise, and zoning of the areas are variables that are considered when assessing the adverse effects

of noise on noise-sensitive receptors. Virtually all municipal/county codes categorize noise by dBA. Many standards will use a continuous L_{eq}, CNEL, or L_{dn} to express the sound levels over a given timeframe. The applicable standards for noise levels that apply to this proposed Project are those within the Kern County General Plan and the Metropolitan Bakersfield General Plan.

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan has established land use compatibility criteria for various community land uses. For noise generated by transportation noise sources such as traffic, the Noise Element of the Metropolitan Bakersfield General Plan specifies that residential land uses are compatible with exterior noise levels of up to 60 dB L_{dn} without the need for noise mitigation. The 60 dB L_{dn} noise level is considered an acceptable noise environment for residential outdoor activities. The Metropolitan Bakersfield General Plan may allow an exterior noise level of up to 65 dB L_{dn} provided that available exterior noise level reduction measures have been implemented and interior noise levels satisfy the Metropolitan Bakersfield General Plan's standard.

An interior noise level criterion of 45 dB L_{dn} is specified in the Noise Element for residential land uses exposed to transportation noise sources. The intent of this interior noise standard is to provide a suitable environment for indoor communication and sleep. In addition to the L_{dn} criteria discussed above, the Metropolitan Bakersfield General Plan establishes noise level performance criteria applied to non-transportation noise exposure at noise sensitive uses. Table 4.13-3, *Hourly Noise Level Performance Standards Metropolitan Bakersfield General Plan*, summarizes the hourly standards. The standards are applied to any hour the noise source is operating, and are five dBA more restrictive during the hours of 10:00 PM to 7:00 AM.

Table 4.13-3. Hourly Noise Level Performance Standards Metropolitan Bakersfield General Plan

Maximum Acceptable Noise Level, dBA		
Min./Hr. (Ln)	Day (7:00 AM – 10:00 PM)	Night (10:00 PM – 7:00 AM)
30 (L_{50})	55	50
15 (L_{25})	60	55
5 ($L_{8.3}$)	65	60
1 ($L_{1.7}$)	70	65
0 (L_{max})	75	70

Note: Ln means the percentage of time the noise level is exceeded during an hour. L50 means the level exceeded 50% of the hour, L25 is the level exceeded 25% of the hour, etc.

Source: City of Bakersfield, Metropolitan Bakersfield General Plan, December 11, 2002.

Significance Criteria for Project-Related Noise Level Increases

The potential increase in traffic noise exposure due to the project is a factor in determining significance. Research into the human perception of changes in sound level indicates the following.

- A 3 dB change is barely perceptible,
- A 5 dB change is clearly perceptible, and
- A 10 dB change is perceived as being twice or half as loud.

A limitation of using a single noise level increase value to evaluate noise impacts is that it fails to account for pre-project noise conditions. Table 4.13-4, *Significance of Changes in Cumulative Noise Exposure*, is based on recommendations made in August 1992 by the Federal Interagency Committee on Noise (FICON) to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been asserted that they are applicable to all sources of noise described in terms of cumulative noise exposure metrics such as the L_{dn}. Specifically, they provide good correlation to transportation-related noise sources.

Table 4.13-4. Significance of Changes in Cumulative Noise Exposure

Significance of Changes in Cumulative Noise Exposure	
Noise Level Without Project (L_{dn})	Increase Required for Significant Impact
<60	+5.0 dB or more
60-65 dB	+3.0 dB or more
>65	+1.5 dB or more

Sources: FICON, City of Bakersfield, Metropolitan Bakersfield General Plan, December 11, 2007.

An increase in the traffic noise levels becomes more significant as the ambient noise levels increase. For instance, a significant increase in traffic noise levels is expected to be 1.5 dB when the no-project traffic noise levels exceed 65 dB L_{dn}. However, a significant increase in traffic noise levels is expected to be 5 dB when the no-project traffic noise levels are less than 60 dB L_{dn}. In other words, as ambient noise levels increase, a smaller increase in noise resulting from the project is sufficient to cause significant annoyance.

Generally, a project may have a significant impact on the environment if it will substantially increase the ambient noise levels at adjoining areas or expose people to severe noise exposure. In practice, more specific professional standards have been developed, as discussed above. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria. Additionally, noise impacts associated with the proposed project would be considered significant if they would expose existing noise-sensitive land uses to traffic noise level increases consistent with Table 4.13-4, above.

The Metropolitan Bakersfield General Plan also provides goals, policies and implementation measures in order to reduce noise impacts. Applicable goals relative to the Project site within these elements are listed below in Table 4.13-5, *Metropolitan Bakersfield General Plans Goals and*

Policies for Noise, followed by a brief explanation of how the proposed Project complies with the goals and policies.

Table 4.13-5. Metropolitan Bakersfield General Plan Goals and Policies for Noise

Goals and Policies: Noise Element
Goal #1: "Ensure that residents of the Bakersfield Metropolitan Area are protected from excessive noise and existing moderate levels of noise are maintained."
Goal #2: "Protect the citizens of the Planning area from the harmful effects of exposure to excessive noise, and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports and other sources."
Policy #1: "Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in Table VII-4. The noise exposure contour maps on file at the City of Bakersfield and County of Kern indicate areas where existing and projected noise exposures exceed 65 dB CNEL (exterior) for the major noise sources identified."
Policy #2: "Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into project design to acceptable levels. "
Policy #3: Review discretionary industrial, commercial or other noise generating land use projects for compatibility with nearby noise-sensitive land uses. Additionally, the development of new noise generating land uses which are not preempted from local noise regulation will be reviewed if resulting noise levels will exceed the performance standards contained within Table VII-4 in areas containing residential or other noise-sensitive land uses.
Policy #4: Require noise level criteria applied to land uses other than residential or other noise-sensitive uses to be consistent with the recommendations of the California Office of Noise Control (see Figure VII-1(I-4))
Policy #5: "Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise."
Policy #6: "Encourage interjurisdictional coordination and cooperation with regard to noise impact issues. "
Policy #7: "Establish threshold standards for the determination of the existence of cumulative noise impacts that are significant, and will therefore require mitigation to achieve acceptable noise standards that do not exceed the standards contained in this element."

Vibration Standards

The County does not have regulations that define acceptable levels of vibration. One of the most recent reference suggesting vibration standards is the Federal Transit Administration's (FTA) publication concerning noise and vibration impacts assessment from transit activities (U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, April 1995). The term VdB is used by the FTA. To prevent vibration annoyance in residences, a level of 80 VdB or less is suggested to prevent damage to fragile buildings.

Kern County Ordinance

Title 19 Kern County Zoning Ordinance

Section 19.04.252 of the Kern County Zoning Ordinance defines *exterior noise level* as "the noise level near the exterior of a structure usually within fifty (50) feet of the structure."

Section 19.80.030.S (1) restricts noise generated by commercial or industrial uses within 500 feet of a residential use or residential zone district. The commercial or industrial use shall not generate noise that exceeds an average 65 dB L_{dn} between the hours of 7 AM and 10 PM. and shall not generate noise that exceeds 65 dB, or which would result in an increase of 5 dB or more from ambient sound levels, whichever is greater, between the hours of 10 PM and 7 AM. Commercial or industrial facilities that are located in the M-3 zone district are exempt from these noise-generation restrictions.

Title 8 Kern County Health and Safety Ordinance

Chapter 8.36 Noise Control

The Noise Control Ordinance in the Kern County Municipal Ordinance (Section 8.36.020 et seq.) prohibits a variety of nuisance noises. Construction-related noise is regulated by means of a limitation on the hours of construction activity for projects located within 1,000 feet of an occupied residential dwelling. In such cases, construction is prohibited between the hours of 9 PM and 6 AM on weekdays and 9 PM and 8 AM on weekends, except as provided below:

- The development services agency director or his designated representative may for good cause exempt some construction work for a limited time.
- Emergency work is exempt from this section.

4.13.4 Impacts and Mitigation Measures

Methodology

CEQA requires determination of the significance of noise impacts associated with the proposed Project. The process of assessing the significance of noise impacts associated with the proposed Project first involved establishing thresholds at which significant impacts on noise-sensitive uses were considered to occur. Next, noise levels associated with activities related to the proposed Project were predicted and compared to the significance thresholds. Where a noise level is predicted to exceed a threshold, the impact is considered significant. Details about assumptions and methods used to predict noise levels are discussed under each impact type.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:

- Exposes persons to, or generates, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

- Exposes persons to, or generates, excessive ground borne vibration or ground borne noise levels;
- Results in a substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project;
- Results in a substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project;
- Exposes persons residing or working in the Project area to excessive noise levels as identified in the Kern County Airport Land Use Compatibility Plan; and/or
- Exposes people residing or working in the Project area to excessive noise levels due to a private airstrip within the vicinity of the project.

Project Impacts

Impact 4.13-1: The Project Would Result in Exposure of Persons to, or Generation of, Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance or Applicable Standards of Other Agencies.

There are a variety of noise sources associated with the future development of the proposed Project site which have the potential to create noise levels in excess of the 65 dB County noise standards. These noise sources could result in annoyance at existing noise-sensitive receivers surrounding the proposed Project area such as the residential uses to the east. Proposed Project implementation would result in both short-term construction-related and long-term operational-related impacts.

The identified, primary noise-producing elements associated with the proposed Project are increased traffic on the local roadway network, Project-related traffic on new roadways, and industrial operations associated with the proposed Project.

At this time, specific industrial uses on the proposed Project site are not available. As a result, it is not feasible to identify specific noise impacts associated with each of the proposed uses; however, a general discussion and assessment of impacts can be conducted based upon the possible types of uses associated with these land use designations. The following is a discussion of the potentially significant noise sources associated with the possible industrial uses proposed at the Project site.

Industrial Land Uses

The conceptual layout of the proposed Project site includes lots zoned for light and service industrial uses, and highway and general commercial uses. Various uses could be permitted under these uses. The purpose of the proposed M-1 PD (Light Industrial Precise Development Combining) District is to designate areas for wholesale commercial, storage, trucking, assembly-type manufacturing, and other similar industrial uses. The purpose of the proposed M-2 PD (Medium Industrial Precise Development Combining) District is to designate areas for general manufacturing, processing and assembly activities. The purpose of the proposed CH PD (Highway Commercial Precise Development Combining) and C-2 PD (General Commercial Precise Development Combining) is to designate areas for retail uses. Uses may not produce fumes, odor, dust, smoke, gas, or vibrations extending beyond zoning district boundaries.

The production of noise is a result of many industrial processes, even when the best available noise control technology is applied. Noise exposures within industrial facilities are controlled by the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) and the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), but exterior noise levels may exceed locally acceptable standards. Commercial, recreational, and public service facility activities can also produce noise which affects adjacent sensitive land uses.

These noise sources can be continuous and may contain tonal components which have a potential to annoy individuals who live nearby. In addition, noise generation from fixed noise sources may vary based upon climatic conditions. Noise production due to future project industrial uses may significantly impact nearby existing residential uses on Lamb Avenue west of South Union Avenue (SR-204). The Project-related industrial uses are unknown at this time and would be considered a potentially significant impact.

Increased Traffic Along Roadways and Site Entrance

Future development within the area would result in additional traffic on adjacent roadways, thereby increasing vehicular noise in the vicinity of existing and proposed land uses. To assess noise impacts due to project-related traffic increases on the local roadway network, traffic noise levels were predicted at a representative distance (100 feet from the roadway centerlines) for the 2025, 2025+Project, 2035, and 2035+Project scenarios. Results of the Project-related traffic noise analyses are summarized in Table 4.13-6 *Predicated Traffic Noise Exposure Levels 100 Feet from Roadway Centerlines*.

Table 4.13-6 Predicated Traffic Noise Exposure Levels 100 Feet from Roadway Centerlines

Roadway	Segment	Ldn, dB (Change, dB)	
		2025+ Project	2035+Project
Panama Lane	West of 99 SB Ramp	72 (+2)*	72 (+2) *
	99 SB Ramp to 99 NB Ramp	69 (+2) *	70 (+3) *
	99 NB Ramp to South H St.	70 (+1)	71 (+2) *
	South H St. to South Union Ave.	68 (+3) *	69 (+4) *
	South Union Ave. to Cottonwood Rd.	67 (+3) *	68 (+4) *
	East of Cottonwood Rd.	66 (+2)	66 (+2)
Hosking Ave.	West of Hughes Ln.	60 (+5) *	63 (+8) *
	Hughes Ln. to 99 SB Ramp	61 (+7) *	65 (+11) *
	99 SB Ramp to 99 NB Ramp	61 (+7) *	64 (+10) *
	99 NB Ramp to South H St.	61 (+7) *	65 (+11) *
	South H St. to South Union Ave.	59 (+3)	61 (+5) *
	South Union Ave. to Cottonwood Rd.	49 (+19) *	57 (+27) *

Table 4.13-6 Predicated Traffic Noise Exposure Levels 100 Feet from Roadway Centerlines

Roadway	Segment	Ldn, dB (Change, dB)	
		2025+ Project	2035+Project
Taft Hwy.	West of Wible Rd.	67 (+4) *	69 (+6) *
	Wible Rd. to Compangnoni St.	67 (+5) *	69 (+7) *
	Compagnoni St. to 99 NB Ramp	68 (+3) *	70 (+5) *
	99 NB Ramp to South H St. (2015)	70 (+1)	70 (+1)
	South H St. to South Union Ave.	71 (+2) *	72 (+3) *
	South Union Ave. to Cottonwood Rd.	70 (+2) *	70 (+2) *
	East of Cottonwood Rd.	70 (+2) *	70 (+2) *
Di Giorgio Rd.	West of Chevalier Rd. (Entrance #1)	n/a	46 (n/a)
	Chevalier Rd. (Entrance #1) to South Union Ave.	n/a	58 (n/a)
	South Union Ave. to Cottonwood Rd.	50 (+17) *	53 (+20) *
	East of Cottonwood Rd.	52 (+6) *	49 (+3)
Curnow Rd.	West of South Union Ave.	52 (+8) *	55 (+11) *
	South Union Ave. to Cottonwood Rd.	47 (+9) *	47 (+9)
Houghton Rd.	West of Stine Rd.	59 (-1)	59 (-1)
Buena Vista Blvd.	Stine Rd. to Wible Rd.	58 (0)	58 (0)
	Wible Rd. to South H St.	58 (+5) *	58 (+5) *
	South H St. to 99 SB Ramp	62 (+4)	62 (+4)
	99 SB Ramp to 99 NB Ramp	70 (+8) *	70 (+8) *
	99 NB Ramp to Entrance #7	73 (+9) *	74 (+10) *
	Entrance #7 to Chevalier Rd. (Entrance #6)	73 (+9) *	73 (+9) *
	Chevalier Rd. (Entrance #6) to Entrance #5	71 (+7) *	71 (+7) *
	Entrance #5 to South Union Ave.	70 (+6) *	70 (+6) *
	South Union Ave. to Cottonwood Rd.	67 (+2) *	67 (+2) *
	Cottonwood Rd. to Adobe Rd.	66 (+1)	67 (+2) *
	East of Adobe Rd.	66 (+2)	66 (+2)
Shafter Rd.	Chevalier Rd. to South Union Ave.	46 (+7) *	47 (+8) *
	East of South Union Ave.	47 (+4)	47 (+4)
Bear Mountain Blvd.	West of Costajo Rd.	62 (+2)	63 (+3) *
	Costajo Rd. to 99 NB Ramp	68 (+1)	68 (+1)
	99 NB Ramp o South Union Ave.	70 (+1)	71 (+2) *
	East of South Union Ave.	71 (+2) *	71 (+2) *
Stine Road	North of Houghton Rd.	49 (-1)	48 (-2)
	South of Houghton Rd.	49 (+1)	49 (+1)
Wible Road	North of Taft Hwy.	57 (+2)	58 (+3)
	Taft Hwy to Houghton Rd.	54 (0)	53 (-1)
	South of Houghton Rd.	52 (+3)	53 (+4)
Hughes Lane	South of Hosking Ave.	57 (+3)	59 (+5) *
Compangnoni St.	South of Taft Hwy.	51 (+1)	52 (+2)
South H St.	North of Panama Ln.	62 (+3)	64 (+5) *

Table 4.13-6 Predicated Traffic Noise Exposure Levels 100 Feet from Roadway Centerlines

Roadway	Segment	Ldn, dB (Change, dB)	
		2025+ Project	2035+Project
	Panama Ln. to Hosking Ave.	64 (+2)	65 (+3) *
	Hosking Ave. to Taft Hwy.	61 (+4) *	63 (+6) *
	South of Taft Hwy.	53 (+7) *	56 (+10) *
	North of Houghton Rd. (2015)	50 (+2)	50 (+2)
	South of Houghton Rd. (2015)	51 (+2)	51 (+2)
Chevalier Rd.	Di Giorgio Rd. to Houghton Rd.	n/a	62 (n/a)
	Houghton Rd. to Shafter Rd. (2015)	49 (+9) *	49 (+9) *
South Union Ave.	North of Panama Ln.	72 (+2) *	73 (+3) *
	Panama Ln. to Hosking Ave.	70 (+3) *	72 (+5) *
	Hosking Ave. to Taft Hwy.	68 (+4) *	70 (+6) *
	Taft Hwy. to Curnow Rd.	67 (+7) *	69 (+9) *
	Curnow Rd. to Di Giorgio Rd.	68 (+9) *	69 (+10) *
	Di Giorgio Rd. to Lamb Ave. (Entrance #2)	67 (+8) *	68 (+9) *
	Lamb. Ave. (Entrance #2) to Entrance #3	68 (+9) *	69 (+10) *
	Entrance #3 to Mugsy Ave. (Entrance #4)	68 (+9) *	69 (+10) *
	Mugsy Ave. (Entrance #4) to Houghton Rd.	69 (+10) *	70 (+11) *
	Houghton Rd. to Shafter Rd.	64 (+6) *	66 (+8) *
	Shafter Rd. to Bear Mountain Blvd.	63 (+6) *	65 (+8) *
	South of Bear Mountain Blvd.	61 (+6) *	63 (+8) *
Cottonwood Rd.	North of Panama Ln.	59 (+6) *	61 (+8) *
	Panama Ln. to Hosking Ave.	53 (+11) *	57 (+15) *
	Hosking Ave. to Taft Hwy.	52 (+10) *	55 (+13) *
	Taft Hwy. to Curnow Rd.	52 (+5) *	52 (+5) *
	Curnow Rd. to Di Giorgio Rd.	51 (+4)	51 (+4)
	Di Giorgio Rd. to Houghton Rd.	47 (+11) *	49 (+13) *
Adobe Rd.	North of Buena Vista Blvd.	46 (+10) *	46 (+10) *
	South of Buena Vista Blvd. (2015)	52 (+1)	52 (+1)

Sources: McIntosh & Associates 2016, Bollard Acoustical Consultants, Inc. 2017.

* Represent significant noise level impacts. Cumulative noise impact was assessed based on application of the Table 5 criteria to the future plus project increase relative to the existing condition. Project-related traffic noise impact was assessed based on the project's contribution to the cumulative impact or application of the Table 5 criteria to the project-related increase relative to the no project condition. Please see a more detailed presentation of the significance methodology presented in the Regulatory Setting section. Where a cumulative noise impact or project-related noise impact was identified, the roadway segment in question was inspected in order to identify any existing noise-sensitive land uses.

Based on the information presented in Table 4.13-6, significant Project-related traffic noise exposure would be expected along parts of Panama Lane, Hosking Avenue, Taft Highway, Di Giorgio Road, Curnow Road, Houghton Road/Buena Vista Boulevard, Shafter Road, Bear Mountain Boulevard, Hughes Lane, South H Street, Chevalier Road, South Union Avenue (SR-204), Cottonwood Road, and Adobe Road in the proposed Project vicinity.

Chevalier Road between Houghton Road and Di Giorgio Road, Di Giorgio Road west of South Union Avenue, and Lamb Avenue west of South Union Avenue (SR-204) would be constructed as part of the proposed Project. With the exception of a single existing residence along Lamb Avenue, west of South Union Avenue, there are no current noise-sensitive uses in the immediate project vicinity or near the future Chevalier Road, Di Giorgio Road, and Mugsy Avenue on the proposed Project site. Future (2025 and 2035) traffic noise exposure at the home on Lamb Avenue west of South Union Avenue (SR-204) would be approximately 68 and 69 dB L_{dn}, respectively. This level is above the existing measured ambient noise level of 61 dB L_{dn} and would be expected to add significantly to the overall noise environment at this location based on the established significance criteria. There are no current noise-sensitive uses near the future Chevalier Road and Di Giorgio Road on the proposed Project site.

On portions of Di Giorgio Road, Chevalier Road, Cottonwood Road, Shafter Road, Kaiser Lane, and Adobe Road, Project-related traffic noise exposure increases from their respective roadways would generally be considered significant if not for the existing ambient noise exposure dominated by SR-99. In these cases, existing ambient noise exposure in the proposed Project area are assumed to be no less than 53 dB L_{dn} (conservatively 10 dB less than the measured ambient noise exposure near the east side of the proposed Project site), and future (2025 and 2035) project-related traffic noise exposures would not be expected to add significantly to the noise environments.

As shown in Table 4.13-6, future (2025 and 2035) Project-related traffic noise exposure increases would be expected to exceed the applicable significance criterion (+1.5 dB) along sections of Panama Lane, Hosking Avenue, Taft Highway, Houghton Road/Buena Vista Boulevard, Bear Mountain Boulevard, and South Union Avenue (SR-204) in the proposed Project vicinity. There are no noise sensitive land uses adjacent to Houghton Road between SR-99 and Project Entrance #3, and South Union Avenue between Lamb Avenue and Mugsy Avenue. Therefore, there are no Project-related noise impacts along these roadway segments.

As shown in Table 4.13-6, traffic noise impacts would be expected along roadway segments where both significant traffic noise increases were identified and where existing noise-sensitive land uses along those roadway segments were identified. Depending on the proximity of a particular roadway segment to SR-99, a noise impact may not necessarily materialize. The roadway segments closer to SR-99 would have a higher background ambient noise level environment which may mask the significant increases in traffic noise levels identified along some individual roadways. The farther away a roadway segment is from SR-99, the more likely it would be that the background ambient noise level would be low enough that such masking would not be significant, and the noise impact would occur.

Significant project-related traffic noise level increases are assumed along South Union Avenue (SR-204) between Panama Lane and Lamb Avenue where residential uses currently exist. In addition, the proposed Project would generate increased traffic on local area roadways that exceed thresholds. Project-related traffic noise levels impacts would also be expected along roadway segments where both significant increases were identified and where existing noise-sensitive land uses along those roadway segments were identified. These impacts would be significant.

Mitigation Measures

MM 4.13-1: **Acoustical Analysis.** Prior to the submittal of any Precise Development Plan or modification to an approved Master Precise Development Plan:

1. The project proponent shall be required to prepare an acoustical analysis to ensure that all appropriate noise control measures are incorporated in to the proposed project design so as to mitigate any noise impacts to off-site sensitive uses. Such noise control measures may include, but are not limited to: noise barrier use, site redesign, silencers, partial or complete enclosures of critical equipment, etc.

2. Noise impacts shall be evaluated by the Planning and Natural Resources Department during the Precise Development Plan review process.

MM 4.13-2: **Noise Levels.** The following measures are recommended to reduce short-term noise levels associated with project construction:

1. Construction activities at the project site shall comply with the hourly restrictions for noise-generating construction activities, as specified in the Kern County Noise Ordinance (Municipal Ordinance Code 8.36.020). Accordingly, construction activities shall be prohibited between the hours of 9:00 PM to 6:00 AM on weekdays, and between 9:00 PM to 8:00 AM on weekends. These hourly limitations shall not apply to activities where hourly limitations would result in increased safety risk to workers or the public.

2. Equipment staging and laydown areas shall be located at the furthest practical distance from nearby residential land uses. To the extent possible, staging and laydown areas should be located at least 500 feet of existing residential dwellings.

3. Where feasible construction equipment shall be fitted with approved noise-reduction features such as mufflers, baffles, and engine shrouds that are no less effective than those originally installed by the manufacturer.

4. Haul trucks shall not be allowed to idle for periods greater than five minutes, except as needed to perform a specified function (e.g., concrete mixing).

5. On-site vehicle speeds shall be limited to 15 miles per hour, or less (except in cases of emergency).

6. Back-up beepers for all construction equipment and vehicles shall be broadband sound alarms or adjusted to the lowest noise levels possible, provided that the Occupational Safety and Health Administration and California Division of Occupational Safety and Health's safety requirements are not violated. On vehicles where back-up beepers are not available, alternative safety measures such as escorts and spotters shall be employed.

MM 4.13-3: **Noise Disturbance Coordinator.** Prior to the issuance of grading permits, a "Noise Disturbance Coordinator" shall be established. The project operator shall submit evidence of methods of implementation and shall continuously comply with the following during construction:

1. The disturbance coordinator shall be responsible for responding to any local complaints about construction noise.

2. The disturbance coordinator shall determine the cause of the noise complaint (e.g., starting to early, bad muffler, etc.) and shall be required to implement reasonable measures such that the complaint is resolved.

Level of Significance after Mitigation

Impacts would be significant and unavoidable.

Impact 4.13-2: The Project Would Expose Persons to or Generation of Excessive Ground Borne Vibration or Ground Borne Noise Levels.

The types of construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural.

Construction activities such as blasting, pile driving, pavement breaking, demolition, diesel locomotives, and rail-car coupling can produce vibration that may be felt by adjacent uses. It is not anticipated that construction or operation of the proposed Project would require the use of equipment that is known to generate substantial construction vibration levels, however, given the uncertainty as to the specific use, impacts are considered potentially significant.

Mitigation Measures

Implement Mitigation Measure MM 4.13-2, above.

Level of Significance after Mitigation

Impacts would be significant and unavoidable.

Impact 4.13-3: The Project Would Create a Substantial Permanent Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing Without the Project.

At this time, specific industrial uses on the Project site are not available. As a result, it is not feasible to identify specific noise impacts associated with each of the proposed uses; however, as identified in Impact 4.13-1, general discussion and assessment of impacts can be conducted based upon the possible types of uses associated with these land use designations.

Although a specific industrial use is not proposed at this time, previous discussion has indicated that the Project site will be subject to the existing Metropolitan Bakersfield General Plan thresholds of significance for noise evaluation and attenuation. The proposed Project is located in an area of similar

type industrial uses as those proposed. With implementation, impacts are not expected to expose people to a substantial permanent increase in the ambient noise level in the project vicinity.

Mitigation Measures

Implement Mitigation Measures MM 4.13-2, above.

MM 4.13-4: **Noise Reduction Methods.** The following notes shall be placed on all grading and building permits issued for the project site:

1. Construction noise reduction methods such as shutting off idling equipment, installing temporary acoustic barriers around stationary construction noise sources, maximizing the distance between construction equipment staging areas and occupied residential areas, and use of electric air compressors and similar power tools, rather than diesel equipment, shall be used where feasible.

2. During construction, stationary construction equipment shall be placed such that emitted noise is directed away from sensitive noise receivers.

3. All equipment shall be fitted with factory equipped mufflers, and be in good working condition. Construction contracts shall specify that all construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers and other state required noise attenuation devices.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.13-4: The Project Would Create a Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing Without the Project.

Short-term noise impacts would be associated with the excavation and grading activities during the construction phase. Construction activities would result in short-term noise levels higher than existing ambient noise levels within the proposed Project area. Noise would also be generated during the construction phase(s) of the proposed Project by increased truck traffic on local area roadways. A significant Project-generated noise source would be truck traffic associated with the transport of heavy materials and equipment to and from the construction site.

During the construction phase(s) of the proposed Project, noise from building equipment would be expected to add to the noise environment in the immediate vicinity of the proposed Project. Activities involved in construction would likely generate maximum noise levels, of 77 to 85 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours (7 AM to 6 PM). Although, the noise generated by equipment and experienced at surrounding uses during construction would vary hourly, daily and weekly, due to the number and types of equipment used, existing residences near the proposed Project site would likely be affected by this noise.

Groundborne noise and other types of construction-related noise impacts would typically occur during the initial site preparation, which can create the highest levels of noise; but is also generally the shortest of all construction phases. High groundborne noise levels and other miscellaneous noise levels can be created by the operation of heavy-duty trucks, backhoes, bulldozers, excavators, front-end loaders, compactors, scrapers and other heavy-duty construction equipment. Operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of acoustical disturbance would be random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts).

Typically, the site preparation phase, which includes excavation and grading of the site and infrastructure construction, tends to generate the highest noise levels, because the noisiest construction equipment is earthmoving equipment. Earthmoving includes excavation machinery such as back fillers, bulldozers, excavators/front-end loaders and earthmoving equipment (i.e., compactors, scrapers and graders).

Table 4.13-7, *Typical Construction Noise Levels*, indicates the characteristics of specific types of construction equipment. As indicated in Table 4.13-7, noise levels generated by heavy construction equipment could range from 77 dB to 85 dB at 50 feet. The noise generated by equipment and experienced at surrounding uses during construction would vary hourly, daily, and weekly, due to the number and types of equipment used; however, construction activities would be temporary and would likely occur during daytime working hours.

Table 4.13-7. Typical Construction Noise Levels

Type of Equipment	Maximum Equipment Noise Level dBA, CNEL at 50 feet
Backhoe	78
Concrete Mixer Truck	79
Dump Truck	77
Front End Loader	79
Pneumatic Tools	85
Air Compressor	78

Source: Bollard Acoustical Consultants, Inc. 2017.

During construction and grading activities, all equipment would tend to be operated in a localized area. Thus, at any given moment, there would be a combined sound level from multiple pieces of equipment. However, the tendency is for the use to be sequential. For example, the haul trucks dump the dirt, followed by the loaders, bulldozers and graders, which push it around. These activities are then followed by the compactors and water trucks that pass over the area periodically. The period of time for each operation would vary with graders and compactors in an area for the longest period of time.

During the construction of the proposed Project, construction activities have the potential to impacts noise sensitive land uses in the immediate vicinity. Construction noise is usually not considered to be

significant if construction noise limits to the daytime hours (7:00 AM to 10:00 PM), if extraordinary noise-producing activities (e.g., pile driving) are not anticipated, and if construction equipment is adequately maintained and muffled and would not result in an exceedance of noise standards identified in the Metropolitan Bakersfield General Plan. Implementation of mitigation measures would ensure compliance with the Metropolitan Bakersfield General Plan and County's noise standards. As a result, the proposed Project would result in less than significant construction-related noise impacts.

Mitigation Measures

Implementation of Mitigation Measure MM 4.13-2, above.

MM 4.13-5: **Written Notice to the Public.** Prior to commencement of any on-site construction activities (i.e., fence construction, mobilization of construction equipment, initial grading, etc.) the project proponent shall provide written notice to the public through mailing a notice.

1. The mailing notice shall be to all residences within 1,000 feet of the project site, 15 days or less prior to construction activities. The notices shall include: The construction schedule, telephone number and email address where complaints and questions can be registered with the noise disturbance coordinator.

2. A minimum of one sign, legible at a distance of 50 feet, shall be posted at the construction site or adjacent to the nearest public access to the main construction entrance throughout construction activities that shall provide the construction schedule (updated as needed) and a telephone number where noise complaints can be registered with the noise disturbance coordinator.

3. Documentation the public notice has been sent and the sign has been posted shall be provided to the Kern County Planning and Natural Resources Department.

Level of Significance after Mitigation

Impacts would be significant and unavoidable.

Impact 4.13-5: The Project is Not Located Within an Airport Land Use Plan or, Where Such a Plan Has Not Been Adopted, Within Two Miles of a Public Airport or Public Use Airport, Would the Project Expose People Residing or Working in the Project Area to Excessive Noise Levels.

The proposed Project is not located within any area subject to the land use restrictions of the adopted Kern County Airport Land Use Compatibility Plan. The closest public airport is Bakersfield Municipal Airport, located approximately five (5) miles northeast of the proposed Project site. However, no sensitive receptors would be constructed as part of the proposed Project, and the

Bakersfield Municipal Airport would not expose the Project to excessive noise levels. Airport noise would be considered less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.13-6: The Project is Within the Vicinity of a Private Airstrip, Would the Project Expose People Residing or Working in the Project Area to Excessive Noise Levels.

Refer to Impact 4.13-5, above. As previously mentioned, the proposed Project is not located in within any area subject to the land use restrictions of the adopted Kern County Airport Land Use Compatibility Plan. Costerisan Farms Airport, a private airstrip, is located approximately two (2) miles northwest of proposed Project site; however, this airport does not generate significant daily flights. Activities at the airport would not significantly impact the proposed Project. Impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Noise by definition is a localized phenomenon, and drastically reduces as distance from the source increases. Consequently, only projects and growth due to occur in the general vicinity of the proposed Project site would contribute to cumulative noise impacts. Cumulative noise impact was assessed based on application of the Table 4.13-3 criteria to the future plus project increase relative to the existing condition. Project-related traffic noise impact was assessed based on the project's contribution to the cumulative impact or application of the Table 4.13-3 criteria to the project-related increase relative to the no project condition.

Cumulative Construction Noise

With regard to the exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies (Impact 4.13-1) and with regard to the project resulting in a substantial temporary or periodic increase (e.g. during construction) in ambient noise levels in the project vicinity above levels existing without the project (4.13-4), construction noise impacts are localized in nature because they are limited to the construction site where construction equipment is operating. As discussed under Impact 4.13-1, noise levels from typical construction equipment range from 78 dBA to 85 dBA L_{eq} at 50 feet from the

source. Although other projects may be constructed in the vicinity at the same time as the proposed Project, construction noise would temporary and all projects would be required to conform to all applicable noise reduction standards. However, the proposed Project could combine with past, present, and reasonably foreseeable future projects. Impacts are potentially significant and mitigation measures are required.

Groundborne Vibration

With regard to exposing persons to, or generation of, excessive ground borne vibration or ground borne noise levels (Impact 4.13-2), the proposed Project would not result in substantial levels of ground-borne vibration at sensitive receptors. As described above, major construction activity within 200 feet of a noise-sensitive land use may be potentially disruptive to sensitive operations. In order to result in a cumulative vibration impact, major construction activities would have to be located within 200 feet of another project. Due to the localized nature of vibration impacts and the fact that all construction would not occur at the same time or at the same location, cumulative development in the surrounding Kern County would not result in the exposure of people to or the generation of excessive groundborne vibration and/or noise levels. Therefore, when considered cumulatively with the construction of the other projects in the surrounding area, it is not anticipated that the project would contribute to substantial groundborne vibration levels at sensitive receptors. Therefore, impacts of the proposed Project would not be cumulatively considerable.

Cumulative Operation Impacts

Roadway Noise Exposure

With regard to the exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies (Impact 4.13-1) and with regard to increasing ambient noise levels with respect to increased traffic noise in the proposed Project vicinity above levels existing without the Project (4.13-4), along with future regional growth, and other projects to be developed within the proposed project vicinity would result in increases in traffic that would cumulatively increase traffic noise at 15 roadway segments. These roadways include: Panama Lane, Hosking Avenue, Taft Highway, Di Giorgio Road, Curnow Road, Houghton Road/Buena Vista Boulevard, Shafter Road, Bear Mountain Boulevard, Hughes Lane, South H Street, Chevalier Road, South Union Avenue (SR-204), Cottonwood Road, and Adobe Road.

With regard to the residential land uses, the residence located along Lamb Avenue, west of South Union Avenue (SR-204), would be subject to cumulative impacts associated with roadway noise from traffic associated with past, present, and reasonably foreseeable projects. Therefore, the proposed Project would have a significant cumulative impact in this regard.

Noise Generation

With regard to the generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies (Impact 4.13-3) and with regard to increasing ambient noise levels with respect to development operations in the Project vicinity above levels existing without the proposed Project, the proposed Project's operational impacts would be less

than significant with the implementation of Mitigation Measures. The implementation of reasonably foreseeable development projects would have the potential to increase ambient noise from new operational noise sources (such as HVAC equipment, parking lots, and truck deliveries) and by increasing human activity throughout the project sites and surrounding areas. Mechanical HVAC equipment located on the ground or on rooftops of new buildings have the potential to generate noise levels that exceed 65 dBA within an approximately 100-foot radius of the equipment. Additionally, commercial development would have the potential to result in noise levels above 65 dBA CNEL within approximately 70 feet of the source. Noise sources from parking lots typically range from about 30 to 66 dBA at a distance of 100 feet. Therefore, the project, in combination with other reasonably foreseeable development project, would have the potential to result in ambient noise levels that exceed 65 dBA CNEL.

In general, the noise levels generated by commercial, industrial and recreational facility operations would not exceed 65 dBA at a distance of 100 feet from each individual source. Thus, impacts from operational noise would be site-specific in nature and reasonably foreseeable development projects would be required to conform to policies in the MBGP and Kern County Zoning Ordinance to minimize exposure to excessive noise levels. In addition, each individual project is required to undergo site-specific analysis to determine individual noise impacts and provide mitigation measures as appropriate. The proposed Project would have the potential to combine with reasonably foreseeable projects in the vicinity to increase ambient noise levels; however, the proposed Project operational noise impacts would be mitigated to a less than significance level with the incorporation of the above measures. It is expected that through conformance with adopted policies and requirements to reduce noise, and project specific mitigation; impacts of the proposed Project, in combination with reasonably foreseeable nearby projects, cumulative impacts would be reduced to less than significant levels.

Private or Public Airstrip Noise

With regard to the project exposing people residing or working in the project area to excessive noise levels from a private or public airstrip (Impact 4.13-5), project impacts would be less than significant; however, the project would result in a greater number of people working in the project site and potentially being exposed to airstrip noise from Costerisan Farms Airport, a private airstrip, located approximately two (2) miles northwest of proposed. As stated above, this airport does not generate significant daily flights and activities at the airport would not significantly impact the proposed Project. As such, these impacts would not combine with impacts from past, present, or reasonably foreseeable projects to make a considerable contribution to a significant cumulative impact. Impacts would be less than significant, and no mitigation measures would be required.

Mitigation Measures

Implement Mitigation Measures MM 4.13-1 through MM 4.13-5 above.

Level of Significance after Mitigation

Cumulative impacts would be significant and unavoidable.

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Section 4.14

Population and Housing

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Section 4.14
Population and Housing

4.14.1 Introduction

This section examines the impacts of the proposed Project on population, housing, and employment in the area. This section also outlines the existing population and housing in the area, as well as projected population growth, future housing demands, and employment growth in Kern County. Information in this section is based on data from the Kern Council of Governments (Kern COG), including its Regional Housing Needs Allocation Plan (2014); the Kern County Housing Element 2015-2023 (December 2016); the U.S. Census Bureau; and California Department of Finance (DOF) demographic information.

4.14.2 Environmental Setting

Population

According to the DOF, the population in Kern County, including incorporated areas, was estimated to be 916,464 persons as of January 1, 2019 (California Department of Finance [DOF] 2019). In 2018 the population was approximately 906,563, which equates to a one-year increase of approximately 9,901 residents, or a 1.09 percent increase (DOF 2018a). As of January 1, 2019, approximately 318,006 persons (or approximately 34.7 percent) resided within the unincorporated area of Kern County (DOF 2019). The 2019 population within the unincorporated area of Kern County represents an increase of 2,531 residents, over the 2018 population of 315,475 (DOF 2018a). According to the DOF's projections, the County's population is anticipated to increase to 996,506 persons by the year 2025 and 1,214,656 persons in 2040 (DOF 2018).

Existing and Projected Housing

Kern County's housing supply totaled 290,706 dwelling units in 2014 and 299,674 dwelling units in 2019. This represents an increase in housing supply of approximately 3.0 percent (8,968 units). The residential vacancy rate, a translation of the number of unoccupied housing units on the market, is a good indicator of the balance between housing supply and demand in the community. Kern County's vacancy rate is approximately 10.7 percent as of January 1, 2019. The average number of persons per household in the County is 3.95 (DOF 2019).

The DOF estimates that 114,973 dwelling units were located within the unincorporated area of Kern County as of January 1, 2019. These units represent approximately 38.3 percent of the total number of dwelling units within Kern County. The average number of persons per household in the unincorporated area of Kern County was 2.74. Approximately 14.5 percent of the dwelling units within the area were vacant.

Employment

As of March 2019, Kern County had a labor force of 388,700 persons (Employment Development Department [EDD] 2019a). An estimated 39,300 people (approximately 10.1 percent) of the labor force was unemployed. In 2012, Kern County had a labor force of 391,900 persons and approximately 51,500 persons (approximately 13.1 percent) of the labor force were unemployed (EDD 2019a). The unemployment rate as of March 2019 is lower than the estimate seven years ago. Kern County's current unemployment rate is higher than California's rate (4.6 percent) and higher than the national rate (3.8 percent) for April 2019 (USDL 2019). The predominant industries for Kern County for employment growth were not available, but information for the Bakersfield MSA is. Within this area software developers, database administrators, web developers, personal care aides, and helpers, brick masons and tile setters have the highest degree of job growth. In 2017 the government industry accounted for approximately 21.1 percent of Kern County's employment as of April 2019 (EDD 2019c).

4.14.3 Regulatory Setting

State

State law requires each city and county to adopt a general plan for future growth. This plan must include a housing element that identifies housing needs for all economic segments and provides opportunities for housing development to meet that need. At the state level, HCD estimates the relative share of California's projected population growth that would occur in each county in the state based on DOF population projections and historic growth trends. Where there is a regional council of governments, as in Kern County, HCD provides the regional housing need to the council. The council then assigns a share of the regional housing need to each of its cities and counties. The process of assigning shares provides cities and counties the opportunity to comment on the proposed allocations. HCD oversees the process to ensure that the council of governments distributes its share of the state's projected housing need.

Each city and county must update its general plan housing element on a regular basis (generally, every 5 years). Among other things, the housing element must incorporate policies and identify potential sites that would accommodate the city's share of the regional housing need. Before adopting an update to its housing element, the city or county must submit the draft to HCD for review. HCD will advise the local jurisdiction whether its housing element complies with the provisions of California Housing Element Law.

The councils of governments are required to assign regional housing shares to the cities and counties within their region on a similar 5-year schedule. At the beginning of each cycle, HCD provides population projections to the councils of governments, who then allocate shares to their cities and counties. The shares of the regional need are allocated before the end of the cycle so that the cities and counties can amend their housing elements by the deadline.

Local

Kern County Housing Element 2015-2023

The Kern County Housing Element (Kern County Planning Department 2016) covers only the unincorporated portions of the Metropolitan Bakersfield General Plan and the Kern County General Plan. The City of Bakersfield has a separate housing element. The housing element is one of the seven mandated elements of the local general plan. Housing element law, enacted in 1969, mandates that local governments adequately plan to meet the existing and projected housing needs of all economic segments of the community. The law acknowledges that, in order for the private market to adequately address housing needs and demand, local governments must adopt land use plans and regulatory systems that provide opportunities for, and do not unduly constrain, housing development. As a result, housing policy in the state rests largely upon the effective implementation of local general plans and, in particular, local housing elements. Housing element law also requires the Department of Housing and Community Development (HCD) to review local housing elements for compliance with State law and to report its written findings to the local government. State law requires the Kern County Housing Element be updated regularly; the current 2015-2023 Housing Element Update was adopted by the Kern County Board of Supervisors on April 16, 2016 and approved by the State.

Kern Council of Governments (Kern COG)

Kern COG is an association of city and county governments created to address regional transportation issues while protecting the integrity and autonomy of each jurisdiction. Its member agencies include the County and the 11 incorporated cities within Kern County.

Under California Housing Element Law, Kern COG is the regional council of governments responsible for allocating the regional housing need to the County. Kern COG adopted a Regional Housing Needs Allocation Plan (RHAP) in June 2014 that establishes housing production goals for each jurisdiction within the region for the period between 2013 and 2023.

Future housing needs refer to the projected amount of housing a community is required to plan for during a specified planning period. California's Housing and Community Development Department provides each regional council of governments its share of the statewide housing need. In turn, all councils of governments are required by State law to determine the portion allocated to each jurisdiction within the region. This allocation process is known as the RHAP in the Kern COG region.

The RHAP determines housing needs with a special emphasis on ensuring adequate housing for persons in the very low, low, and moderate income ranges. This assessment allows communities to anticipate growth so that they can grow in a way that enhances quality of life; improves access to jobs, transportation, and housing; and does not adversely affect the environment. Kern COG has determined the total number of units needed in the County by 2023 (the 11-year projection period) is 67,675. For Bakersfield, the number of units is 36,290, or 53.6 percent of the County total, and for Unincorporated County, the number of units is 21,583, or 31.8 percent of the County total, by 2023.

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan lists the issues, goals, policies, and implementation measures related to population and housing in the County, as contained in the Land Use Element.

Project implementation would be guided in part by the goals, policies, and implementation programs, which are presented in Table 4.14-1, *Metropolitan Bakersfield General Plan Goals and Policies for Population and Housing.*

Table 4.14-1. Metropolitan Bakersfield General Plan Goals and Policies for Population and Housing

Goals and Policies: Land Use Element
Goal #3: Accommodate new development which provides a full mix of uses to support its population.
Goal #3: Accommodate new development which is compatible with and complements existing land uses.
Goal #4: Accommodate new development which channels land uses in phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.
Policy #3: Ensure that residential uses are located in proximity to commercial services, employment centers, public services, transportation routes, and recreational and cultural resources.
Policy #15: Allow for the development of a variety of commercial centers/corridors which are differentiated by their function, intended users and level of intensity, including convenience centers serving local residential neighborhoods, sub-regional centers which serve groupings of neighborhoods, and major regional centers which serve the planning area and surrounding areas.
Policy #16: Allow for the development of a variety of commercial uses, including those which serve residents (groceries, clothing, etc.), highway users, and tourists-visitors.
Policy #34: Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors.
Policy #76: Provide for a mix of land uses which meets the diverse needs of residents; offers a variety of employment opportunities; capitalizes, enhances, and expands upon existing physical and economic assets; and allows for the capture of regional growth.
Policy #79: Provide for an orderly outward expansion of new "urban" development (any commercial, industrial, and residential development having a density greater than one unit per acre) so that it maintains continuity of existing development, allows for the incremental expansion of infrastructure and public services, minimizes impacts on natural environmental resources, and provides a high-quality environment for living and business.

4.14.4 Impacts and Mitigation Measures

Methodology

The potential impacts to population and housing are based on qualitative and quantitative analyses of the proposed Project's related increases in population and housing compared to planned growth estimates and population projections for the Kern County and the Southern San Joaquin Valley area.

Thresholds of Significance

Significance Criteria

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:

- Induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure);
- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; and/or
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

The lead agency determined in the NOP/IS (see Appendix A) that the following environmental issues areas resulted in no impact and were scoped out of requiring further review in this Recirculated Draft EIR. Please refer to Appendix A of this Recirculated Draft EIR for a copy of the NOP/IS and additional information regarding the following impacts:

- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.

The proposed Project includes approximately 314.30 acres of agricultural land. A steel storage building associated with agricultural activities is located in the eastern portion of the Project site, near South Union Avenue (SR-204). Implementation of the proposed Project would not require the removal or displacement residential structures; therefore, no housing would be displaced, and the project would not require construction of replacement housing elsewhere. No impact would occur.

- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

The proposed Project includes approximately 314.30 acres of agricultural land. A steel storage building associated with agricultural activities is located in the eastern portion of the Project site, near South Union Avenue (SR-204). Implementation of the proposed Project would not require the removal or displacement residential structures or their inhabitants; therefore, no people would be displaced, and the project would not require construction of replacement housing elsewhere. No impact would occur.

Project Impacts

Impact 4.14-1: The Project Would Directly Induce Substantial Population Growth.

The Project proposes the future development of industrial and commercial uses on-site, which would not result in an increase in local population and housing units when compared to current conditions. The proposed Project includes a General Plan Amendment (GPA) to modify the existing Metropolitan Bakersfield General Plan land use designations and a Zone Change (ZCC) for the Project site. The GPA and ZCC would alter the existing land use and zone designations for the Project site's estimated 314.30 acres to allow for light and service industrial uses. The industrial areas would contain approximately 4,613,004 square feet (net building area) of warehousing, distribution, and retail showroom uses. No residential uses would be constructed under the proposed Project.

A project could induce population growth in an area either directly or indirectly. More specifically, the development of new homes or businesses could induce population growth directly, whereas the extension of roads or other infrastructure could induce population growth indirectly. The introduction

of approximately 4,613,004 square feet of light to medium industrial development within the Project site would increase the number of employees needed within the County. Given the current unemployment rate within the County, it is anticipated that any new jobs generated from this proposed Project would not result in a need for new housing or a population increase. This is because the existing labor force can be used to provide employees to the new industrial facilities.

As the Project proposes to amend the Metropolitan Bakersfield General Plan to allow for the industrial uses, the proposed Project would be removing an obstacle to growth in the Project area by changing the existing land use designation from R-IA (Resource-Intensive Agriculture) to LI (Light Industrial), SI (Service Industrial), GC (General Commercial), and HC (Highway Commercial). This allows for additional employment opportunities, which can lead to the relocation of people to jobs and ultimately and increase in population. However, the size of the labor force within Kern County and the current unemployment rates as discussed above, are considered to be sufficient for the current County population to accommodate jobs generated by the proposed Project.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

As discussed above, the proposed Project would not increase population, as no new residences would be constructed and the current labor force would be used to provide the number of employees necessary for the industrial facilities proposed by the Project. This proposed Project would not directly increase population or the housing stock.

Because the proposed Project would not directly increase population and there is a high unemployment rate, the proposed Project is not anticipated to result in a direct or indirect impact on population and housing, nor is it anticipated to be growth inducing. Therefore, the proposed Project, in conjunction with the current and reasonably foreseeable projects discussed in Chapter 3, *Project Description*, would not lead to population growth. The employment opportunities provided by the proposed Project and other reasonably foreseeable projects would help to provide a balance with the current and projected labor force associated with future conditions. Therefore, this cumulative impact would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Section 4.15

Public Services

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Section 4.15
Public Services

4.15.1 Introduction

This section focuses on public services, comprised of fire protection, sheriff / police protection, schools, parks and recreation, and libraries. The potential impacts on public services were evaluated, based in part, on coordination with the appropriate local service agencies that serve the proposed Project area. This section provides baseline information, and evaluates potential impacts, on public services practices and policies related to the proposed Project. A Public Services Report was prepared by McIntosh & Associates in October 2008 (refer to Appendix N). A second Public Services Report was prepared by McIntosh & Associates in June 2017. See Appendix J, *Public Support Services*, and Appendix N, *Original Technical Studies*.

4.15.2 Environmental Setting

The public services addressed in this section include police and fire protection, parks, schools, libraries, and other countywide public protection facilities.

Fire Protection

The Kern County Fire Department (KCFD) is responsible for fire protection services, fire prevention, emergency medical and rescue services, arson investigation and hazardous materials coordination with citizens within the Metropolitan Bakersfield General Plan area. The KCFD has established a ratio of staff to resident population and operates at a ratio of 1.092 fire personnel per 1,000 residents which slightly exceeds the national standards. The KCFD provides primary fire protection to unincorporated areas of the county and on regional transportation corridors such as Interstate (I) 5. The KCFD also acts as a secondary responder. The Emergency Communications Center was established as a joint dispatch center for the Bakersfield Fire Department and the KCFD in 1988, which provides for the closest station response concept. The center's dispatch covers more than 8,000 square miles, includes more than 65 fire stations, including 15 Kern County Fire Stations, and receives calls from nine separate public safety agencies. A Joint Powers Agreement has been established between the County and City of Bakersfield fire departments that provides for the closest station response concept. The two fire departments have adopted nonoverlapping, but contiguous station response boundaries without regard to City or County limits.

The National Fire Code set forth by the National Fire Protection Association (NFPA), California Fire Code, the California Building Code (CBC) and the Ordinance Code of Kern County are applied and utilized to regulate fire safety in the County.

Facilities and Services

The KCFD would serve the proposed Project. All KCFD first alarm response companies are staffed with a three-person engine company and a three-person truck company that provides basic Emergency Medical Technician medical aid services. Currently, Kern County Fire Station 52, located at 312 Taft Highway, is the first responding station for the Project area. Station 52 also houses a heavy

rescue vehicle that is "shared staffing" with either engine. There is a potentially low, first-unit emergency response time of three minutes to the edge of the site (at South Union Avenue [SR-204]), given the proximity of the project site to Station 52. Due to traffic and distance, the response time could range from four to eight minutes. An overall average response time for engine and truck companies is 5.2 minutes for any property within a 2.6-mile area around a specific station. Station No. 52 is located approximately 1.1 miles from the northeast corner of the project site, while the furthest point (southwest corner) is approximately 2.7 miles away.

Because the proposed Project is located outside of the boundaries of the Joint Powers Agreement, response companies located at City of Bakersfield Fire Station 13 (the closest City Fire Station at Poppyseed Street and Stine Road, south of Panama Lane) are not currently available.

The KCFD has established a ratio of staff to resident population, but the national industry standard is 1.0 fire personnel per 1,000 residents. Currently, the KCFD operates at a ratio of 1.092 fire personnel per 1,000 residents, slightly exceeding the national standard.

Whether the existing facilities, manpower, and equipment are adequate to maintain a sufficient level of service in the Greenfield area would depend on the density of new occupancy. In the last five to ten years, the KCFD has witnessed a marked increase in the population of Kern County. An increase in service requests, such as for residential fires, vehicle accidents, medical aid, mandated business inspections and safe programs, have been associated with this increase in population. As with most businesses, fire service is also impacted with growth, rather small or large impacts.

Sheriff/Police Protection

The Kern County Sheriff's Department is responsible for providing law enforcement services through the enforcement of local, State and Federal laws. The completion of this goal involves crime prevention, field patrol (ground and air), crime investigation, apprehension of offenders, regulation of noncriminal activity and the performance of a number of related and support services. Traffic and parking control functions are also provided, with some investigation of property damage, traffic accidents and complete investigations of all injury, fatal, intoxication and hit-and-run accidents.

The Kern County Sheriff's Department administers police services throughout the County, enforcing local, State and federal laws. The Kern County Sheriff's Department is responsible for crime prevention, field patrol (ground and air), crime investigation, the apprehension of offenders, regulation of noncriminal activity, and a number of related and support services. Traffic and parking control functions are also provided, along with some investigation of property damage reports and traffic accidents.

Response time is the time required to handle a call for service, which is measured from the time a call is received until the time a patrol car arrives at the scene. Response times are variable, particularly because the nearest responding patrol car may be located anywhere in the station's patrol area and may not respond from the nearest substation. The average response used by the Kern County Sheriff's Department is five minutes or less for an emergency or immediate response incident (e.g., a crime that is underway and/or a life-or-death situation) and eight to ten minutes for routine calls (e.g., a crime that has already occurred and/or an incident that is not life threatening). Response to an

emergency at or near the proposed Project site can vary depending on the demands of the substation at the time of the call. If demands are high, response time will be longer than estimated. The response time for a non-emergency call could range from 15 to 30 minutes or more, depending on staffing and other calls for service.

Facilities and Services

The proposed Project is located within the Lamont Substation's jurisdiction of the Kern County Sheriff's Department, located at 12022 Main Street, in the township of Lamont, and is approximately 6 miles east from the proposed project. The Lamont Substation is responsible for providing law enforcement services to the residents and businesses located throughout an almost 500-square-mile area. The Kern County Sheriff's Department Lamont Substation has 20 deputies assigned for patrol within the geographic service area, which includes the proposed Project. The Lamont Substation has 1 sergeant, 3 senior deputies, 16 deputies, and 1 section lieutenant during the day. At night, an additional sergeant and lieutenant are responsible for monitoring calls within the Lamont service area (McIntosh & Associates 2017). If a situation warranted immediate aid, deputies from Frazier Park and Taft would be requested first. The next level of assistance would be requested department side from 10 other Substations, Metro Patrol and Special Units (McIntosh & Associates 2017).

The County of Kern and the City of Bakersfield have a formal mutual aid agreement for law enforcement and emergency services. Beyond departmental capabilities, a formal request for mutual aid will occur by established protocols. Agencies within the County of Kern will be requested first and then request outside the county will begin by region. Additionally, both the Kern County Sheriff's Department and the Bakersfield Police Department aided dispatch systems identify calls for service by City and County aid jurisdiction. The Lamont Substation response time to an emergency in the proposed Project area could range from 15 to 30 minutes depending on call priority (McIntosh & Associates 2017). The Kern County Sheriff's patrol units traveling through the City shall respond to observed public safety problems and then call the City Police Department for follow-up.

California Highway Patrol (CHP)

As a major Statewide law enforcement agency, the California Highway Patrol (CHP) is responsible for the management and regulation of traffic to achieve safe, lawful and efficient use of the California highways as well as provide disaster and lifesaving assistance.

The purpose of the CHP is to ensure safety and provide service to the public on the highway transportation system and to assist local government during emergencies when requested. The primary responsibility of the CHP is to patrol state highways and all county roadways, enforce traffic regulations, respond to traffic accidents, and provide service and assistance to disabled vehicles. The CHP maintains a mutual aid agreement with the Kern County Sheriff's Department.

The CHP is divided into eight different divisions. The proposed Project is located in the CHP Central Division, which includes which includes 15 area offices, two commercial vehicle enforcement facilities (CVEF), and three communications and dispatch centers (CHP 2017). The closest CHP area office to the proposed Project area is the Bakersfield office, located approximately one mile north of the proposed Project site, at 9855 Compagnoni Street (CHP 2017).

Schools

Primary and secondary school facilities are provided throughout Metropolitan Bakersfield by several school districts and collegiate institutions. The educational institutions are responsible for the operation, staffing and scheduling of more than 70 individual school facilities. Two of the key factors that affect existing and future school facilities are funding and student generation rates. The proposed Project is located within the Greenfield Union School and Kern High School Districts.

Greenfield Union School District

The proposed Project is located within the Greenfield Union School District (GFUSD) jurisdiction. The closest elementary school is Granite Point Elementary School, located at 2900 Berkshire Road, approximately 5.5 miles north of the proposed Project. Granite Point Elementary School has a design capacity of 750 students and has a current enrollment of approximately 958 students. The closest middle school is McKee Middle School, located at 205 McKee Road, approximately two miles north of the proposed Project. McKee Middle School has a design capacity of 1,100 students and has a current enrollment of approximately 946 students (McIntosh & Associates 2017).

Kern County High School District

The proposed Project is also located within Kern High School District boundaries. The proposed Project site and the area west of South Union Avenue (SR-204) are located within the Ridgeview High School (8501 Stine Road) attendance area. Ridgeview High School is located at 8501 Stine Road, and is approximately 5.5 miles northwest of proposed Project. The school serves grades 9th through 12th, has a capacity of 2,176 students, and has a current enrollment of approximately 2,274 students. The District has no plans to increase enrollment capacity (McIntosh & Associates 2017).

Collegiate Institutions

Higher education within Metropolitan Bakersfield is provided by Bakersfield College and California State University at Bakersfield (CSU Bakersfield). Bakersfield College is a two-year community college, whereas CSU Bakersfield has four-year and graduate degree programs.

Parks and Recreation

The Kern County Parks and Recreation Department manages eight (8) regional parks, 25 public buildings, and 40 neighborhood parks. There are no recreational facilities currently serving the Project, nor are there existing parks located within ¾-mile of the proposed Project. The nearest developed park to the proposed Project is Kern Delta Park (approximately 1.5 miles north-northwest of the proposed Project).

Libraries

The Kern County Library system consists of 24 branches and two (2) bookmobiles throughout Kern County, with the main branch library (the Beale Memorial Library) located in Bakersfield. Materials for use at county branches include books, government documents, computers, CDs, and other informational media. The Kern County library system maintains a collection of 1.15 million books,

audiovisual items, periodicals, and other informational sources (Kern County Library 2017). The closest libraries to the proposed Project are the Lamont Branch Library, located approximately 5.25 miles northeast of the proposed Project, at 8304 Segrue Road, Lamont, and Wilson Branch Library, located approximately 5.5 miles north of the proposed Project site, at 1901 Wilson Road in Bakersfield.

4.15.3 Regulatory Setting

State

Senate Bill (SB) 50

The Leroy F. Greene School Facilities Act of 1998, or Senate Bill 50 (SB 50), authorizes school districts to levy developer fees to finance the construction or reconstruction of school facilities. In January 2015, the State Allocation Board (SAB) approved maximum Level 1 developer fees at $0.54 per square foot of enclosed and covered space in any commercial or industrial development, and $3.36 per square foot for residential development. These fees are intended to address the increased educational demands on the school district resulting from new development. Public school districts can, however, impose higher fees than those established by the SAB, provided they meet the conditions outlined in the act. Private schools are not eligible for fees collected pursuant to SB 50.

The payment of school mitigation impact fees authorized by SB 50 is deemed to provide full and complete mitigation of project impacts on school facilities. SB 50 provides that a State or local agency may not deny or refuse to approve the planning, use, or development of real property on the basis of a developer's refusal to provide mitigation in amounts in excess of that established by SB 50.

Local

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan cites policies to provide decision-makers with long-range guidance affecting the future character of the Metropolitan Bakersfield planning area. The elements within the Metropolitan Bakersfield General Plan provide goals and policies in order to ensure that public services have adequate capacity to service proposed developments. Applicable public services goals and policies relative to the proposed Project site are identified in Table 4.15-1, *Metropolitan Bakersfield General Plan Goals and Policies for Public Services*, below.

Table 4.15-1. Metropolitan Bakersfield General Plan Goals and Policies for Public Services
Metropolitan Bakersfield General Plan: Safety Element
Safety Element Goal #2: Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development of metropolitan police and fire facilities and services.
Public Services and Facilities (PSF) School Policies
PSF School Policy #1: New development will be required to pay its proportional share of the cost of school impact fees within the Plan area.
Public Services and Facilities (PSF) Parks Element Policies
PSF Park Policy #3: "Require developers to dedicate land, provide improvements and/or in lieu fees to serve the needs of the population in newly developing areas."

Capital Improvement Plan

A countywide Capital Improvement Plan (CIP) was presented to the board of supervisors on October 9, 2007, and adopted in 2008. This report presents the best current understanding regarding new public facilities that would be needed to serve projected development in the County through 2030. The scope of services includes parks; libraries; Kern County Sheriff's Department (public protection and investigation), fire department, animal control, public health, and landfill/transfer facilities; and, general government services. Road and sewer costs, as well as related impacts, are not part of this program. The program includes three phased components:

Phase One: Develop a conceptual CIP for the included facility categories, assessing what additional capacity and conceptual projects are required to provide needed infrastructure for new development through 2030;

Phase Two: Evaluate existing and potential funding sources, and outline options available as financing mechanisms, including a development fee proposal; and

Phase Three: Perform a fiscal (operational) analysis for use in evaluating the ongoing operating and maintenance impact of a new development on the County's general fund.

The adopted CIP includes a summary of proposed service levels for the included facilities and a conceptual list of the planned projects upon which the CIP was based.

Public Facilities Mitigation Program

The changing fiscal landscape in California during the past 30 years has steadily undercut the financial capacity of local governments to fund infrastructure. Three dominant trends stand out:

- The passage of a string of tax limitation measures, starting with Proposition 13 in 1978 and continuing through the passage of Proposition 218 in 1996;
- Declining popular support for bond measures to finance infrastructure for the next generation of residents and businesses; and

- Steep reductions in federal and state assistance.

Faced with these trends, the County has adopted a policy of "growth pays its own way" through use of a public facilities mitigation program. The primary policy objective of this program is to ensure that new development pays the capital costs associated with growth. In 2008, the County adopted a Capital Improvement Plan (CIP) that document identifies the best current understanding of the public facilities that will be needed to accommodate new development anticipated through 2030. The CIP further identified appropriate facility demand standards to be used as a basis for estimating future facility needs and level of service. The basic purpose of the CIP is to identify the facilities and infrastructure needed to serve the population in 2030.

Continued growth within the County and the associated impacts resulting from that growth have increased the demands to Countywide public services and have made it difficult to not only implement and fund many of those facilities identified within the Capital Improvement Plan, but maintain existing public service demand standards as growth occurs. In short, despite the increase in property taxes generated as a result of the proposed project and other similar projects within the County, public facility impacts are still underfunded and unable to maintain existing and adopted facility standards.

The purpose of the Public Facilities Mitigation Program is to identify those impacts on public services and determine the California Environmental Quality Act (CEQA)-required mitigation (in dollars) that would be needed to address the growth impacts adequately. The following categories have been identified to help determine which specific public needs are impacted by the proposed project.

- Countywide Public Protection Facilities;
- Sheriff Patrol and Investigation Facilities;
- Library Facilities;
- Animal Control Facilities:
- Park Facilities;
- Fire Facilities;
- Waste Management Facilities;
- Public Health Facilities; and
- General government Facilities.

4.15.4 Impacts and Mitigation Measures

Methodology

The potential impacts associated with the proposed Project are evaluated on a quantitative basis through a comparison of the anticipated project effects on public services. The evaluation of project impacts as based on professional judgment, consistency analysis with the goals and polices of Metropolitan Bakersfield General Plan and the significance criteria established by Appendix G of the

State CEQA Guidelines, which the County has determined to be appropriate criteria for this Recirculated Draft EIR. In accordance with CEQA, the effects of a project are evaluated to determine if they will result in a significant adverse impact on the environment. An EIR is required to focus on these effects and offer feasible mitigation measures to reduce or avoid any significant impacts that are identified.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed project would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities; and/or result in the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services, which include:

    i. Fire Protection

    ii. Police Protection

    iii. Schools

    iv. Parks

    v. Other Public Facilities

Project Impacts

Impact 4.15-1: The Project Would Result in Adverse Physical Impacts Associated with New or Physically Altered Governmental Facilities or Result in the Need for New or Physically Altered Governmental Facilities and Have Significant Fiscal Impacts on Public Services.

In May 2009, the County prepared, in consultation with Willdan Financial Services a Public Services Study, the purpose of which was to calculate and present development factors that will enable the County to expand its inventory of public facilities, and therefore maintain its existing facilities standards, as new development leads to service population increases. The applicability of these factors assumes full property taxes and are based on the services provided by the County to a given area to determine the underfunded public service needs. Table 4.15-2, *Applicability of Proposed Mitigation Factors to Residential and Non-Residential Uses*, identified below, summarizes the applicability of each of the proposed mitigation factors to residential and non-residential uses.

Table 4.15-2. Applicability of Proposed Mitigation Factors to Residential and Non-Residential Uses

Fee Category	Geographic Applicability	Service Population	
		Residential	Non-Residential
Public Protection	Countywide	X	X
Sheriff Patrol & Investigation	Unincorporated	X	X
Library	Countywide	X	
Animal Control	Unincorporated areas, Maricopa, McFarland, Tehachapi, Arvin, Bakersfield	X	
Community Parks	Countywide	X	
Regional Parks	Countywide	X	
Fire	Kern County Fire Service Area	X	X
Waste Management	Countywide	X	X
Public Health	Countywide	X	X
General Government	Countywide, different rates for cities	X	X

Future development of industrial uses would create public services typical of any new industrial development. As a non-residential facility, implementation of the proposed Project has the potential to result in a demand for new and/or additions to existing public protection facilities, sheriff facilities, fire facilities, waste management facilities, public health facilities and various general governmental facilities.

At this time, specific industrial uses on the proposed Project site are not available. The proposed M-1 PD (Light Industrial, Precise Development Combining), M-2 PD (Medium Industrial, Precise Development Combining), C-2 PD (General Commercial, Precise Development Combining), and CH PD (Highway Commercial, Precise Development Combining) Zone Districts would allow for, gas stations, restaurants, motels, wholesale commercial, storage, trucking, assembly-type manufacturing, general manufacturing, processing, office, or industrial uses to be constructed on-site. As a result, it is not feasible to specifically identify monetary mitigation for public facilities at this time, given the various commercial, office or industrial uses allowed within the M-2 PD Zone District. Given the proposed Project is non-residential, impacts to library, animal control, community and regional parks are considered less than significant.

The following is a discussion on the various public service impacts that would result with implementation of the proposed Project.

Fire Protection

Construction of the proposed Project has the potential to create an increased demand for fire services on the KCFD due to the increase in urban/industrial development. According to Captain Jim Eckroth, the proposed Project could increase the demand for fire protection and emergency services that could require manpower and equipment that are adequate to maintain a sufficient level of service in the

Greenfield area depending on the density of the new proposed commercial and industrial development (McIntosh &Associates 2017).

At this time mitigation development fees and taxes are undetermined by the KCFD; however, the proposed Project would be required to pay all fees and taxes established for the fire department prior to issuance of building permits. During the plan review phase, the Project Applicant may be required to agree to Conditions of Approval for development of the proposed Project in order to mitigate the demand for additional fire personnel and additional emergency equipment necessary to maintain adequate fire protection service. As such, implementation of the required mitigation measures below would reduce impacts to a less than significant level for fire protection services related to increase fire personnel.

The proposed Project has the potential of having short-term construction-related impacts. If during construction there is a need to redirect traffic or block access routes or residential streets, potential delays in emergency response could result. This temporary impact would be reduced to less than significant with implementation of mitigation measures pertaining to coordination during construction (refer to Section 4.16, *Transportation and Traffic*). Additionally, compliance with fire safety standards and requirements such as interior sprinkler systems, fire alarms, emergency access and adequate fire flow at public and on-site hydrants would be required during the plan review process and would reduce impacts to less than significant levels.

Furthermore, construction of the proposed Project would be subject to the provisions of the Uniform Fire Code and local amendments; Titles 19, 22 and 27 of the California Safety Code Regulations; the Kern County Ordinance Code; and the National Fire Prevention Association Standards. Thus, ensuring adequate fire protection services are maintained within the Project site.

Therefore, the proposed Project and the increase demand would not create an adverse impact because planned growth is something that is simply responded to by the KCFD. The KCFD and the Kern County Planning and Natural Resources Department reviews each new development to ensure that all requirements for emergency access, fire hydrant location and spacing, fire flows, and fire lanes are incorporated into the proposed project designs. Kern County code of Ordinances, regulations, guidelines, and fees are periodically updated. Development projects, including the proposed Project, are required to incorporate the most current code requirement that are in effect at the time of map recordation or building permit issuance. Impacts would be less than significant.

Sheriff/Police Protection

Construction of the proposed Project has the potential to create an increased demand for police services on the Kern County Sheriff's Department due to the increase in urban/industrial development. However, according to Commander Drake Massey, the existing facility, manpower and equipment are adequate to maintain sufficient service for this response area (McIntosh & Associates 2017). Additionally, the addition of officers, clerical staff, and law enforcement equipment pursuant to conditions of approval as set forth by the County, would decrease the demand on the existing police services and reduce the significance of impacts to less than significant levels.

Similar to the fire protection services, the proposed Project has the potential of having short-term construction related impacts. Construction areas may require additional police monitoring throughout

the duration of Project construction both during day and nighttime periods. Additionally, the need to redirect traffic or block access routes or residential streets may arise which would result in potential delays in police response. These temporary impacts would not be considered significant with implementation of mitigation measures pertaining to coordination during construction (refer to Section 4.16, *Transportation and Traffic*).

Other Public Facilities

Public protection facilities include criminal detention facilities, courthouses, coroner, 911 communications, and the Kern County Sheriff's Department administrative buildings. In contrast with sheriff patrol and investigation facilities, which are used primarily to provide services in unincorporated areas of the County, public protection facilities serve residential and nonresidential development countywide. Similar to sheriff facilities, demand for public protection services per employee are less than compared per resident, however implementation of the proposed Project would increase the service need. With implementation of the mitigation measures, impacts will be considered less than significant for public protection.

Refuse collection services for the proposed project is operated and managed by Price Environmental Services, Inc. Refuse collected is transported to one of two landfills, the Metropolitan Bakersfield Sanitary Landfill at (Bena Landfill) or Shafter-Wasco Sanitary Landfill. Calculations made utilizing the Kern County Waste Management Department methodology of solid waste estimation; the proposed project is anticipated to generate 12,883 tons of construction waste to buildout, and 13,519 tons of solid waste annually thereafter. Bena Landfill has reported the remaining capacity at 22,174,654 tons and the landfill is projected to accommodate solid waste for 26.8 years and is currently scheduled for closure in the year 2038. Shafter-Wasco Landfill has reported the remaining capacity at 3,671,755 tons and is projected to accommodate solid waste for 16.4 years (McIntosh & Associates 2017).

The County's waste management facility standard adopted in the CIP is 38.45 tons of landfill capacity per capita. This standard is based on the existing per capita landfill capacity. A planned system-wide transition from the several local sanitary landfill sites to regional sanitary landfills supplemented by local transfer stations is currently in process. The Kern County Waste Management Department presently has plans for eleven new facilities, several facility closures, and numerous miscellaneous capital projects which expand existing disposal facilities, consolidate local disposal sites to three regional disposal sites, and protect landfills from encroachment of incompatible land uses by acquiring buffer zones around disposal sites. Implementation of the project will contribute to the overall service needs for the Kern County Waste Management Department on a Countywide level. Implementation of the mitigation measures below will reduce impacts to waste management to a less than significant level.

General government facilities provide space for the Board of Supervisors and for general County administration including the Assessor, Treasures, Tax Collector and the Auditor-Controller County Clerk. Some general government facilities are primarily used to provide service and administration in unincorporated areas, while others provide service on an equal basis countywide. It is estimated that new development, Countywide, between now and the year 2030 would result in an increase of service population by 448,500 people (residents and workers combined). The Kern County CIP identifies a general government facility standard of 0.25 building square feet per capita, which was

the existing standard of general government facilities at the time the CIP was adopted. The County anticipates that less than 0.25 general government building square feet per capita will be needed to accommodate new development through 2030, therefore, the general government impact fee is based on the cost of planned facilities per capita. With implementation of the mitigation measure below, impacts to general government facilities will be reduced to less than significant levels.

These increased facility demands to public protection, waste management, and general government go above and beyond those funded through the increase in property taxes generated as a result of rezoning the property to industrial use.

Schools

As mentioned above, the proposed Project is located within the Greenfield Union School District and the Kern High School District. No school age children would reside on the proposed Project because no residential structures are proposed for this property. The Project applicant would be required to pay applicable statutory school fees under California Government Code Section 65995-65996. The rate factor for the Greenfield Union School District's students is determined by the factors based on total student generation impact per 1,000 square feet of commercial and industrial development, as shown in Table 4.15-3.

Table 4.15-3. Total Student Generation Impact

Commercial and Industrial Category	Elementary School Inter-District Impact	Middle School Inter-District Impact	Total Inter-District Cost Impact
Banks	0.0878	0.0373	0.1251
Community Shopping Center	0.0477	0.0202	0.0679
Neighborhood Shopping Center	0.0870	0.0370	0.1240
Industrial Business Parks	0.1093	0.0464	0.1557
Industrial Parks/Warehousing	0.0419	0.0178	0.0597
Research & Development	0.0945	0.0402	0.1347
Hospitality (Lodging)	0.0352	0.0149	0.0501
Commercial Offices (Standard)	0.1489	0.0633	0.2122
Corporate Offices	0.0835	0.0355	0.1190
Medical Offices	0.1326	0.0563	0.1889

Source: McIntosh & Associates, Public Services Report, 2017.
Notes: Total student generation impact per 1,000 square feet of commercial and industrial development.

The proposed Project is projected, in a worst-case scenario, to indirectly cause the addition of some residents based on the number people that will move to the area to fill managerial and other positions created by the development. This increase may create a demand for housing that may include school age children, which will indirectly create a demand for school services. Therefore, although the proposed Project would increase the intensity of land use on the Project site, the proposed Project is a commercial and industrial development and will not directly create a demand for school services. Thus, impacts to schools in the proposed Project area would not be considered substantial, as no residential uses are proposed.

In addition, the proposed Project would be required to contribute development impact fees in accordance with Senate Bill 50 (SB 50) (Level 1 impact fees) and the above-mentioned standards and

policies. Therefore, Project-related impacts to schools regarding acceptable service levels would be reduced to less than significant levels following implementation of State law.

Parks and Recreation

The proposed Project includes industrial uses and would not directly result in a demand for park facilities. According to the Metropolitan Bakersfield Kern County General Plan, a level of service standard of 2.5 acres of park area per 1,000 residents shall be implemented; therefore, the demand for park facilities is based on the residential population with the County. Since the proposed Project does not include housing, the proposed Project would not result in a direct demand for park and recreation facilities.

Mitigation Measures

MM 4.15-1: **Fire Safety Plan.** Prior to the issuance of grading or building permits, the project proponent shall develop and implement a Fire Safety Plan for use during construction and operation. The project proponent will submit the Fire Safety Plan, along with maps of the project site and access roads, to the Kern County Fire Department for review and approval. The Fire Safety Plan will contain notification procedures and emergency fire precautions for construction and operations phases of the proposed project.

MM 4.15-2: **Land Development Services Fee Schedule.** Prior to the issuance of grading or building permits, the project proponent shall coordinate with Kern County to determine the need for payment of land development services fees, in accordance with the Kern County Land Development Services Fee Schedule, for impacts to countywide public protection, sheriff's patrol and investigative services, and fire services.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Significant cumulative impacts to public services would occur if the cumulative projects would overburden the public service agencies and if utility providers were unable to provide adequate services. The cumulative impacts of this proposed Project, in conjunction with all the other projects, would result in the need for new fire, sheriff, library, and general governmental facilities. Implementation of the Development Impact Fee Program as directed by the Kern County Board of Supervisors, is appropriate mitigation to reduce cumulative impacts to public services. The cumulative projects would substantially increase the demand for public service providers and utility servers. However, public agencies and utilities have the opportunity to respond to an inquiry for information regarding potential increase in demand on their services. Monetary mitigation is determined on a project-by-project basis to mitigate for the increase in demand on public services and utilities. Incorporation of the mitigation measures would reduce impacts from the proposed Project, in conjunction with other projects in the area, to a less than significant cumulative level.

Mitigation Measures

Implement Mitigation Measures MM 4.15-1 and 4.15-2, above.

Level of Significance after Mitigation

Impacts would be less than significant.

Section 4.16

Transportation and Traffic

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Section 4.16
Transportation and Traffic

4.16.1 Introduction

The purpose of this section is to evaluate existing traffic conditions and the potential traffic impacts of the proposed Project. The evaluation considers impacts on local roadways, intersections, and regional facilities, as well as proposed Project access and internal circulation. Mitigation measures are recommended to avoid or lessen impacts, as necessary. A Traffic Impact Study (Traffic Study) was prepared by McIntosh & Associates in November 2016, and a technical memo regarding trip generation counts was prepared in May 2018. See Appendix M, *Traffic Study*.

The following analysis scenarios are evaluated in this section:

- Existing 2016 Conditions
- Future Year 2025 (Project Buildout) Without Project Conditions
- Future Year 2025 (Project Buildout) With Project Conditions
- Future Year 2035 Without Project Conditions
- Future Year 2035 With Project Conditions

Project impacts were assessed based on intersection and roadway levels of service (LOS). Improvements needed to maintain or improve operational LOS were also identified.

4.16.2 Environmental Setting

Study Area

The proposed Project is located approximately 1.10 miles southeast of the Bakersfield city limits, within the Metropolitan Bakersfield General Plan in Kern County. The proposed Project consists of approximately 314.30 acres, generally located north of Houghton Road, east of State Route 99 (SR-99), west of South Union Avenue, and south of DiGiorgio Road. South Union Avenue, Houghton Road, and the DiGiorgio Road alignment provide the primary access to and from the proposed Project area. The Project study area is illustrated on the figures provided in this section. A total of 43 intersections were analyzed within the study area. Of these intersections, 36 currently exist and seven (7) are proposed. The seven (7) proposed intersections were assumed to be in operation by Year 2025.

Existing and Proposed Street Network

The following is a summary of roadways within the study area:

Panama Lane is a designated east-west arterial west of the SR-99 Southbound Off-Ramp to east of Cottonwood Road in various stages of widening. Panama Lane currently exists as a six-lane, divided

roadway from the west of SR-99 Southbound Off-Ramp to South H Street. It then continues east from South H Street as a four-lane, divided roadway to South Union Avenue. Panama Lane exists at a two-lane, undivided roadway from South Union Avenue to the east of Cottonwood Road.

Hosking Avenue is a designated east-west arterial that exists as a two-lane, undivided roadway from west of SR-99 to Cottonwood Road.

Taft Highway/ State Route 119 (SR-119)/Panama Road is a designated east-west expressway from west of Wible Road to SR-99 and a designated arterial from SR-99 to the east of Cottonwood Road. Taft Highway/SR-119 is aligned with Panama Road to the east of South Union Avenue. Taft Highway/SR-119 currently exists as a two-lane, undivided roadway from west of Wible Road to South Union Avenue. Panama Road exists as a two-lane, undivided roadway from South Union Avenue to the east of Cottonwood Road.

Curnow Road is a designated east-west collector that currently exists as a two-lane, undivided roadway from west of South Union Avenue to Cottonwood Road.

DiGiorgio Road is a designated east-west arterial that currently exists as a two-lane, undivided roadway from South Union Avenue to the east of Cottonwood Road. DiGiorgio Road will be constructed in the future along the project's frontage and from the future Chevalier Road to South Union Avenue. DiGiorgio Road will provide direct access to the project site via the project's northern frontage.

Lamb Avenue is a designated east-west collector that currently exists as a two-lane, undivided roadway to the east of South Union Avenue. Lamb Avenue will be constructed in the future within the project boundary from Chevalier Road to South Union Avenue, and it will serve as direct access to the project site via several entrances on both the north and south sides of Lamb Avenue.

Mugsy Avenue is a designated east-west local roadway that currently exists as a two-lane, undivided roadway from South Union Avenue to east of South Union Avenue. Mugsy Avenue will provide direct access to the project site via several entrances within the project's interior.

Houghton Road/ Buena Vista Boulevard is a designated east-west arterial that currently exists as a two-lane, undivided roadway from west of Stine Road to South Union Avenue. Houghton Road is aligned with Buena Vista Boulevard at South Union Avenue and becomes Buena Vista Boulevard to the east of South Union Avenue. Buena Vista Boulevard is a designated east-west arterial that currently exists as a two-lane, undivided roadway from South Union Avenue to east of Adobe Road. Houghton Road will front the project's southern boundary and provide direct access to the project site via entrances on the project's southern frontage.

Shafter Road is a designated east-west collector that currently exists as a two-lane, undivided roadway from Chevalier Road to South Union Avenue. Shafter Road then becomes a designated arterial to the east of South Union Avenue, and it exists as a two-lane, undivided roadway to the east of South Union Avenue.

Kaiser Lane is a designated east-west collector that currently exists as a two-lane, undivided roadway from Chevalier Road to South Union Avenue.

Bear Mountain Boulevard/State Route 223 (SR-223) is a designated east-west arterial that currently exists as a two-lane, undivided roadway from west of Costajo Street to east of South Union Avenue.

Stine Road is a designated north-south arterial that currently exists as a two-lane, undivided roadway from north of Houghton Road to south of Houghton Road.

Wible Road is a designated north-south arterial that currently exists as a two-lane, undivided roadway from north of Taft Highway/SR-119 to south of Houghton Road.

South H Street is a designated north-south arterial that currently exists in various stages of widening. South H Street currently exists as a four-lane, divided roadway to the north of Panama Lane, and it continues southerly from Panama Lane to south of Houghton Road as a two-lane, undivided roadway. South H Street is aligned with Curnow Road to the south of Taft Highway/SR-119, but it realigns with its original alignment on the west side of SR-99 to the south of Curnow Road.

SR-99 is a designated north-south freeway that currently exists as a six-lane, divided roadway from north of Panama Lane to south of Bear Mountain Boulevard/SR-223. The freeway right-of-way will serve as the western boundary of the project site.

Costajo Road is a designated north-south collector that currently exist as a two-lane, undivided roadway from Houghton Road to Bear Mountain Boulevard/SR-223.

Chevalier Road is a designated north-south collector that currently exists as a two-lane, undivided roadway from Houghton Road to Kaiser Lane. Chevalier Road will be constructed in the future within the project boundary from DiGiorgio Road to Houghton Road. Chevalier Road will provide direct access to the project via several entrances within the project's interior.

South Union Avenue (SR-204)/SR-99 Business is a designated north-south arterial that currently exists as a four-lane, divided roadway from north of Panama Lane to south of Bear Mountain Boulevard/SR-223. This roadway will provide direct access to the project site via entrances along the project's eastern frontage. SR-204 and Union Avenue coexist north of SR-58.

Cottonwood Road is a designated north-south arterial that currently exists as a two-lane, undivided roadway from north of Panama Road to Buena Vista Boulevard.

Adobe Road is a designated north-south arterial that currently exists as a two-lane, undivided roadway from north of Buena Vista Boulevard to south of Buena Vista Boulevard.

Performance Criteria

For California Environmental Quality Act (CEQA) purposes, defined performance criteria are utilized to determine if a proposed project causes a significant impact. In general, according to the Transportation Research Board, National Research Council's 2010 Highway Capacity Manual (HCM), LOS ranges from LOS "A" (free-flow conditions) to LOS "F" (severely congested conditions), based on the average delay experienced per vehicle. The Metropolitan Bakersfield General Plan performance criterion for intersections and roadway segments is LOS "C" or better.

Existing Traffic Conditions

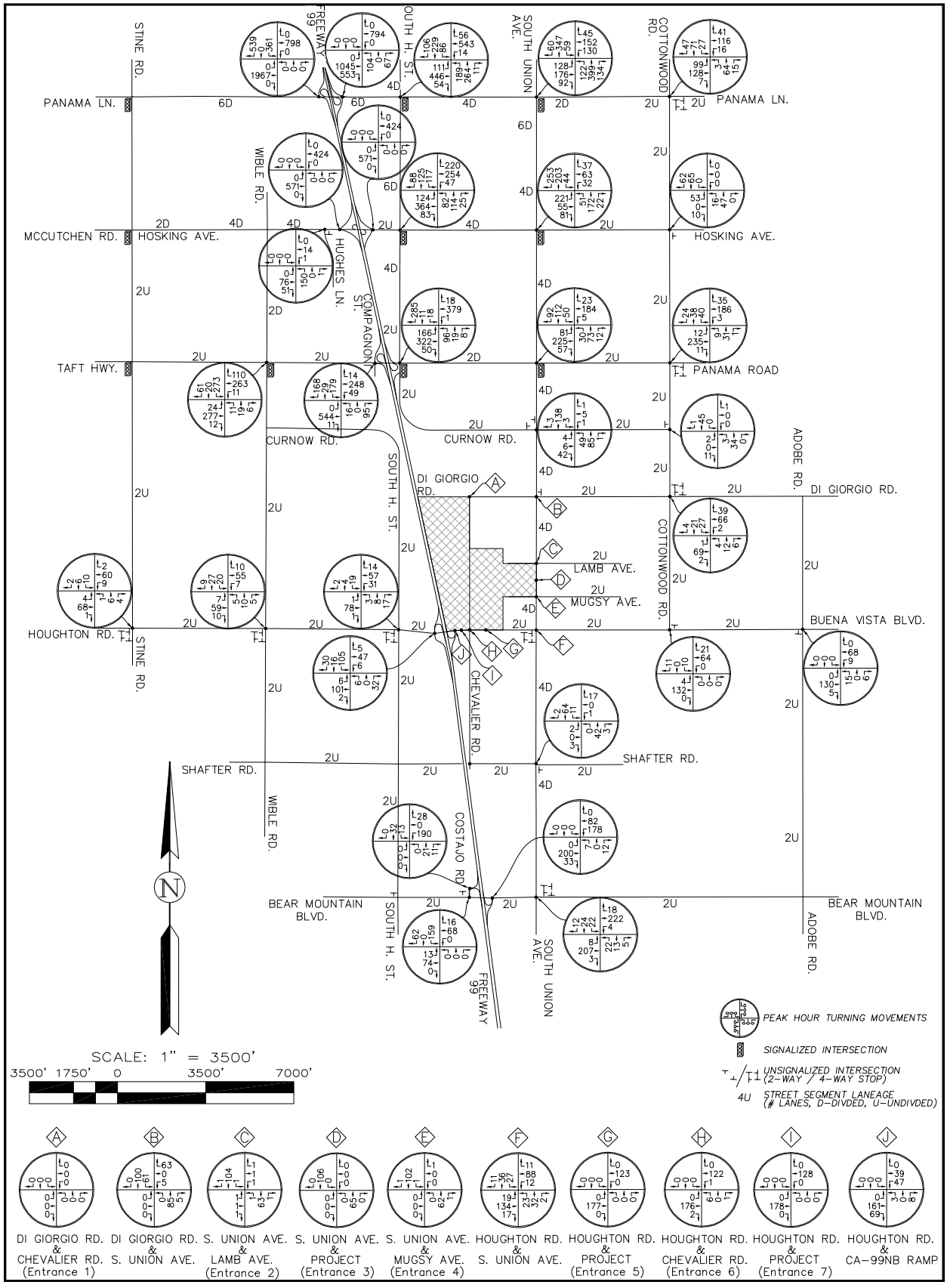
Existing Traffic Volumes

Traffic counts were taken at major intersections within the study area, as required by the City of Bakersfield, County of Kern, and the California Department of Transportation (Caltrans). The counts were used to determine the local peak-hour period, directional distribution, and existing operational LOS. Existing traffic counts were taken at the AM and PM peak hours for all intersections within the study area, and are illustrated in Figure 4.16-1a, *AM Peak Hour Turning Movements,* and Figure 4.16-1b, *PM Peak Hour Turning Movements.*

Existing Intersection Level of Service

Table 4.16-1, *Intersection Level of Service*, outlines the AM and PM peak hour LOS of the study intersections under Year 2016, Year 2025, and Year 2035 conditions. Based on the traffic counts taken for the Traffic Study, and as illustrated in Table 4.16-1, the following study intersections operate at an unacceptable LOS under existing 2016 conditions.

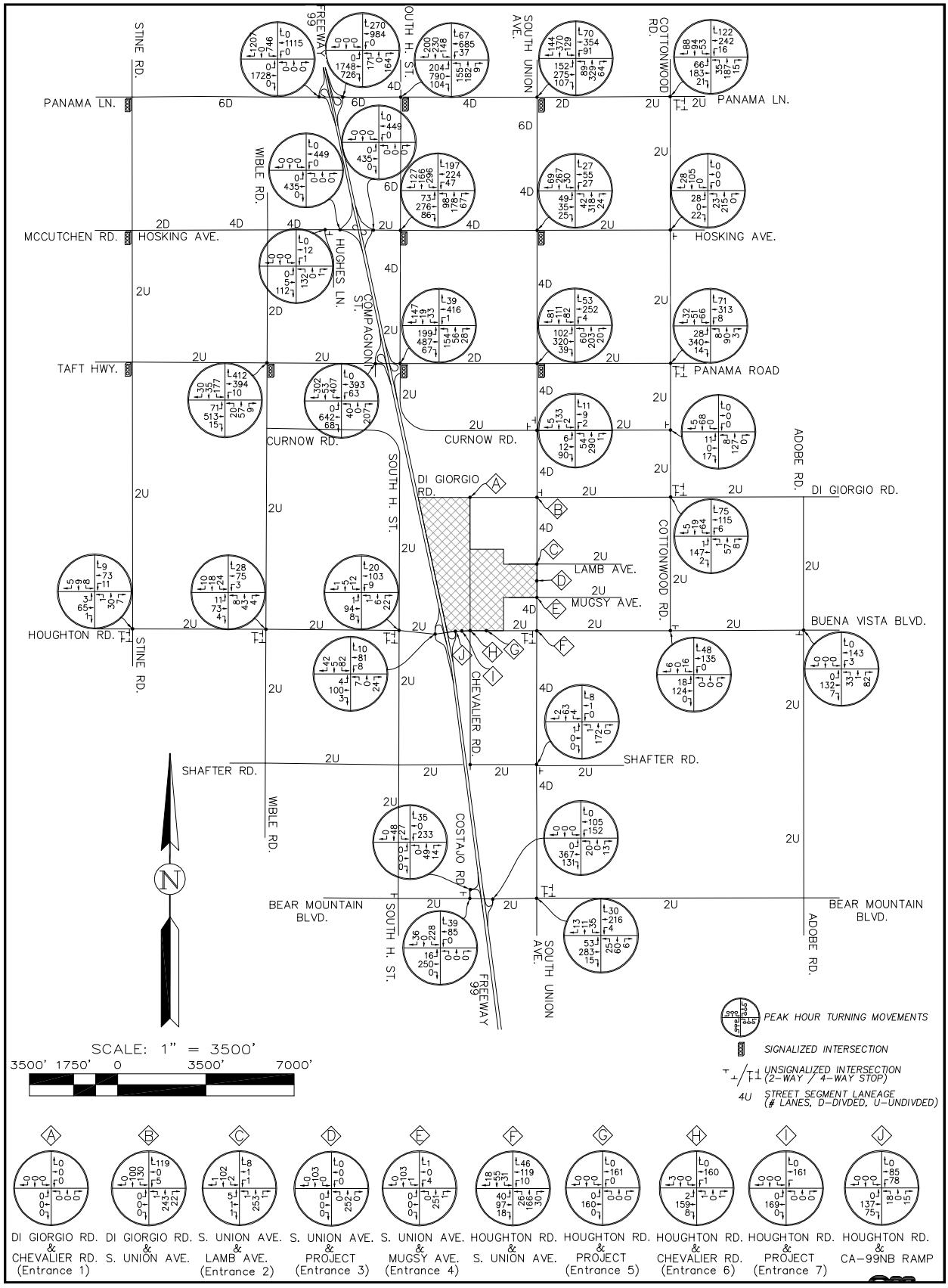
- Panama Lane and South H Street (PM Peak Hour LOS "D")
- Panama Lane and South Union (PM Peak Hour LOS "D")
- Hosking Avenue and South H Street (PM peak hour LOS "D")
- Taft Highway/SR-119 and SR-99 Southbound Ramp/Compagnoni Street (PM Peak Hour LOS "D")
- Taft Highway / SR-119 and South H Street (AM peak hour LOS "D")



Source: McIntosh & Associates, 2016

AM Peak Hour Turning Movements

Figure 4.16-1a



Source: McIntosh & Associates, 2016

99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07 • AGRICULTURAL PRESERVE #13 EXCLUSION

PM Peak Hour Turning Movements

Figure 4.16-1b

Table 4.16-1. Intersection Level of Service

Intersection	Scenario	Type	LOS
PANAMA LANE and SR-99 SB RAMP AM PEAK	Existing	S	B
	2025 Future w/o Project	S	B
	2025 Future with Project	S	B
	2035 Future w/o Project	S	C
	2035 Future with Project	S	C
PANAMA LANE and SR-99 SB RAMP PM PEAK	Existing	S	C
	2025 Future w/o Project	S	E
	2025 Future with Project	S	E
	2035 Future w/o Project	S	F
	2035 Future with Project	S	F
PANAMA LANE and SR-99 NB RAMP AM PEAK	Existing	S	B
	2025 Future w/o Project	S	B
	2025 Future with Project	S	B
	2035 Future w/o Project	S	B
	2035 Future with Project	S	B
PANAMA LANE and SR-99 NB RAMP PM PEAK	Existing	S	B
	2025 Future w/o Project	S	B
	2025 Future with Project	S	B
	2035 Future w/o Project	S	B
	2035 Future with Project	S	C
PANAMA LANE and SOUTH H STREET AM PEAK	Existing	S	C
	2025 Future w/o Project	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	D
	2035 Future with Project	S	D
PANAMA LANE and SOUTH H STREET PM PEAK	Existing	S	D
	2025 Future w/o Project	S	D
	2025 Future w/o Project (Improved)	S	D
	2025 Future with Project	S	D
	2035 Future w/o Project	S	E
	2035 Future with Project	S	E

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
PANAMA LANE and SOUTH UNION AVENUE AM PEAK	Existing	S	C
	2025 Future w/o Project	S	D
	2025 Future w/o Project (Improved)	S	C
	2025 Future with Project	S	D
	2025 Future with Project (Mitigated)	S	C
	2035 Future w/o Project	S	E
	2035 Future w/o Project (Improved)	S	C
	2035 Future with Project	S	D
PANAMA LANE and SOUTH UNION PM PEAK	Existing	S	D
	2025 Future w/o Project	S	E
	2035 Future w/o Project (Improved)	S	D
	2025 Future with Project	S	D
	2035 Future w/o Project	S	F
	2035 Future w/o Project (Improved)	S	C
	2035 Future with Project	S	C
PANAMA LANE and COTTONWOOD ROAD AM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	B
	2025 Future with Project	AWS	C
	2035 Future w/o Project	AWS	E
	2035 Future w/o Project (Improved)	AWS	C
	2035 Future with Project	AWS	C
PANAMA LANE and COTTONWOOD ROAD PM PEAK	Existing	AWS	C
	2025 Future w/o Project	AWS	F
	2025 Future w/o Project (Improved)	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	F
	2035 Future w/o Project (Improved)	S	C
	2035 Future with Project	S	C
HOSKING AVENUE and HUGHES AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	F
	2035 Future w/o Project (Improved)	S	D
	2035 Future with Project	S	D
HOSKING AVENUE and HUGHES PM PEAK	Existing	U	A
	2025 Future w/o Project	U	F
	2025 Future w/o Project (Improved)	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	D
	2035 Future with Project	S	D

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
HOSKING AVENUE and SR-99 SB RAMP AM PEAK	Existing	N/A	
	2025 Future w/o Project	U	B
	2025 Future with Project	U	B
	2035 Future w/o Project	U	C
	2035 Future with Project	U	C
HOSKING AVENUE and SR-99 SB RAMP PM PEAK	Existing	N/A	
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	B
	2035 Future with Project	U	B
HOSKING AVENUE and SR-99 NB RAMP AM PEAK	Existing	N/A	
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
HOSKING AVENUE and SR-99 NB RAMP PM PEAK	Existing	N/A	
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
HOSKING AVENUE and SOUTH H STREET AM PEAK	Existing	S	C
	2025 Future w/o Project	S	E
	2025 Future w/o Project (Improved)	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	F
	2035 Future w/o Project (Improved)	S	E
	2035 Future with Project	S	E
HOSKING AVENUE and SOUTH H STREET PM PEAK	Existing	S	D
	2025 Future w/o Project	S	F
	2025 Future w/o Project (Improved)	S	D
	2025 Future with Project	S	D
	2035 Future w/o Project	S	F
	2035 Future w/o Project (Improved)	S	E
	2035 Future with Project	S	E
HOSKING AVENUE and SOUTH UNION AVENUE AM PEAK	Existing	S	C
	2025 Future w/o Project	S	F
	2025 Future w/o Project (Improved)	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	F
	2035 Future w/o Project (Improved)	S	C
	2035 Future with Project	S	C

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
HOSKING AVENUE and SOUTH UNION AVENUE PM PEAK	Existing	S	B
	2025 Future w/o Project	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	D
	2035 Future w/o Project (Improved)	S	C
	2035 Future with Project	S	C
HOSKING AVENUE and COTTONWOOD ROAD AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
HOSKING AVENUE and COTTONWOOD ROAD PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
TAFT HIGHWAY/SR-119 and WIBLE AM PEAK	Existing	S	B
	2025 Future w/o Project	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	E
	2035 Future w/o Project (Improved)	S	C
	2035 Future with Project	S	C
TAFT HIGHWAY/SR-119 and WIBLE PM PEAK	Existing	S	B
	2025 Future w/o Project	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	F
	2035 Future w/o Project (Improved)	S	C
	2035 Future with Project	S	C
TAFT HIGHWAY/SR-119 and COMPAGNONI STREET / SR-99 SB RAMP AM PEAK	Existing	S	C
	2025 Future w/o Project	S	D
	2025 Future w/o Project (Improved)	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	C
	2035 Future with Project	S	C
TAFT HIGHWAY/SR-119 and COMPAGNONI STREET / SR-99 SB RAMP PM PEAK	Existing	S	E
	2025 Future w/o Project	S	F
	2025 Future w/o Project (Improved)	S	D
	2025 Future with Project	S	D
	2035 Future w/o Project	S	F
	2035 Future w/o Project (Improved)	S	C
	2035 Future with Project	S	C

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
TAFT HIGHWAY/SR-119 and SOUTH H STREET AM PEAK	Existing	S	D
	2025 Future w/o Project	S	F
	2025 Future w/o Project (Improved)	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	F
	2035 Future w/o Project (Improved)	S	D
	2035 Future with Project	S	D
TAFT HIGHWAY/SR-119 and SOUTH H STREET PM PEAK	Existing	S	C
	2025 Future w/o Project	S	E
	2025 Future w/o Project (Improved)	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	E
	2035 Future w/o Project (Improved)	S	D
	2035 Future with Project	S	E
	2035 Future with Project (Mitigated)	S	D
TAFT HIGHWAY/ SR-119/PANAMA ROAD and SOUTH UNION AVENUE AM PEAK	Existing	S	B
	2025 Future w/o Project	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	C
	2035 Future with Project	S	C
TAFT HIGHWAY/SR-119/PANAMA ROAD and SOUTH UNION AVENUE PM PEAK	Existing	S	C
	2025 Future w/o Project	S	C
	2025 Future with Project	S	C
	2035 Future w/o Project	S	D
	2035 Future w/o Project (Improved)	S	C
	2035 Future with Project	S	C
PANAMA ROAD[1] and COTTONWOOD AM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	C
	2025 Future with Project	AWS	C
	2035 Future w/o Project	AWS	F
	2035 Future w/o Project (Improved)	S	D
	2035 Future with Project	S	D
PANAMA ROAD[1] and COTTONWOOD PM PEAK	Existing	AWS	C
	2025 Future w/o Project	AWS	F
	2025 Future w/o Project (Improved)	S	D
	2025 Future with Project	S	D
	2035 Future w/o Project	S	F
	2035 Future w/o Project (Improved)	S	E
	2035 Future with Project	S	E

[1] Taft Highway/ SR-119 becomes Panama Road at South Union Avenue.

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
CURNOW ROAD and SOUTH UNION AVENUE AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
CURNOW ROAD and SOUTH UNION AVENUE PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	C
	2035 Future with Project	U	F
	2035 Future with Project (Mitigated)	U	C
CURNOW and COTTONWOOD AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
CURNOW and COTTONWOOD PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
DiGIORGIO and CHEVALIER (#1) AM PEAK	Existing	N/A	
	2025 Future w/o Project		
	2025 Future with Project	U	A
	2035 Future w/o Project		
	2035 Future with Project	U	A
DiGIORGIO and CHEVALIER (#1) PM PEAK	Existing	N/A	
	2025 Future w/o Project		
	2025 Future with Project	U	A
	2035 Future w/o Project		
	2035 Future with Project	U	A
DiGIORGIO and SOUTH UNION AVENUE AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	B

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
DiGIORGIO and SOUTH UNION AVENUE PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	E
	2025 Future with Project (Mitigated)	U	C
	2035 Future w/o Project	U	B
	2035 Future with Project	U	A
DiGIORGIO and COTTONWOOD AM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	A
	2025 Future with Project	AWS	A
	2035 Future w/o Project	AWS	A
	2035 Future with Project	AWS	A
DiGIORGIO and COTTONWOOD ROAD PM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	A
	2025 Future with Project	AWS	A
	2035 Future w/o Project	AWS	A
	2035 Future with Project	AWS	B
LAMB AVENUE and SOUTH UNION AVENUE (#2) AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
LAMB AVENUE and SOUTH UNION AVENUE (#2) PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	D
	2035 Future with Project (Mitigated)	U	A
ENTRANCE # 3 and SOUTH UNION AM PEAK	Existing	N/A	
	2025 Future w/o Project	U	
	2025 Future with Project	U	A
	2035 Future w/o Project	U	
	2035 Future with Project	U	A
ENTRANCE # 3 and SOUTHUNION AVENUE PM PEAK	Existing	N/A	
	2025 Future w/o Project	U	
	2025 Future with Project	U	A
	2035 Future w/o Project	U	
	2035 Future with Project	U	A

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
MUGSY AVENUE (#4) and SOUTH UNION AVENUE AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
MUGSY (#4) and SOUTH UNION AVENUE PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
HOUGHTON and STINE AM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	A
	2025 Future with Project	AWS	A
	2035 Future w/o Project	AWS	A
	2035 Future with Project	AWS	A
HOUGHTON and STINE PM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	A
	2025 Future with Project	AWS	A
	2035 Future w/o Project	AWS	A
	2035 Future with Project	AWS	A
HOUGHTON and WIBLE AM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	A
	2025 Future with Project	AWS	A
	2035 Future w/o Project	AWS	A
	2035 Future with Project	AWS	A
HOUGHTON and WIBLE PM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	A
	2025 Future with Project	AWS	A
	2035 Future w/o Project	AWS	A
	2035 Future with Project	AWS	A
HOUGHTON and SOUTH H STREET AM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	A
	2025 Future with Project	AWS	A
	2035 Future w/o Project	AWS	A
	2035 Future with Project	AWS	A
HOUGHTON and SOUTH H STREET PM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	A
	2025 Future with Project	AWS	A
	2035 Future w/o Project	AWS	A
	2035 Future with Project	AWS	A

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
HOUGHTON and SR-99 SB RAMP AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	C
	2035 Future w/o Project	U	A
	2035 Future with Project	U	F
	2035 Future with Project (Mitigated)	S	C
HOUGHTON and SR-99 SB RAMPS PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	D
	2035 Future with Project (Mitigated)	U	C
HOUGHTON and SR-99 NB RAMPS AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	F
	2035 Future with Project (Mitigated)	S	C
HOUGHTON and SR-99 NB RAMPS PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	B
	2035 Future w/o Project	U	A
	2035 Future with Project	U	F
	2035 Future with Project (Mitigated)	S	C
HOUGHTON and PROJECT ENTRANCE #7 AM PEAK	Existing	N/A	
	2025 Future w/o Project	U	
	2025 Future with Project	U	A
	2035 Future w/o Project	U	
	2035 Future with Project	U	A
HOUGHTON and PROJECT ENTRANCE # 7 PM PEAK	Existing	N/A	
	2025 Future w/o Project	U	
	2025 Future with Project	U	A
	2035 Future w/o Project	U	
	2035 Future with Project	U	F
	2035 Future with Project (Mitigated)	U	A
HOUGHTON and CHEVALIER (#6) AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	C
	2035 Future w/o Project	U	A
	2035 Future with Project	U	F
	2025 Future with Project (Mitigated)	S	D

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
HOUGHTON and CHEVALIER (#6) PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	F
	2025 Future with Project (Mitigated)	S	C
	2035 Future w/o Project	U	A
	2035 Future with Project	S	F
	2035 Future with Project (Mitigated)	S	E
HOUGHTON and ENTRANCE #5 AM PEAK	Existing	N/A	
	2025 Future w/o Project	U	
	2025 Future with Project	U	A
	2035 Future w/o Project	U	
	2035 Future with Project	U	A
HOUGHTON and ENTRANCE # 5 PM PEAK	Existing	N/A	
	2025 Future w/o Project	U	
	2025 Future with Project	U	A
	2035 Future w/o Project	U	
	2035 Future with Project	U	B
HOUGHTON and SOUTH UNION AVENUE AM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	A
	2025 Future with Project	AWS	B
	2035 Future w/o Project	AWS	B
	2035 Future with Project	AWS	C
HOUGHTON ROAD/ and SOUTH UNION AVENUE PM PEAK	Existing	AWS	A
	2025 Future w/o Project	AWS	B
	2025 Future with Project	AWS	D
	2025 Future with Project (Mitigated)	AWS	C
	2035 Future w/o Project	AWS	C
	2035 Future with Project	AWS	F
	2035 Future with Project (Mitigated)	S	D
BUENA VISTA BLVD and COTTONWOOD ROAD AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
BUENA VISTA BLVD and COTTONWOOD ROAD PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
BUENA VISTA BLVD and ADOBE ROAD AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
BUENA VISTA BLVD and ADOBE ROAD PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
SHAFTER ROAD and SOUTH UNION AVENUE AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
SHAFTER ROAD and SOUTH UNION AVENUE PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
SR-99 SB RAMP and COSTAJO ROAD AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	D
	2035 Future with Project	U	D
.			
SR-99 SB RAMP and COSTAJO ROAD PM PEAK	Existing	U	A
	2025 Future w/o Project	U	B
	2025 Future with Project	U	B
	2035 Future w/o Project	U	F
	2035 Future with Project	U	F
	2035 Future with Project (Mitigated)	U	F
BEAR MOUNTAIN BLVD and COSTAJO ROAD AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
BEAR MOUNTAIN BLVD and COSTAJO ROAD PM PEAK	Existing	U	A
	2025 Future w/o Project	U	B
	2025 Future with Project	U	B
	2035 Future w/o Project	U	F
	2035 Future with Project	U	F

Table 4.16-1 (Continued). Intersection Level of Service.

Intersection	Scenario	Type	LOS
BEAR MOUNTAIN BLVD and SR-99 NB RAMP AM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
BEAR MOUNTAIN BLVD AND SR-99 NB RAMP PM PEAK	Existing	U	A
	2025 Future w/o Project	U	A
	2025 Future with Project	U	A
	2035 Future w/o Project	U	A
	2035 Future with Project	U	A
BEAR MOUNTAIN BLVD and SOUTH UNION AVENUE AM PEAK	Existing	AWS	B
	2025 Future w/o Project	AWS	B
	2025 Future with Project	AWS	B
	2035 Future w/o Project	AWS	C
	2035 Future with Project	AWS	C
BEAR MOUNTAIN BLVD/ SR-223 and SOUTH UNION AVENUE PM PEAK	Existing	AWS	B
	2025 Future w/o Project	AWS	C
	2025 Future with Project	AWS	C
	2035 Future w/o Project	AWS	E
	2035 Future with Project	AWS	E

U-Unsignalized Intersection; S-Signalized Intersection; AWS - All Way Stop

Notes:

[1] Taft Highway/ SR-119 becomes Panama Road at South Union Avenue.

Source: Traffic Impact Study for 99 Houghton, McIntosh & Associates, November 2016.

Existing Traffic Signal Warrants

Signalization of an intersection is not necessarily justified by the satisfaction of a single warrant. Poor operations (LOS) and poor safety characteristics, as well as satisfaction of multiple warrants are normally the criteria for installing a traffic signal. For purposes of the Traffic Study, a poor operational LOS for multiple movements, and satisfaction of signal warrants, was considered justification for traffic signal installations.

All unsignalized intersections within the Traffic Study scope were analyzed for traffic signal warrants using the procedures outlined in the California Manual on Uniform Traffic Control Devices (MUTCD) for Warrants 1A: ADT – Minimum Vehicular Traffic; 1B: ADT – Interruption of Continuous Traffic; 1A and 1B: ADT – Combinations of Warrants 1A and 1B; and 3: Peak Hour (70% Factor) Warrant.

Under Existing 2016 Conditions, traffic signal warrants are not satisfied at any of the study intersections.

Existing Roadway Volume to Capacity (V/C)

The volume-to-capacity (V/C) ratios were calculated for roadways under existing conditions, based on published average daily traffic (ADT) information. The proposed Project is located within the Metropolitan Bakersfield General Plan; therefore, Metropolitan Bakersfield General Plan performance criterion was utilized for intersections and roadway segments. A V/C of greater than 0.80 corresponds to a LOS "D", "E", or "F".

The following roadway segments operate at unacceptable LOS under Existing 2016 Conditions:

- Taft Highway/SR-119/SR-99 Northbound Ramp: South H Street (V/C=0.98; LOS "E")
- Taft Highway/SR-119/Panama Road: South H Street to South Union Avenue (V/C=1.03; LOS "F")
- Taft Highway/SR-119/Panama Road: South Union Avenue to Cottonwood Road (V/C=0.89; LOS "D")
- Panama Road: East of Cottonwood Road (V/C=0.85; LOS "D")
- Bear Mountain Boulevard/SR-223: SR-99 Northbound Ramp to South Union Avenue (V/C=0.93; LOS "E")
- Bear Mountain Boulevard/SR-223: East of South Union Avenue (V/C=0.94; LOS "E")

Non-Motorized Transportation

There are no dedicated pedestrian or bicycle facilities in the immediate proposed Project vicinity or along the surrounding roadways.

Public Transit

Public transportation in Kern County is provided by Kern Regional Transit. Kern County provides service between Bakersfield and rural communities, such as Lamont and the Kern River Valley, while the private carriers serve other major cities. Kern Regional Transit has 16 fixed routes, and also provides a dial-a-ride general public transportation service for residents in Lake Isabella, Lamont, Mojave, Rosamond, Tehachapi, and Frazier Park. In addition, Kern Regional Transit provides a non-emergency medical dial-a-ride service to passengers traveling to and from the Metropolitan Bakersfield area on the fixed routes for medical appointments.

The largest transit system for the Metropolitan Bakersfield area is Golden Empire Transit (GET), which is the local bus operator. GET operates 18 routes throughout the Metropolitan Bakersfield area and carries approximately 23,000 passengers per day. This amounts to one percent of total travel in the Metropolitan Bakersfield area. GET does not provide service outside of the Metropolitan Bakersfield area.

Intercity bus operators are Greyhound, Orange Belt Stages, Airport Bus of Bakersfield and Kern County. Paratransit providers include the taxicab system and various social service agencies that provide specialized transportation to their clients.

Amtrak provides rail service to and from Bakersfield. The Amtrak station is located at Truxtun Avenue and S Street.

Existing rail lines include two major railroads that provide freight service to Bakersfield: Burlington Northern-Santa Fe (BNSF) and Southern Pacific. The BNSF and the Union Pacific (UPRR) rail yard is located in East Bakersfield between Kentucky and Sumner Streets.

Airport Facilities

Commercial air travel in the area is provided by Meadows Field Airport, which is owned by Kern County and is one of seven airports operated by the Department of Airports. Located approximately seven (7) miles north of downtown Bakersfield and approximately 12 miles north of the proposed Project site, Meadows Field Airport serves more than 700,000 people in or near the southern San Joaquin Valley. The airport is approximately 1,400 acres in size.

The Bakersfield Municipal Airport, owned by the City of Bakersfield, is approximately 200 acres in size with two runways and is located approximately five (5) miles northeast of the proposed Project site. It is a corporate airport that is home to over 100 general aviation aircraft and primarily serves general aviation small aircraft for destinations in southern California.

Costerisan Farms Airport, a private airstrip, was located approximately two (2) miles northwest of proposed Project site. Costerisan Farms Airport was serviced by two grass runways. This private airstrip is no longer in use (pilotnav 2017).

Because several miles exist between the airports and the proposed Project site, neither construction nor completion of the proposed Project is expected to have any effect on air traffic patterns. Thus, air traffic patterns are not further addressed in the impact analysis for this proposed Project.

4.16.3 Regulatory Setting

Federal

Federal Aviation Administration (FAA)

The FAA regulates aviation at regional, public, private, and military airports, such as Lemoore Naval Air Station Tejon Ag Airport. The FAA regulates objects affecting navigable airspace and structures taller than 200 feet according to Federal Aviation Regulation 14 Code of Federal Regulations Part 77 (14 CFR 77). The U.S. and California Departments of Transportation also require the proponent to submit FAA Form 7460-1, Notice of Proposed Construction or Alteration.

As described in 14 CFR 77.9 (Construction or alteration requiring notice), each sponsor who proposes any of the following construction or alteration scenarios shall notify the FAA in the form and manner as follows:

> If requested by the FAA, or if you propose any of the following types of construction or alteration, you must file notice with the FAA of:
>
> (a) Any construction or alteration that is more than 200 feet AGL at its site.

(b) Any construction or alteration that exceeds an imaginary surface extending outward and upward at any of the following slopes:

(1) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway more than 3,200 ft. in actual length, excluding heliports.

(2) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway no more than 3,200 feet in actual length, excluding heliports.

(3) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport described in paragraph (d) of this section.

(c) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a) or (b) of this section.

(d) Any construction or alteration on any of the following airports and heliports:

(1) A public use airport listed in the Airport/Facility Directory, Alaska Supplement, or Pacific Chart Supplement of the U.S. Government Flight Information Publications;

(2) A military airport under construction, or an airport under construction that will be available for public use;

(3) An airport operated by a Federal agency or the DOD.

(4) An airport or heliport with at least one FAA-approved instrument approach procedure.

(e) You do not need to file notice for construction or alteration of:

(1) Any object that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height, and will be located in the congested area of a city, town, or settlement where the shielded structure will not adversely affect safety in air navigation;

(2) Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device meeting FAA-approved siting criteria or an appropriate military service siting criteria on military airports, the location and height of which are fixed by its functional purpose;

(3) Any construction or alteration for which notice is required by any other FAA regulation.

(4) Any antenna structure of 20 feet or less in height, except one that would increase the height of another antenna structure.

Per 14 CFR 77.7, notification requirements include sending one executed form set of FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the Manager, Air Traffic Division, FAA Regional Office having jurisdiction over the area within which the construction or alteration will be located. The notice required must be submitted at least 45 days before the earlier of the following dates: (1) the date the proposed construction or alteration is to begin, or (2) the date an application for a construction permit is to be filed.

State

California Department of Transportation

The California Department of Transportation (Caltrans) is responsible for operating and maintaining the State highway system. In the project vicinity, SR-99 and associated freeway ramps and ramp terminal intersections fall under Caltrans jurisdiction. Caltrans provides administrative support for transportation programming decisions made by the California Transportation Commission (CTC) for state funding programs. The State Transportation Improvement Program (STIP) is a multi-year capital improvement program that sets priorities and funds transportation projects envisioned in long-range transportation plans. The Caltrans *Guide for the Preparation of Traffic Impact Studies* provides general guidance regarding the preparation of traffic impact studies for projects that may have an impact on the State Highway System. The Caltrans *Highway Design Manual* (HDM) establishes uniform policies and procedures for State highway designs. Caltrans also sets maximum load limits for trucks and safety requirements and administers the following regulations for oversized vehicles that operate on State highways:

California Vehicle Code (CVC), Division 15, Chapters 1 through 5 (Size, Weight, and Load)

Includes regulations pertaining to licensing, size, weight, and load of vehicles operated on highways.

California Street and Highway Code Sections 660-711, 670-695

Requires permits from Caltrans for any roadway encroachment during truck transportation and delivery, includes regulations for the care and protection of State and county highways and provisions for the issuance of written permits, and requires permits for any load that exceeds Caltrans weight, length, or width standards for public roadways.

Local

Metropolitan Bakersfield General Plan

Traffic analysis in the State of California is guided by policies and standards set at the state level by Caltrans and local jurisdictions. Transportation policies that may apply to the proposed Project are discussed within the Metropolitan Bakersfield General Plan. The Metropolitan Bakersfield General Plan is the product of a joint planning effort between the City of Bakersfield and Kern County, and it covers all territory within the Bakersfield Metropolitan Priority Area of the Kern County General Plan. The goals and policies that apply to transportation are discussed below in Table 4.16-2, *Metropolitan Bakersfield General Plan Goals and Policies for Traffic and Circulation.*

Kern Council of Governments (Kern COG) Congestion Management Program (CMP)

All urbanized areas larger than 200,000 persons are required to have a Congestion Management System, Program, or Process. Kern COG refers to its congestion management activities as the Congestion Management Program (CMP). Kern COG was designated as the Congestion Management Agency.

The CMP is a systematic process for managing congestion that provides information on: (1) transportation system performance, and (2) alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs.

The purpose of the CMP is to help ensure that a balanced transportation system is developed that relates population growth, traffic growth and land use decisions to transportation system LOS performance standards and air quality improvement. The CMP is an effort to more directly link land use, air quality, transportation and the use of new advanced transportation technologies as an integral and complementary part of this region's plans and programs.

The purpose of defining the CMP network is to establish a system of roadways that will be monitored in relation to established LOS standards. At a minimum, all State highways and principal arterials must be designated as part of the Congestion Management System of Highways and Roadways. Kern County has 18 designated state highways.

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Table 4.16-2. Metropolitan Bakersfield General Plan Goals and Policies for Traffic and Circulation
GOALS AND POLICIES
Circulation Element - Streets Goals
Streets Goal #1: Provide a safe and efficient street system that links all parts of the area for movement of people and goods.
Streets Goal #2: Provide for safe and efficient motorized, non-motorized, and pedestrian traffic movement.
Streets Goal #3: Minimize the impact of truck traffic on circulation, and on noise sensitive land uses.
Streets Goal #4: Provide a street system that creates a positive image of Bakersfield and contributes to residents' quality of life.
Streets Goal #6: Provide a local street network that contributes to the quality and safety of residential neighborhoods and commercial districts.
Streets Goal #7: Develop and maintain a circulation system that supports the land use plan shown in the General Plan.
Circulation Element - Streets Policies
Streets Policy #3: Provide additional right-of-way and pavement width to accommodate turn lanes at intersections.
Streets Policy #4: Provide additional right-of-way and pavement width at other locations for turn lanes, bus lanes, etc., as needed, based on engineering study.
Streets Policy #5: Place traffic signals to minimize delay.
Streets Policy #6: Design and locate site access driveways to minimize traffic disruption where possible considering items such as topography, past parcelization and other factors.
Streets Policy #7: Minimize direct and uncontrolled property access from arterials.
Streets Policy #8: Limit full access median breaks on arterials to a maximum of three per mile and include left-turn lanes at each.
Streets Policy #10: Design local streets to conform to topography. Allow for deviation from "grid" system on local streets when they do not interfere with other traffic policies and traffic flows.
Street Policy #11: Design local collector street systems to minimize through traffic movements and include short block lengths to discourage excessive speeds.
Streets Policy #12: Maintain the integrity of the circulation system.
Streets Policy #18: Provide and maintain landscaping on both sides and in the median of arterial streets within incorporated areas. In unincorporated areas, landscaping within road right-of-way may be allowed and shall be limited to low shrubs; blank irrigation conduit only will be provided within the median of arterial streets.
Streets Policy #19: Provide and maintain landscaping on both sides of collector streets. In unincorporated areas, landscaping within road right-of-way may be allowed and shall be limited to low shrubs.
Streets Policy #21: Route traffic around, rather than through, pedestrian-oriented areas.
Streets Policy #22: Design transportation improvements to minimize noise impacts on adjacent uses.

Table 4.16-2. Metropolitan Bakersfield General Plan Goals and Policies for Traffic and Circulation
GOALS AND POLICIES
Streets Policy #32: Reserve or acquire right-of-way for all future transportation facilities in conformance with the Circulation Plan Map.
Streets Policy #35: Require new development and expansion of existing development in incorporated areas to fully provide for on-site transportation facilities including, streets, curbs, traffic control devices, etc. Within unincorporated areas street improvements will be determined by County Ordinance.
Streets Policy #36: Prevent streets and intersections from degrading below Level of Service "C" where possible due to physical constraints (as defined in a Level of Service Ordinance) or when the existing Level of Service is below "C" prevent where possible further degradation due to new development with a three-part mitigation program: adjacent right-of-way dedication, access improvements and/or on area-wide impact fee. The area-wide impact fee would be used where the physical changes for mitigation are not possible due to existing development and/or the mitigation measures is part of a larger Project, such as freeways, which will be built at a later date.
Streets Policy #37: Require new development and expansion of existing development to pay for necessary access improvements, such as street extensions, widenings, turn lanes, signals, etc., as identified in the transportation impact report as may be required for a Project.
Streets Policy #39: Require new development and expansion of existing development to pay or participate in its pro rata share of the costs of expansions in area-wide transportation facilities and services which it necessitates.
Streets Policy #40: Provide new local street systems that are logical and comprehensible and systems of street names and addresses that are simple, consistent, and understandable.
Streets Policy #41: Plan alignments for local streets to permit economical and practical patterns, shapes, and sizes of development parcels.
Circulation Element - Transit Goals
Transit Goal #2: Provide a street system and land development policies that support public transportation.
Transit Goal #3: Provide cost-effective public transportation services.
Transit Goal #4: Reduce traffic congestion and parking requirements and improve air quality through improved transportation services.
Circulation Element - Transit Policies
Transit Policy #1: Consider transit service issues in the design of the arterial and collector street system.
Transit Policy #2: Consider for bus turnouts along arterials and collectors where appropriate.
Transit Policy #3: Consider transit service issues in the site planning review process.
Transit Policy #4: Coordinate with GET [Golden Empire Transit] to locate bus stops as close as possible to the facilities they serve.
Circulation Element - Bikeways Goals
Bikeways Goal #1: Provide a circulation system which recognizes and responds to the needs of bicycle travel.
Bikeways Goal #2: Provide a circulation system that minimizes cyclist/motorist conflicts.

Table 4.16-2. Metropolitan Bakersfield General Plan Goals and Policies for Traffic and Circulation
GOALS AND POLICIES
Circulation Element - Bikeways Policies
Bikeways Policy #5: Consider bicycle safety when implementing improvements for automobile traffic operations.
Bikeways Policy #7: Provide bicycle parking facilities at activity centers such as shopping centers, employment sites, and public buildings.
Bikeways Policy #9: Require new subdivisions to provide bike lanes on collector and arterial streets in accordance with the Bikeway Master Plan.
Bikeways Policy #11: Construct bike lanes in conjunction with all street improvement Projects that coincide with the Bikeway Master Plan.
Circulation Element - Parking Goals
Parking Goal #1: Provide an efficient parking system to respond to the needs of motorists.
Parking Goal #2: Satisfy parking requirements in all new developments (residential, commercial, industrial, etc.) through off-street facilities.
Parking Goal #3: Preserve and enhance residential neighborhoods through parking policy.
Circulation Element - Parking Policies
Parking Policy #1: Periodic review and, if needed, revision of adopted minimum parking requirements based on parking demand.
Parking Policy #2: Periodic review and, if needed, revision of adopted stall and aisle widths that are convenient and efficient.
Parking Policy #5: Remove abandoned vehicles promptly from city streets.
Parking Policy #6: Regulate parking of vehicle, boats, trailers, etc. on city streets.
Parking Policy #7: Identify on-site parking needs in activity centers and outline procedures to finance and provide the facilities.
Parking Policy #8: Give top priority to satisfying short-term parking needs, i.e., less than or equal to three hours, and second priority to long-term parking needs.
Parking Policy #9: Locate short-term parking to be convenient to the businesses served.
Parking Policy #10: Locate long-term parking on peripheral lands, accessible to arterial streets.
Parking Policy #11: Discourage parking between the sidewalk and buildings in pedestrian sensitive areas.
Circulation Element - Pedestrian Ways Goals
Pedestrian Ways Goal #1: Encourage pedestrian travel as a viable mode of movement throughout the Planning area.
Pedestrian Ways Goal #2: Provide adequate sidewalks throughout the planning area.

Table 4.16-2. Metropolitan Bakersfield General Plan Goals and Policies for Traffic and Circulation
GOALS AND POLICIES
Circulation Element - Pedestrian Ways Policies
Pedestrian Ways Policy #1: Provide sidewalks along streets where pedestrian use warrants.
Pedestrian Ways Policy #4: Provide for the physically handicapped in the design of all pedestrian facilities.
Pedestrian Ways Policy #5: Encourage development of pedestrian sensitive uses and design characteristics in the following areas: a) Downtown b) Baker Street c) Southwest Center d) Northwest Center

4.16.4 Impacts and Mitigation Measures

Methodology

This section presents the methodologies used to perform the traffic analyses. The study methodology is consistent with the guidelines of the City of Bakersfield, Caltrans, Kern County, and the Metropolitan Bakersfield General Plan. The overall methodologies used to develop future traffic volume forecasts and the explicit traffic operations analysis methodologies are summarized herein.

Analyses were performed for Year 2016 for existing conditions, and Years 2025 and 2035 for both the "without Project" and "with Project" scenarios. The Traffic Study obtained Year 2016 traffic volumes by conducting traffic counts in accordance with all agencies within the study area: Kern County, City of Bakersfield, and Caltrans. Year 2025 and Year 2035 traffic volumes in the Traffic Study were determined using data from a regional cumulative projects traffic model prepared by Kern COG. Proposed Project impacts were assessed based on roadway and intersection LOS. Improvements needed to maintain or improve traffic operational LOS were also identified.

Intersection Analysis Methodology

Traffic LOS is commonly used as a qualitative description of intersection operation and is based on the capacity of the intersection and the volume of traffic using the intersection. The methods used to evaluate cumulative plus project traffic conditions were taken from the Transportation Research Board, National Research Council's 2010 Highway Capacity Manual (HCM). Additionally, the SYNCHRO 9 computer software package was utilized to coordinate and facilitate extensive HCM intersection calculations.

The 2010 HCM Operational Analysis Methodology describes the operation of an unsignalized intersection using a range from LOS "A" (free-flow conditions) to "F" (severely congested conditions), based on the average delay experienced per vehicle, as shown in Table 4.16-3, *Level of Service Criteria for Unsignalized Intersections.*

Table 4.16-3. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (Seconds per Vehicle)	Expected Delay to Minor Street Traffic
A	= 10	Little or no delay
B	> 10 and = 15	Short traffic delays
C	> 15 and = 25	Average traffic delays
D	> 25 and = 35	Long traffic delays
E	> 35 and = 50	Very long traffic delays
F	> 50	When demand volume exceeds the capacity of the lane, extreme delays will be encountered. This condition usually warrants improvement to the intersection.

Source: 2010 Highway Capacity Manual.

Operating conditions at intersections are assessed in terms of the LOS during a typical hour-long period. The LOS is based on the volume of traffic passing through an intersection, the number of lanes available to serve the traffic demands, and the type of traffic control at the intersection (i.e., stop sign control or traffic signal). Table 4.16-4, *Level of Service Criteria for Signalized Intersections,* summarizes the LOS criteria for signalized intersections as identified by the HCM. LOS "A" represents free flow conditions, LOS "D" represents conditions where vehicles on some approaches may have to wait through more than one traffic signal cycle to pass through the intersection, LOS "E" represents the theoretical capacity of the intersection, and LOS "F" represents jammed conditions.

Table 4.16-4. Level of Service Criteria for Signalized Intersections

Level of Service	Control Delay (Seconds per Vehicle)	Volume/Capacity
A	< 10	< 0.60
B	> 10 and = 20	0.61-0.70
C	> 20 and = 35	0.71-0.80
D	> 35 and = 55	0.81-0.90
E	> 55 and = 80	0.91-1.00
F	> 80	> 1.0

Source: 2010 Highway Capacity Manual.

Roadway Analysis Methodology

Operating conditions for roadway segments are based on corresponding V/C ratios shown in Table 4.16-5, *LOS Criteria – Roadway Segments*. A V/C of greater than 0.80 corresponds to an LOS "D", "E" or "F", as defined in the Highway Capacity Manual. The Metropolitan Bakersfield General Plan performance criterion for intersections and roadway segments is LOS "C".

Table 4.16-5. LOS Criteria – Roadway Segments

Level of Service (LOS)	Description	Volume/Capacity Ratio
A	Free flow conditions, unimpeded ability to maneuver and pass, very little delay, no platoons, highest average travel speeds.	≤ 0.60
B	Mostly free flow conditions, presence of other vehicles beings to be noticeable. Passing is required to maintain speeds, slightly less average travel speeds than Level of Service "A'.	0.61 – 0.70
C	Traffic density clearly affects the ability to pass and maneuver within the stream. Speeds are reduced to about 50 mph on highways and about 50% of the average on urban arterials.	0.71 – 0.80
D	Unstable flow. Speeds are reduced from 40% to 60% of normal. Passing demand is high although mostly impossible on 2-land highways. Traffic disruptions usually cause extensive queues.	0.81 – 0.90

Table 4.16-5. LOS Criteria – Roadway Segments

Level of Service (LOS)	Description	Volume/Capacity Ratio
E	Very unstable flow at or near capacity. Passing and maneuvering virtually impossible. Extensive platooning on highways and queuing on arterials. Speeds range from 20 mph to less on arterials and 2-lane highways, and up to 50 mph on multi-lane highways.	0.91 – 1.00
F	Forced or breakdown flow. Demand exceeds capacity. Vehicles experience short spurts of movement followed by stoppages. Intersection congestion, long queues and delays are common.	> 1.00

Source: 2010 Highway Capacity Manual.

Definition of Deficiency and Significant Impact

The definition of deficiency was obtained from the Metropolitan Bakersfield General Plan Circulation Element. The performance criteria for all intersections and street segments is LOS "C". Kern County has two standards for determining whether project traffic has a significant impact, and therefore, requires mitigation:

- Mitigation would be required when the addition of project traffic causes the LOS of an intersection or street to drop below LOS "C".
- If an intersection or street operates below LOS "C" prior to the addition of project traffic, mitigation would be required only as necessary to maintain the status quo.

Thresholds of Significance

The traffic issues related to the proposed land use and development have been evaluated in the context of CEQA and the Kern COG Regional Transportation Plan (RTP). Kern County is the lead agency responsible for preparation of the traffic impact analysis, in accordance with both CEQA and CMP authorizing legislation.

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project could potentially have a significance effect if it would:

- Conflict with an applicant plan, ordinance, or policy establishing measures of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;
- Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency or adopted County threshold for designated roads or highways. Specifically, would implementation of the project cause the LOS for roadways and/or intersections to decline below the following thresholds or further degrade already degraded segment(s);

  - Metropolitan Bakersfield General Plan, below LOS "C";

- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access;
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts and bicycle racks).

A project is considered to have a significant transportation impact where it causes the LOS to drop below LOS "C" on local roadways and intersections and LOS "D" of state facilities and intersections. A project is also considered to have a significant impact if it adds substantial traffic volumes to a roadway segment or intersection that is already operating at unacceptable LOS.

Project Impacts

Impact 4.16-1: The project would not conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.

The proposed Project components are described in detail in Section 3.0*, Project Description.* The proposed Project would allow for development of a light to medium industrial park containing approximately 4,613,004 square feet (net building area) of warehousing, distribution, and retail showroom uses. South Union Avenue, Houghton Road, and the DiGiorgio Road alignment provide the primary access to and from the Project area.

Project Trip Generation and Design Hour Volumes

The trip generation and design hour volumes indicated in Table 4.16-6, *Project Trip Generation*, were calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, 2012. Project traffic was estimated for weekday AM and PM peak hour traffic. Rate equations and directional splits for ITE Land Use Code 130 (Industrial Park) and 820 (Shopping Center) were used to estimate trip generation for the Project based on 314.30 acres of development. The ITE Land Use Code of 130 represents a conservative estimate for future traffic generated from the project site because it reflects the maximum vehicle trip generation for the various uses that would be permitted for the potential land uses and zoning of the proposed project (McIntosh and Associates, 2018).

Table 4.16-6. Project Trip Generation

ITE Code	Development Type	Variable / Acres	Daily Trips	AM Peak Hour Trips		PM Peak Hour Trips	
			ADT	In Split/ Trips	Out Split/ Trips	In Split/ Trips	Out Split/ Trips
130	Light Industrial / Service Industrial	267.30 acres	16,351	1,819	373	502	1,778
820	General Commercial	47 acres	15,702	257	165	877	912
20% Reduction to Account for "Pass By"				(44)	(37)	(175)	(183)
	Totals	314.30 acres	32,053 trips	2,029	501	1,203	2,508

Source: May 29, 2018 Response Letter to Kern County Planning from McIntosh & Associates regarding the November 2016 Traffic Impact Study for 99 Houghton.

The Circulation Element of the Metropolitan Bakersfield General Plan is the primary guidance document detailing the planning tools essential for achieving the local transportation goals and policies. The Circulation Element consists of the general location and extent of existing and proposed major thoroughfares, transportation routes, terminals, and other local public utilities and facilities, all correlated with the Land Use Element of the Metropolitan Bakersfield General Plan.

It is not possible to build transportation projects fast enough to keep pace with development in all instances. Both the Metropolitan Bakersfield Circulation Plan and the Kern County Circulation Plan operate on the theory that existing roads will be widened as land use intensity increases. The County is uniquely dependent on State Highway construction and retrofits to satisfy inter-city road travel and assumes that future development will be the trigger for the development of new roads. As such, it is the policy of the County to protect all surveyed section and mid-section lines, through right-of-way dedications in the Valley and Desert Regions of the County for arterial and collector highways. The Circulation Element road standards for arterial and collector highways are identified below. Modifications to these standards are considered on a case-by-case basis.

- Arterial (Major Highway) Minimum 110-foot right-of-way:
- County Standard 110 feet
- Collector (Secondary Highway) Minimum 90-foot right-of-way:
- County Standard 90 feet

In reviewing the total number of trips estimated for the development of the proposed Project site, it is anticipated that implementation of the proposed Project would not exceed the capacity of the identified circulation system when the roadways are built to the identified standards. Roadway dedications are required for all development and are implemented through compliance with the Kern County Land Division Ordinance, Zoning Ordinance and Development Standards. The proposed Project does not include any amendments to the existing Circulation Element. As such, impacts to

the existing road network are considered less than significant through implementation of local and state right-of-way dedication requirements.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.16-2: The Project Would not Conflict with an Applicable Congestion Management Program, Including, but not Limited to Level of Service Standards and Travel Demand Measures, or Other Standards Developed by the County Congestion Management Agency for Designated Roads or Highways.

Unlike future road right-of-way dedications, which can be protected in advance of development, LOS for adjacent and surrounding road segments or roadway intersections are directly impacted by the type of development proposed in a given area. The proposed Project is located within the administrative boundaries of the Metropolitan Bakersfield General Plan. As previously stated, for all roads subject to the Metropolitan Bakersfield General Plan, it is the objective and policy to maintain a minimum LOS "C" or better.

LOS standards are primarily addressed through improvements to intersections such as the installation of signal lights and the addition of turning lanes among other site- specific transportation related improvements. Mitigation is required if development causes affected roadways to fall below LOS "C".

Additionally, State law requires that urbanized counties prepare an annual CMP. City and County eligibility for new gas tax subventions is contingent upon their participation in the congestion management program. The County has designated Kern COG as the County's Congestion Management Agency. To qualify for funding provided through the State Transportation Improvement Program (STIP) or the Federal Transportation Improvement Program (FTIP), the regional transportation agency must keep a current Regional Transportation Plan (RTP) that contains the CMP. Also, the CMP offers local jurisdictions the opportunity to find cooperative solutions to the multi-jurisdictional problems of air pollution and traffic congestion. Requiring projects to maintain a LOS "C" ensures the County is in compliance with the adopted CMP.

The following information was included in the Traffic Study (refer to Appendix M, *Traffic Impact Study*).

Trip Distribution and Assignment

The proposed Project trip distribution and assignment assumptions within the study area are illustrated on Figure 4.16-2a, *Total Project Generated AM Peak Hour Turning Movements*, and Figure 4.16-2b, *Total Project Generated PM Peak Hour Turning Movements*. Project traffic

distribution was estimated based on Kern COG traffic model output and a review of existing development and proposed growth within the study area.

Future Year 2025 Without Project Traffic Volumes

Future Year 2025 peak hour turning movements without Project traffic are illustrated in Figure 4.16-3a, *Future Year 2025 AM Peak Hour Turning Movements Without Project*, and Figure 4.16-3b, *Future Year 2025 PM Peak Hour Turning Movements Without Project*.

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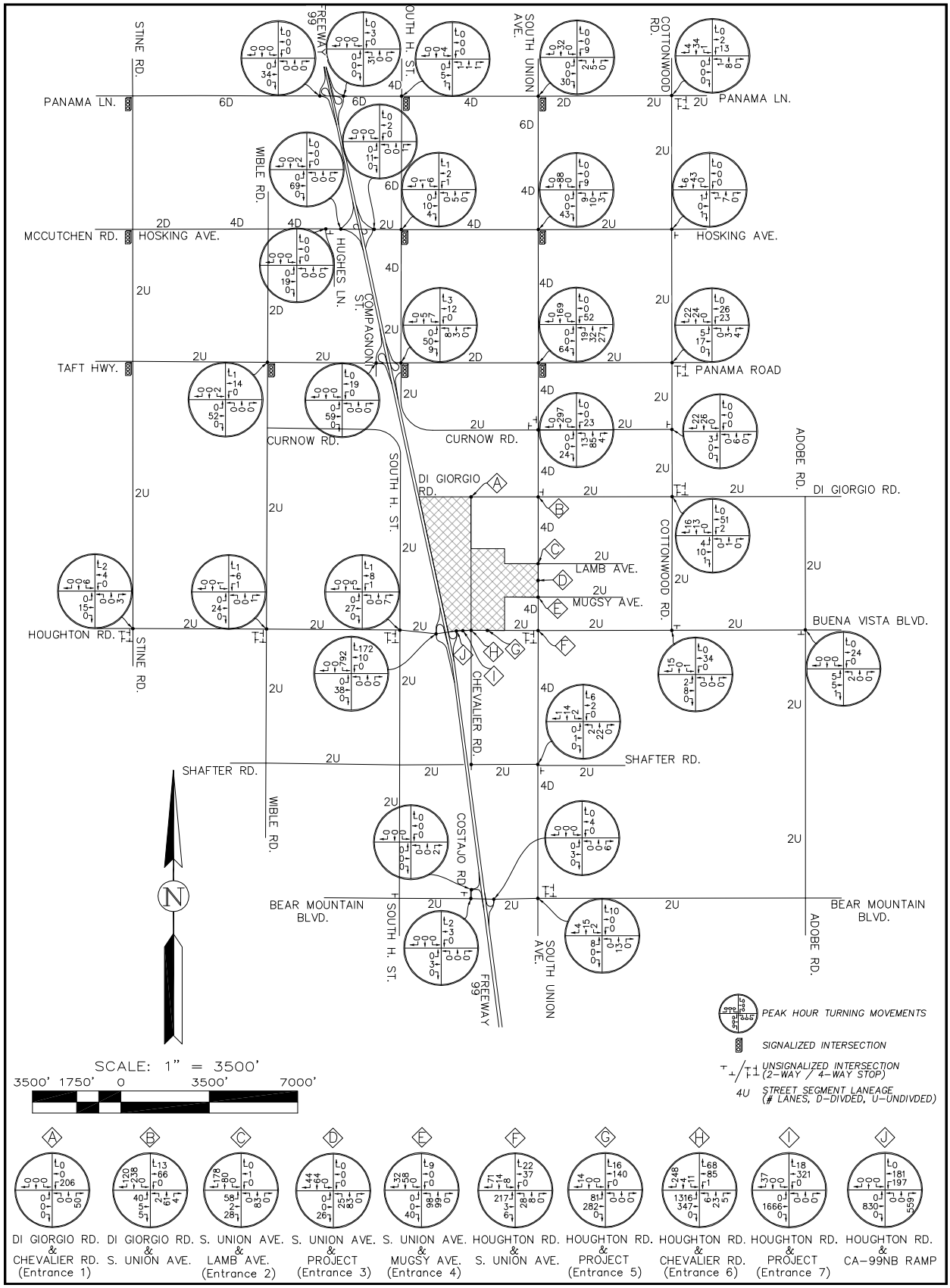


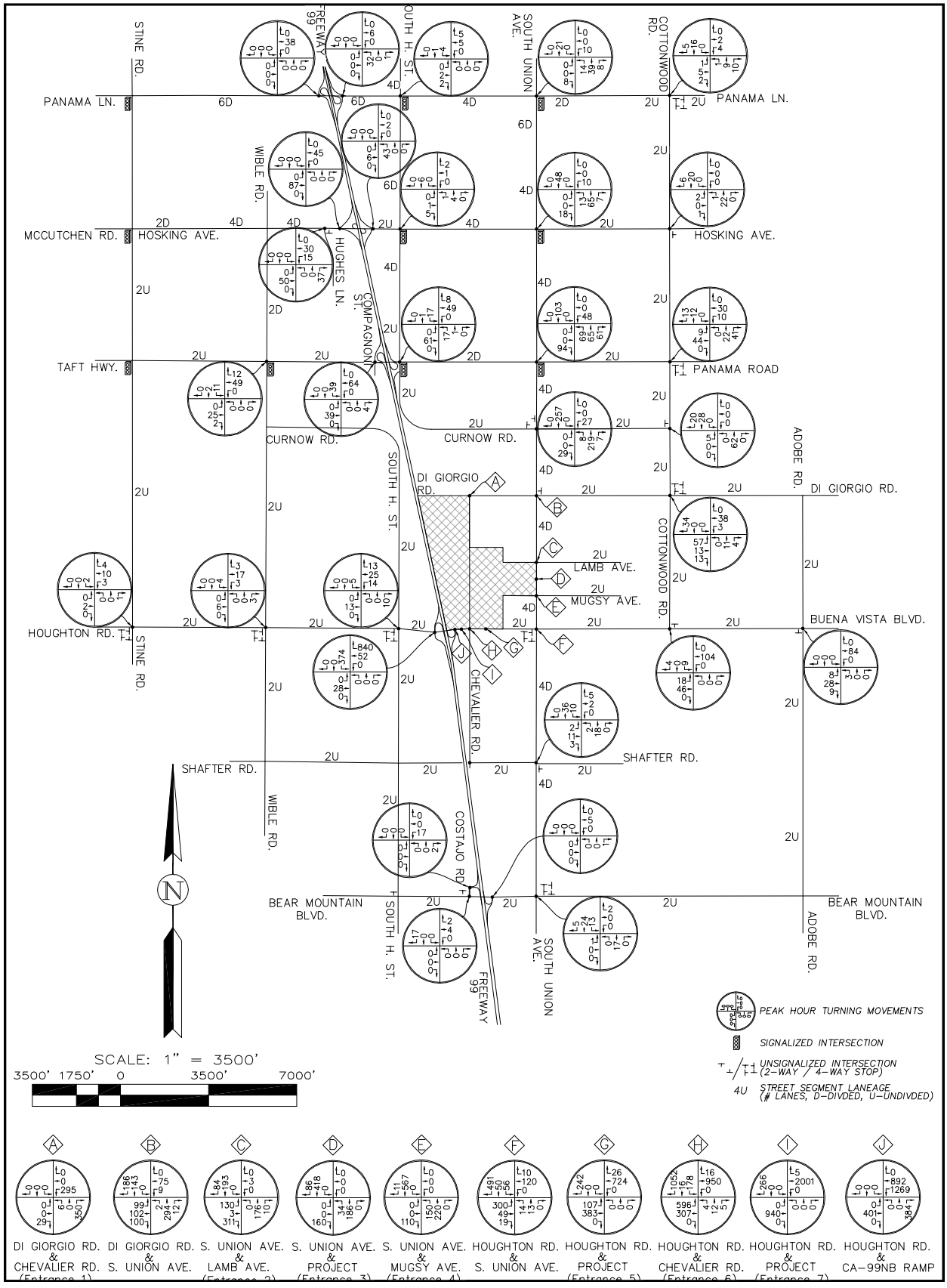
Source: McIntosh & Associates, 2016

99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07 • AGRICULTURAL PRESERVE #13 EXCLUSION

Total Project Generated AM Peak Hour Turning Movements

Figure 4.16-2a



Source: McIntosh & Associates, 2016

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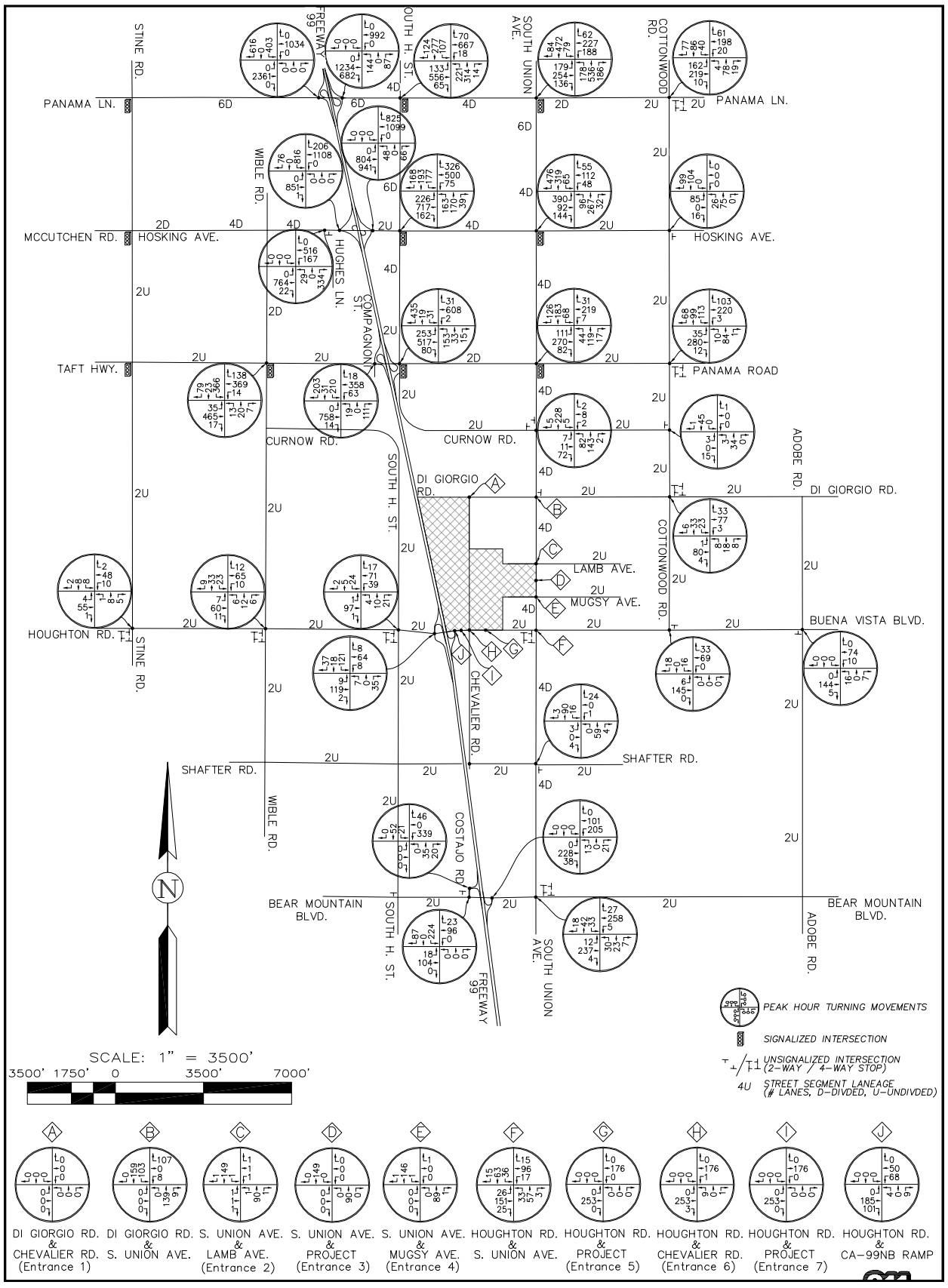
Total Project Generated PM Peak Hour Turning Movements

Figure 4.16-2b



Source: McIntosh & Associates, 2016

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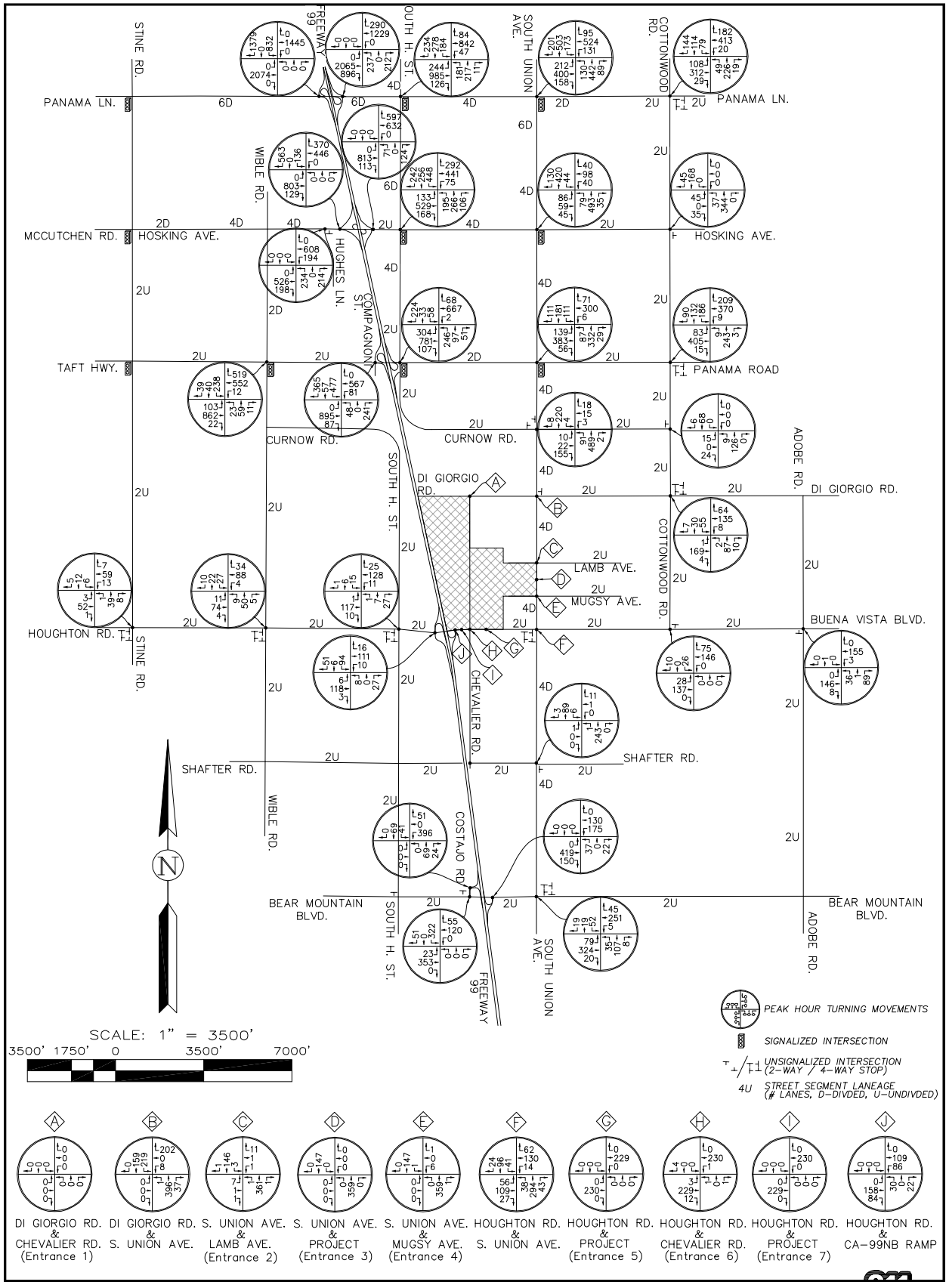
Future Year 2025 AM Peak Hour Turning Movements Without Project

Figure 4.16-3a



Source: McIntosh & Associates, 2016

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Future Year 2025 PM Peak Hour Turning Movements Without Project

Figure 4.16-3b

Future Year 2025 Without Project Intersection LOS

Table 4.16-1, *Intersection Level Of Service*, outlines the AM and PM peak hour LOS of the study intersections under Future Year 2025 Without Project conditions. The Metropolitan Bakersfield General Plan considers LOS "C" acceptable within the general plan area; therefore, as indicated in Table 4.16-1, the anticipated growth in traffic volumes by the Year 2025 would cause the following study intersections to operate at a deficient LOS (LOS "D", "E", or "F") under Future Year 2025 Without Project conditions:

- Panama Lane and South H Street (PM peak hour LOS "D")
- Panama Lane and SR-99 Southbound Ramp (PM peak hour LOS "E")
- Panama Lane and South Union Avenue (AM peak hour LOS "D" and PM peak hour LOS "E")
- Panama Lane and Cottonwood Road (PM peak hour LOS "F")
- Hosking Avenue and Hughes Lane (PM peak hour LOS "F")
- Hosking Avenue and South H Street (AM peak hour LOS "E" and PM peak hour LOS "F")
- Hosking Avenue and South Union Avenue (AM peak hour LOS "F")
- Taft Highway/SR-119 and Compagnoni Street / SR-99 Southbound Ramp (AM peak hour LOS "D" and PM peak hour LOS "F")
- Taft Highway/SR-119 and South H Street (AM peak hour LOS "F" and PM peak hour LOS "E")
- Panama Road and Cottonwood Road (PM peak hour LOS "F")

Future Year 2025 Without Project Traffic Signal Warrants

The results of the signal warrant analysis under Future Year 2025 Without Project conditions are indicated in Table 4.16-7, *Traffic Signal Warrants – Future Year 2025 Without Project Conditions*.

Table 4.16-7. Traffic Signal Warrants – Future Year 2025 Without Project Conditions

Intersection	Warrant(s) Satisfied[1]	Notes
Panama Lane and Cottonwood Road	1 and 3	Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).
Hosking Avenue and Hughes Lane	1 and 3	Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee (RTIF) Program.
Hosking Avenue and SR-99 Northbound Ramp	1 and 3	Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).
Hosking Avenue and SR-99 Southbound Off-Ramp	1 and 3	Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).
Panama Road[2] and Cottonwood Road	1 and 3	Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).

Table 4.16-7. Traffic Signal Warrants – Future Year 2025 Without Project Conditions

Intersection	Warrant(s) Satisfied[1]	Notes

[1] Warrants 1A: ADT – Minimum Vehicular Traffic; 1B: ADT – Interruption of Continuous Traffic; 1A and 1B: ADT – Combinations of Warrants 1A and 1B; and 3: Peak Hour (70% Factor) Warrant

[2] Taft Highway/ SR-119 becomes Panama Road at South Union Avenue.

Source: Traffic Impact Study for 99 Houghton, McIntosh & Associates, November 2016.

As indicated in Table 4.16-7, the traffic signal warrant is satisfied at the following intersections under Future Year 2025 Without Project conditions:

- Panama Lane and Cottonwood Road
- Hosking Avenue and Hughes Lane
- Hosking Avenue and SR-99 Northbound Ramp
- Hosking Avenue and SR-99 Southbound Ramp
- Panama Road and Cottonwood Road

Future Year 2025 Without Project Roadway V/C

The V/C ratios were calculated for roadways with published ADT information and future traffic projections. Ultimate capacity is based on functional classification. A V/C of greater than 0.80 corresponds to a LOS "D" or below. Future traffic would cause the following studied roadway segments to operate at a deficient LOS (LOS "D", "E," or "F") in their existing configurations under Future Year 2025 Without Project conditions:

- Panama Lane - South Union Avenue to Cottonwood Road (V/C=1.02, LOS "F")
- Taft Highway/SR-119 – Compagnoni Street/SR-99 Southbound Ramp to SR-99 Northbound Ramp (V/C = 0.85, LOS "D")
- Taft Highway/SR-119 – SR-99 Northbound Ramp to South H Street (2015), (V/C = 1.17, LOS "F")
- Taft Highway/SR-119/Panama Road - South H Street to South Union Avenue (V/C= 1.53, LOS "F")
- Taft Highway/SR-119/Panama Road - South Union Avenue to Cottonwood Road (V/C 1.20, LOS "F")
- Panama Road - East of Cottonwood Road (V/C 1.15, LOS "F")
- Bear Mountain Road/SR-223 – SR-99 Northbound Ramp to South Union Avenue (V/C 1.19, LOS "F")
- Bear Mountain Road – East of South Union Avenue (SR-204) (V/C 1.24, LOS "F")

Future Year 2025 With Project Traffic Volumes

Future Year 2025 peak hour turning movements with Project traffic are illustrated in Figure 4.16-4a, *Future Year 2025 AM Peak Hour Turning Movement with Project*, and Figure 4.16-4b, *Future Year 2025 PM Peak Hour Turning Movement with Project.*

Future Year 2025 With Project Intersection LOS

Table 4.16-1, *Intersection Level of Service*, outlines the AM and PM peak hour LOS of the study intersections under Future Year 2025 With Project conditions. The Metropolitan Bakersfield General Plan considers LOS "C" acceptable within the general plan area; therefore, as indicated in Table 4.16-1, the anticipated growth in traffic volumes by the Year 2025 would cause the following study intersections to operate at a deficient LOS (LOS "D", "E", or "F") under Future Year 2025 With Project conditions:

- Panama Lane and SR-99 Southbound Ramp (PM peak hour LOS "E")
- Panama Lane and South H Street (PM peak hour LOS "D")
- Panama Lane and South Union Avenue (AM and PM peak hour LOS "D")
- Hosking Road and South H Street (PM peak hour LOS "D")
- Taft Highway/SR-119 and Compagnoni Street/SR-99 Southbound Ramp (PM peak hour LOS "D")

Panama Road and Cottonwood Road (PM peak hour LOS "D")

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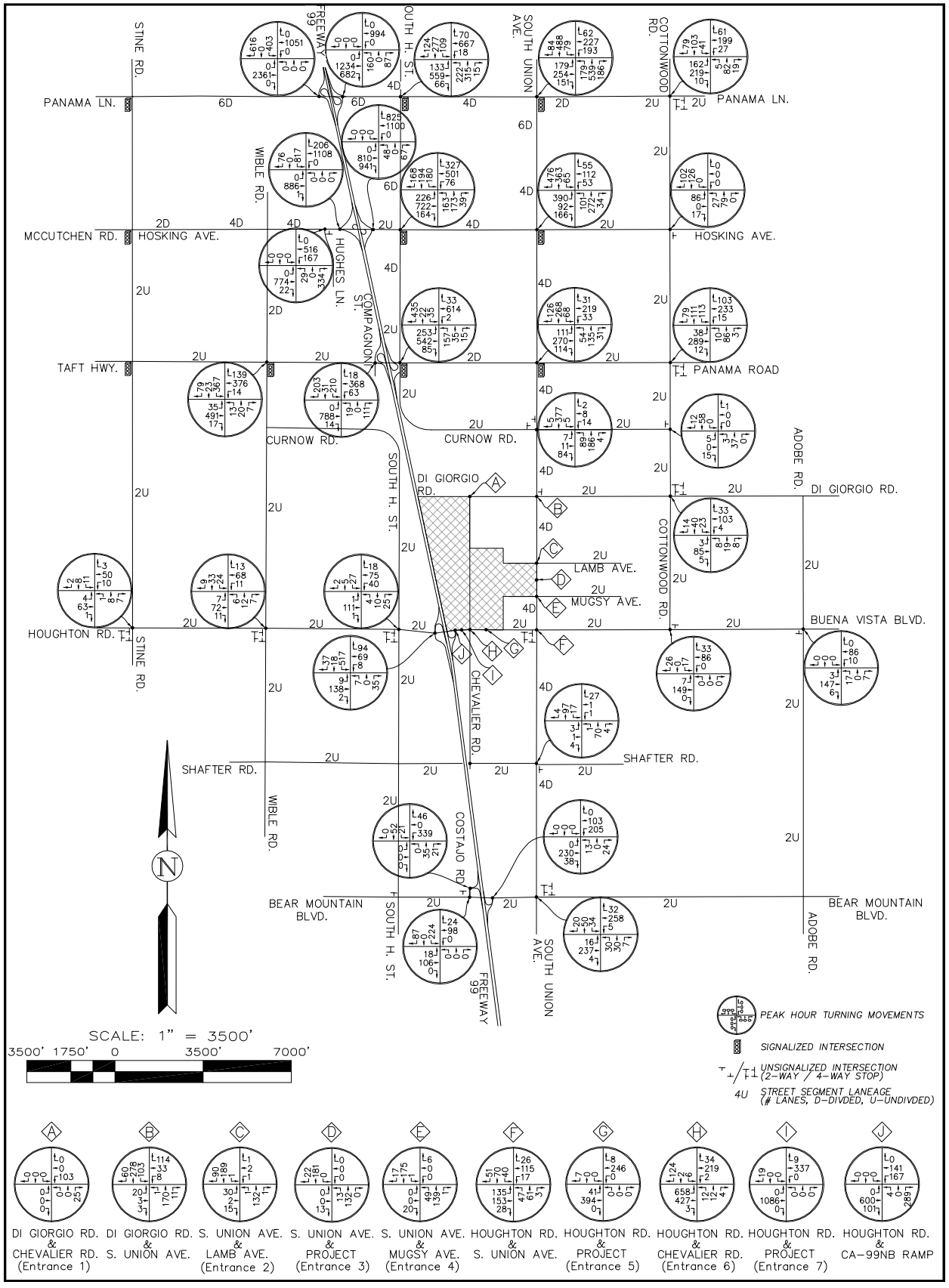

Source: McIntosh & Associates, 2016

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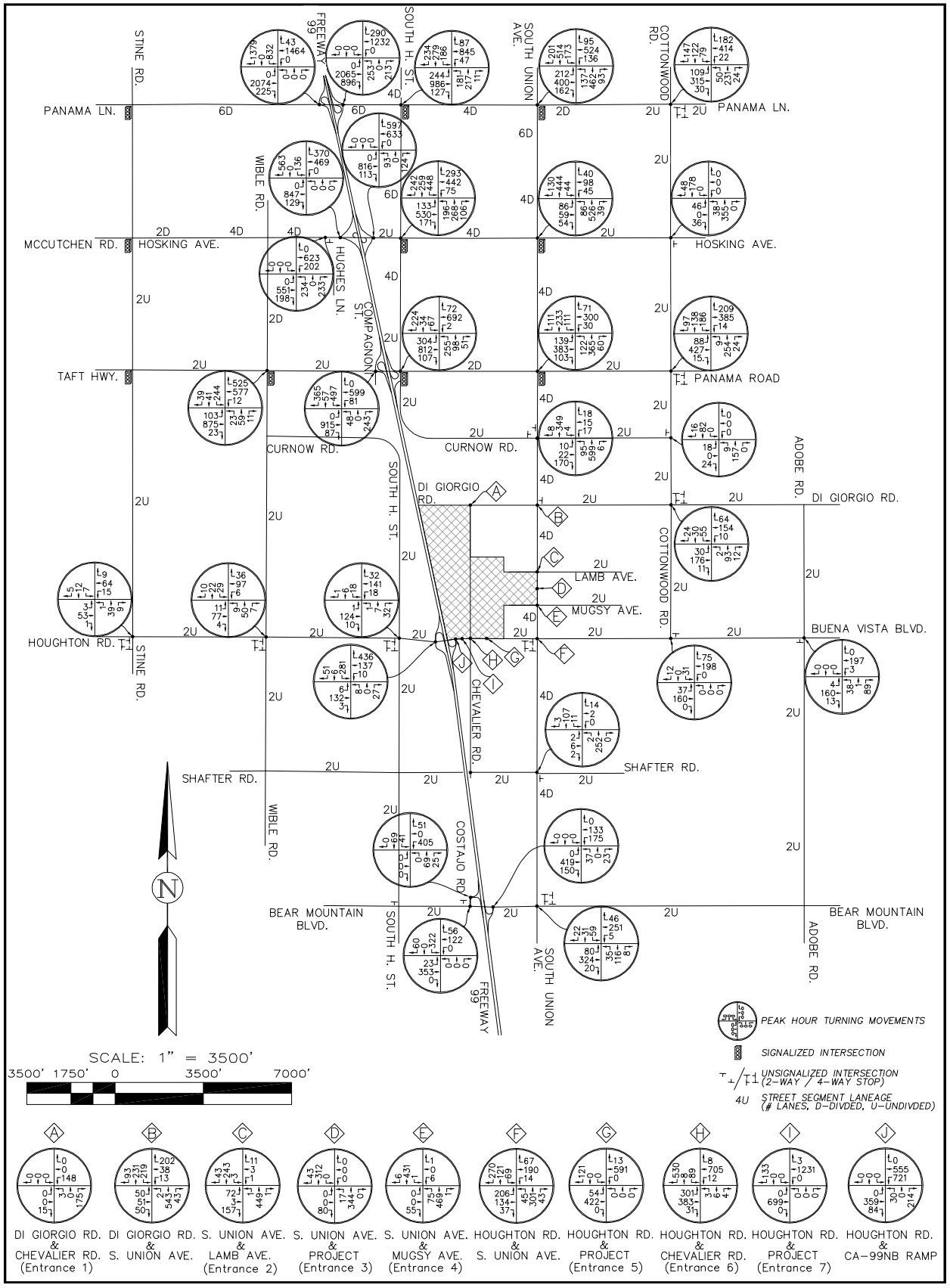
Future Year 2025 AM Peak Hour Turning Movements With Project

Figure 4.16-4a



Source: McIntosh & Associates, 2016

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Future Year 2025 PM Peak Hour Turning Movements With Project

Figure 4.16-4b

- DiGiorgio Road and South Union Avenue (PM peak hour LOS "E")
- Houghton Road and Chevalier (#6) Road (PM peak hour LOS "F")
- Houghton Road and South Union Avenue (PM peak hour LOS "D")

Future Year 2025 With Project Traffic Signal Warrants

The results of the signal warrant analysis under Future Year 2025 With Project conditions are indicated in Table 4.16-8, *Traffic Signal Warrants – Future Year 2025 With Project Conditions*. Only one traffic signal warrant is satisfied under Future Year 2025 With Project conditions.

Table 4.16-8. Traffic Signal Warrants – Future Year 2025 With Project Conditions

Intersection	Warrant(s) Satisfied*	Notes
Houghton Road and Chevalier Road	1 and 3	Signalization of this intersection is not included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).

* Warrants 1A: ADT – Minimum Vehicular Traffic; 1B: ADT – Interruption of Continuous Traffic; 1A and 1B: ADT – Combinations of Warrants 1A and 1B; and 3: Peak Hour (70% Factor) Warrant

Source: Traffic Impact Study for 99 Houghton, McIntosh & Associates, November 2016.

Future Year 2025 With Project Roadway V/C

The V/C ratios were calculated for roadways with published ADT information and future traffic projections. Ultimate capacity is based on functional classification. A V/C of greater than 0.80 corresponds to a LOS "D" or below. Future traffic would cause the following studied roadway segments to operate at a deficient LOS (LOS "D", "E" or "F") in their existing configurations under Future Year 2025 With Project conditions:

- Taft Highway/SR-119 - South H Street to South Union Avenue (V/C = 0.82, LOS "D")
- Houghton Road – SR-99 Southbound Ramp to SR-99 Northbound Ramp (V/C = 1.10, LOS "F")
- Houghton Road – SR-99 Northbound Ramp to Project Entrance #7 (V/C = 2.44, LOS "F")
- Houghton Road – Project Entrance #7 to Chevalier Road (Project Entrance #6) (V/C 2.35, LOS "F")
- Houghton Road - Chevalier Road (Project Entrance #6) to Project Entrance #5 (V/C 1.35, LOS "F")
- Houghton Road – Project Entrance #5 to South Union Avenue (V/C 1.09, LOS "F")
- Chevalier Road – DiGiorgio Road to Houghton Road (V/C = 0.85, LOS "D")

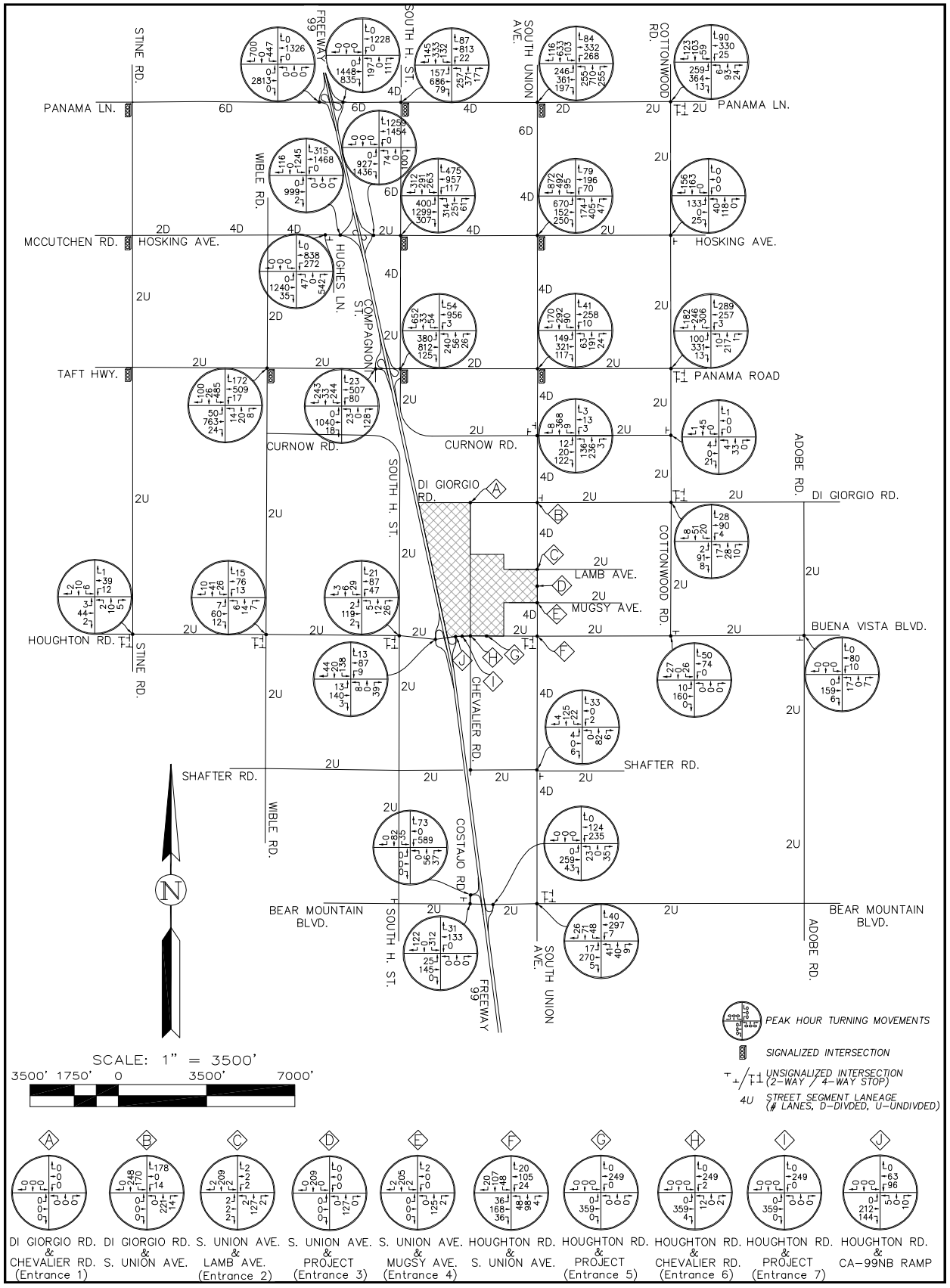
Future Year 2035 Without Project Traffic Volumes

Future Year 2035 peak hour turning movements without Project traffic are illustrated in Figure 4.16-5a, *Future Year 2035 AM Peak Hour Turning Movement Without Project*, and Figure 4.16-5b, *Future Year 2035 PM Peak Hour Turning Movement Without Project.*

Future Year 2035 Without Project Intersection LOS

Table 4.16-1, *Intersection Level of Service*, outlines the AM and PM peak hour LOS of the study intersections under Future Year 2035 Without Project conditions. The Metropolitan Bakersfield General Plan considers LOS "C" acceptable within the general plan area; therefore, as indicated in Table 4.16-1, the anticipated growth in traffic volumes by the Year 2035 would cause the following study intersections to operate at a deficient LOS (LOS "D", "E", or "F") under Future Year 2035 Without Project conditions:

- Panama Lane and SR-99 Southbound Off-Ramp (PM peak hour LOS "F')
- Panama Lane and South H Street (AM peak hour LOS "D" and PM peak hour LOS "E")
- Panama Lane and South Union Avenue (AM peak hour LOS "E" and PM peak hour LOS "F")
- Panama Lane and Cottonwood Road (AM peak hour LOS "E" and PM peak hour LOS "F")
- Hosking Avenue and Hughes Lane (AM peak hour LOS "F" and PM peak hour LOS "D")
- Hosking Avenue and South H Street (AM and PM peak hour LOS "F")
- Hosking Avenue and South Union Avenue (AM peak hour LOS "F" and PM peak hour LOS "D")
- Taft Highway/SR-119 and Wible Road (AM peak hour LOS "E" and PM peak hour LOS "F")
- Taft Highway/SR-119 and Compagnoni Street/SR-99 Southbound Ramp (PM peak hour LOS "F")
- Taft Highway/SR-119 and South H Street (AM peak hour LOS "F" and PM peak LOS "E")



Source: McIntosh & Associates, 2016

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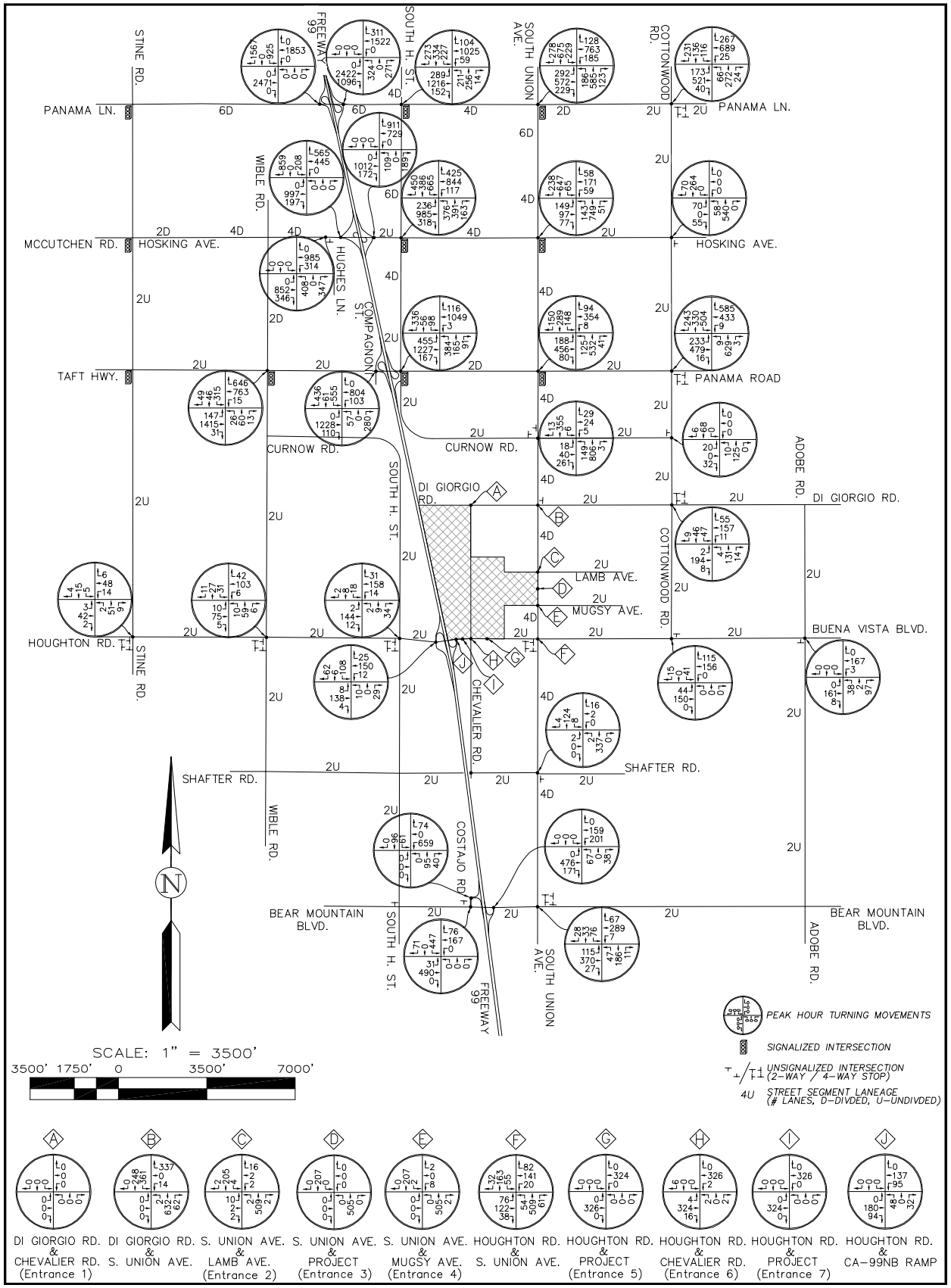
Future Year 2035 AM Peak Hour Turning Movements Without Project

Figure 4.16-5a



Source: McIntosh & Associates, 2016

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Future Year 2035 PM Peak Hour Turning Movements Without Project

Figure 4.16-5b

- Taft Highway/SR-119/Panama Road and South Union Avenue (PM peak hour LOS "D")
- Panama Road and Cottonwood Road (AM and PM peak hour LOS "F")
- Costajo Road and SR-99 Southbound Ramp (AM peak hour LOS "D" and PM peak hour LOS "F")
- Bear Mountain Boulevard/SR-233 and Costajo Road (PM peak hour LOS "F")
- Bear Mountain Boulevard/SR-223 and South Union Avenue (PM peak hour LOS "E")

Future Year 2035 Without Project Traffic Signal Warrants

The results of the signal warrant analysis provided in the 2016 Traffic Study (refer to Appendix M, *Traffic Study*) determined that there are no traffic warrants under Future Year 2035 without Project conditions.

Future Year 2035 Without Project Roadway V/C

The V/C ratios were calculated for roadways with published ADT information and future traffic projections. Ultimate capacity is based on functional classification. A V/C of greater than 0.80 corresponds to a LOS "D" or below. Future traffic would cause the following studied roadway segments to operate at a deficient LOS (LOS "D", "E" or "F') in their existing configurations under Future Year 2035 Without Project conditions:

- Panama Lane - West of SR-99 Southbound Ramp – (V/C = 0.94, LOS "E")
- Panama Lane - East of Cottonwood Road – (V/C = 0.93, LOS "E")
- Taft Highway/SR-119 – West of Wible Road – (V/C = 1.03, LOS "F")
- Taft Highway/SR-119 - Wible Road to Compagnoni Street/SR-99 Southbound Ramp (V/C = 1.08, LOS "F")
- Taft Highway/SR-119/Panama Road – South H Street to South Union Avenue (V/C= 0.94, LOS "E")
- Bear Mountain Road – SR-99 Northbound Ramp to South Union Avenue (V/C = 1.36, LOS "F")
- Bear Mountain Road - East of South Union Avenue (V/C = 1.43, LOS "F")
- South H Street - Berkshire Road to Hosking Avenue (V/C = 0.96, LOS "E")
- South H Street - Hosking Avenue to Taft Highway/SR-119 (V/C = 1.09, LOS "F")
- Cottonwood Road – North of Panama Lane (V/C = 0.81, LOS "D")

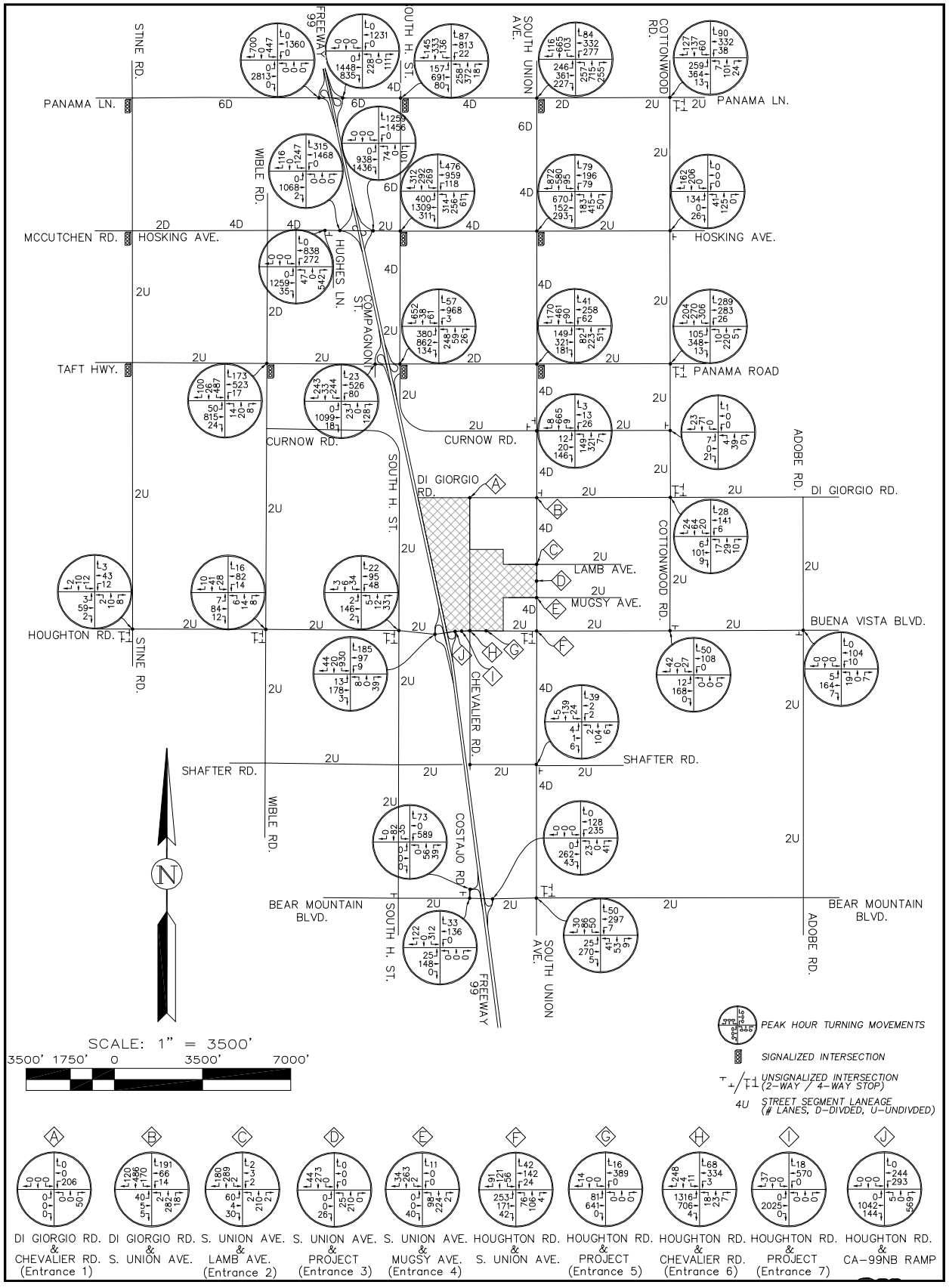
Future Year 2035 With Project Traffic Volumes

Future Year 2035 peak hour turning movements without Project traffic are illustrated in Figure 4.16-6a, *Future Year 2035 AM Peak Hour Turning Movements with Project*, and Figure 4.16-6b, *Future Year 2035 PM Peak Hour Turning Movements with Project*.

Future Year 2035 With Project Intersection LOS

Table 4.16-1, *Intersection Level of Service*, outlines the AM and PM peak hour LOS of the study intersections under Future Year 2035 With Project conditions. The Metropolitan Bakersfield General Plan considers LOS "C" acceptable within the general plan area; therefore, as indicated in Table 4.16-1, the anticipated growth in traffic volumes by the Year 2035 would cause the following study intersections to operate at a deficient LOS (LOS "D", "E", or "F") under Future Year 2035 With Project conditions:

- Panama Lane and SR-99 Southbound Ramp (PM peak hour LOS "F")
- Panama Lane and South H Street (AM peak LOS "D" and PM peak "LOS "E")
- Panama Lane and South Union Avenue (AM peak hour LOS "D")
- Hosking Avenue and Hughes Lane (AM and PM peak hour LOS "D")
- Hosking Avenue and South H Street (AM and PM peak hour LOS "E")
- Taft Highway/SR-119 and South H Street (AM peak hour LOS "D" and PM peak hour LOS "E")
- Panama Road and Cottonwood Road (AM peak hour; LOS "D" and PM peak hour LOS "E")
- Curnow Road and South Union Avenue (PM peak hour LOS "F")
- Lamb Avenue and South Union Avenue (#2) (PM peak hour LOS "D")
- Houghton Road and SR-99 Southbound Ramp (AM peak hour LOS "F" and PM peak hour LOS "D")
- Houghton Road and SR-99 Northbound Ramp (AM and PM peak hour LOS "F")
- Houghton Road and Project Entrance #7 (PM peak hour LOS "F")



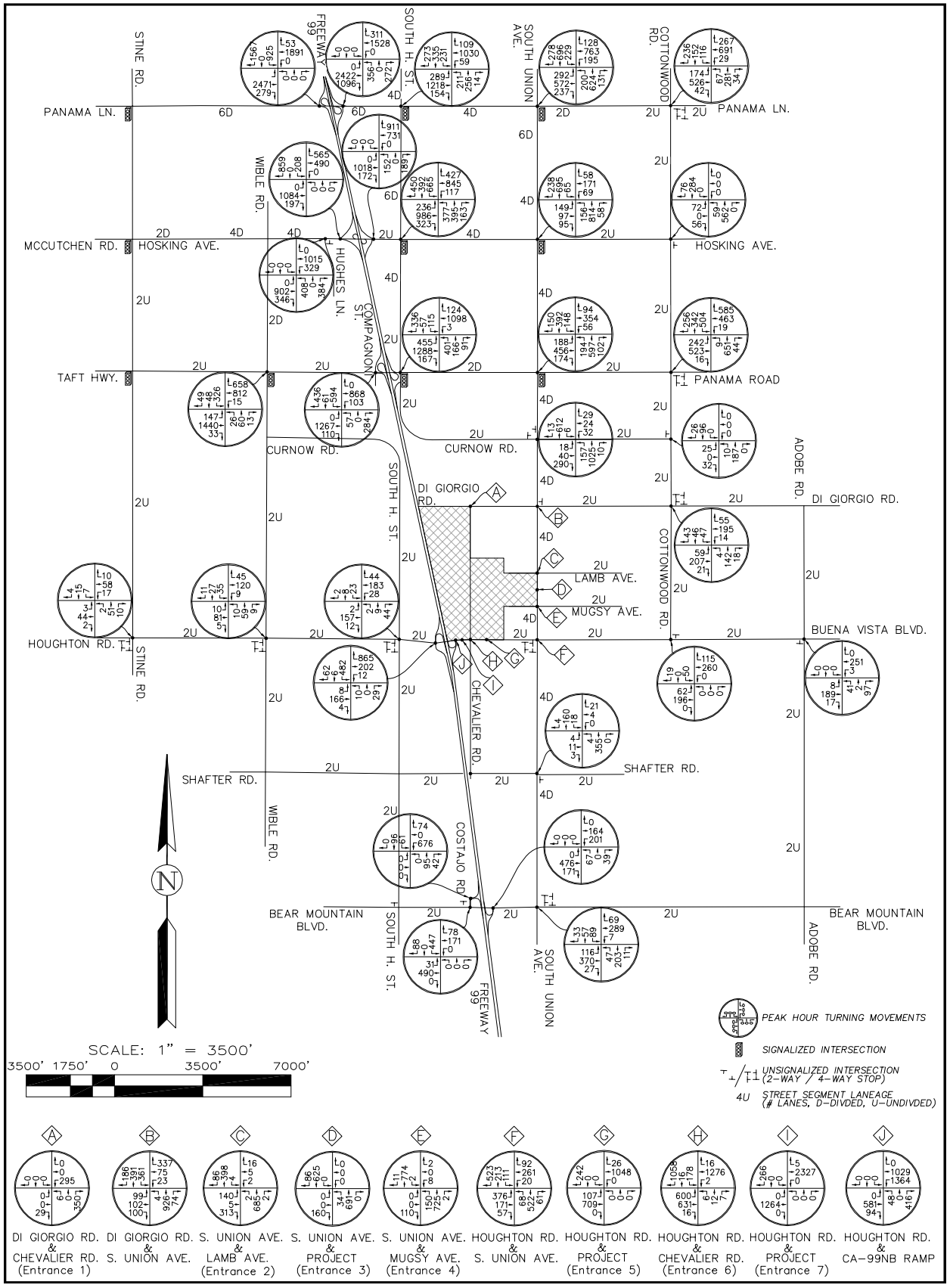
Source: McIntosh & Associates, 2016

99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07 • AGRICULTURAL PRESERVE #13 EXCLUSION

Future Year 2035 AM Peak Hour Turning Movements With Project

Figure 4.16-6a



Source: McIntosh & Associates, 2016

99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07 • AGRICULTURAL PRESERVE #13 EXCLUSION

Future Year 2035 PM Peak Hour Turning Movements With Project

Figure 4.16-6b

- Houghton Road and Chevalier Road (#6) (AM and PM peak hour; LOS "F")
- Houghton Road/Buena Vista Boulevard and South Union Avenue (PM peak hour LOS "F")
- SR-99 Southbound Ramp and Costajo Road (AM peak hour LOS "D" and PM peak hour LOS "F")
- Bear Mountain/SR-233 and Costajo Road (PM Peak hour LOS "F")
- Bear Mountain/SR-233 and South Union Avenue (PM peak hour LOS "E")

Future Year 2035 With Project Traffic Signal Warrants

The results of the signal warrant analysis under Future Year 2035 With Project conditions are indicated in Table 4.16-9, *Traffic Signal Warrants – Future Year 2035 With Project Conditions*.

Table 4.16-9. Traffic Signal Warrants – Future Year 2035 With Project Conditions

Intersection	Warrant(s) Satisfied[1]	Notes[2]
Hosking Road and Cottonwood Road	1 and 3	Acceptable service levels can be achieved without the addition of a traffic signal.
South Union Avenue and Curnow Road	1 and 3	Acceptable service levels can be achieved without the addition of a traffic signal.
South Union Avenue and Mugsy Avenue	1 and 3	Acceptable service levels can be achieved without the addition of a traffic signal.
South Union Avenue and DiGiorgio Road	1 and 3	Acceptable service levels can be achieved without the addition of a traffic signal.
South Union Avenue and Lamb Avenue	1 and 3	Acceptable service levels can be achieved without the addition of a traffic signal.
South Union Avenue and Project Entrance #3	1 and 3	Acceptable service levels can be achieved without the addition of a traffic signal.
Houghton Road and SR-99 Southbound Ramps	1 and 3	None
Houghton Road and SR-99 Northbound Ramps	1 and 3	None
Houghton Road and Project Entrance #7	1 and 3	None
Houghton Road and Project Entrance #5	1 and 3	Acceptable service levels can be achieved without the addition of a traffic signal.
Houghton Road/Buena Vista Blvd and South Union Avenue	1 and 3	None
Costajo Road and Bear Mountain Boulevard/SR-223	1 and 3	Acceptable service levels can be achieved without the addition of a traffic signal.
Bear Mountain Boulevard/SR-223 and South Union Avenue	1 and 3	Acceptable service levels can be achieved without the addition of a traffic signal.

[1] Warrants 1A: ADT – Minimum Vehicular Traffic; 1B: ADT – Interruption of Continuous Traffic; 1A and 1B: ADT – Combinations of Warrants 1A and 1B; and 3: Peak Hour (70% Factor) Warrant
[2] Signalization of intersections are not included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF)

Source: Traffic Impact Study for 99 Houghton, McIntosh & Associates, November 2016.

Future Year 2035 With Project Intersection Improvements

Intersection improvements needed by the Year 2035 to maintain or improve the operational LOS of the street system in the vicinity of the Project are indicated in Table 4.16-10, *Future Intersection Improvements and Local Mitigation*. As mitigation for the Project, it is recommended that the Project pay fees in accordance with the RTIF program. For mitigation improvements not covered by the RTIF, it is recommended that the Project pay the proportionate share for the local mitigation improvements. Table 4.16-10 identifies which RTIF intersection improvements are not covered by the program.

Table 4.16-10. Future Intersection Improvements and Local Mitigation

Intersection	Total Improvements Required by 2035 Without Project[1]	Total Improvements Required by 2035 With Project[2]	Local Mitigation (Improvements not covered by RTIF)
Panama Lane & South H Street	Add 1 ET & 1 NT	No additional improvements required	
Panama Lane & South Union Avenue	Add 1 ET, 1 EL, 2 WT, 1 WL, 1 WR, 1 NT, 1 NL, 1 SL, 1 ST, & 1 SR	No additional improvements required	
Panama Lane & Cottonwood Road	Provide Signal; Add 1 EL, 1 ER, 1 ET, 1 WL, 1 WR, 1 WT, 1 NL, 1 SL, & 1 SR & NR	No additional improvements required	
Hosking Avenue & Hughes Lane	Provide Signal; Add 1 ET, 1 WT, 1 WL & 1 NR	No additional improvements required	
Hosking Avenue & South H Street	Add 1 EL, 1 ET, 1 ER, 1 WL, 1 WT, 1 NL, 2 NT, 1 NR, 1 SL, 2 ST & 1 SR	No additional improvements required	
Hosking Avenue & South Union Avenue	Add 2 ET, 1 EL, 1 ER, 1 WT, 1 NL, 1 NT, 1 NR, 1 ST, 2 SR & Overlapping SR	No additional improvements required	
Taft Highway/SR-119 & Wible Road	Add 1 ET, 1 WT, 1 NL, 2 SL, & 1 SR	No additional improvements required	
Taft Highway/SR-119 & SR-99 Southbound Ramp/ Compagnoni Street	Add 2 ET, 2 WT, 1 NR, Convert SL to ST/L & 1 SR	No additional improvements required	
Taft Highway/ SR-119 & South H Street	Add 1 EL, 2 ET, 2 WT, 1 WR and 1 SR	Add 1 NL	NL
Taft Highway/ SR-119/ Panama Road & South Union Avenue	Add 1 ET and 1 WT	No additional improvements required	
Taft Highway/ SR-119/ Panama Road & Cottonwood Road	Provide signal; Add 2 EL, 2 ET, 1 ER, 2 WT, 1 WL, 2 WR, 1 NL, 1 NR, 2 NT, 2 ST, 1 SL, & 1 SR	No additional improvements required	
Curnow Road & South Union Avenue	No additional improvements required	Add 1 ER	ER
DiGiorgio Road & Chevalier Road/Project Entrance #1	No additional improvements required	Construct entrance with 1 ET/R, 1 WT/L, & 1 NL/R	ET/R, WT/L, NL/R
DiGiorgio Road & South Union Avenue	No additional improvements required	Construct east approach with 1 EL, 1 ET/R; & 1 SR & 1 WL	EL, ET/R, SR & WL
South Union Avenue & Lamb Avenue/Project Entrance #2	No additional improvements required	Add 1 ER	ER

Table 4.16-10. Future Intersection Improvements and Local Mitigation

Intersection	Total Improvements Required by 2035 Without Project[1]	Total Improvements Required by 2035 With Project[2]	Local Mitigation (Improvements not covered by RTIF)
South Union Avenue & Project Entrance #3	No additional improvements required	Construct entrance with 1 ER; Add 1 NL	ER, NL
South Union Avenue & Mugsy Road/Project Entrance #4	No additional improvements required	Construction east approach	East approach
Houghton Road & SR-99 Southbound Ramp/ Costajo Road	No additional improvements required	Provide Signal; Add 1 EL, 1 WL, 1 NL, & 2 SL	Signal, EL, WL, NL, 2SL,
Houghton Road & SR-99 Northbound Ramp	No additional improvements required	Provide Signal; Add 2 ET, 2 WL, 2 WT & Overlapping NR	Signal, 2 ET, 2 WL, 2 WT, Overlapping NR
Houghton Road & Project Entrance #7	No additional improvements required	Add 1 ET, 1 WT, 1 WR & 1 SR	1 ET, 1 WT, 1 WR & SR
Houghton Road & Chevalier Road/Project Entrance #6	No additional improvements required	Provide Signal; Construct entrance; Add 2 EL, 2 ET, 1 ER, 1 WL, 1 WT, 1 WR, 1 NT, 2 SL, 1 ST, 1 SR, & Overlapping SR	Signal, 2 EL, 2 ET, ER, WL, WT, WR, NT, SL, ST, SR, & Overlapping SR
Houghton Road & Project Entrance #5	No additional improvements required	Construct entrance with 1 SR; Add 1 EL & 1 WR	EL, WR
Houghton Road/ Buena Vista Boulevard & South Union Avenue	No additional improvements required	Provide Signal; Add 2 EL, 1 ET, 1 WL, 1 WT, 1 NL, 1 SL, & 1 SR	Signal, EL, ET, WL, WT, NL, SL, SR
Bear Mountain Boulevard/ SR-223/ Costajo Road & SR-99 Southbound Ramp	No additional improvements required	Add 1 NR	NR

[1]Improvements listed include any improvements needed in 2025 without project and 2035 without project.

[2]Improvements listed include any improvements needed at "opening day," 2025 with project, and 2035 with project.

*NL needed at 2035 w/o only if Project is not built at 2025+Project

Notes:
RTIF = Regional Transportation Impact Fee
NL = Northbound Left Lane, **NT** = Northbound Through Lane, **NR** = Northbound Right Lane, **EL** = Eastbound Left Lane, **ET** = Eastbound Through Lane, **ER** = Eastbound Right Lane, **SL** = Southbound Left Lane, **ST** = Southbound Through Lane, **SR** = Southbound Right Lane, **WL** = Westbound Left Lane, **WT** = Westbound Through Lane, **WR** = Westbound Right Lane

Source: Traffic Impact Study for 99 Houghton, McIntosh & Associates, November 2016.

Future Year 2035 With Project Roadway V/C

The V/C ratios were calculated for roadways with published ADT information and future traffic projections. Ultimate capacity is based on functional classification. A V/C of greater than 0.80 corresponds to a LOS "D" or below. Future traffic would cause the following studied roadway segments to operate at a deficient LOS (LOS "D", "E" or "F") in their existing configurations under Future Year 2035 With Project conditions:

- Panama Lane – West of SR-99 Southbound Ram (V/C – 0.95, LOS "E")
- Bear Mountain Boulevard/SR-223 – SR-99 Northbound Ramp to South Union Avenue (V/C = 1.36, LOS "F")
- Bear Mountain Boulevard/SR-223 - East of South Union Avenue (V/C = 1.44, LOS "F")
- Chevalier Road – DiGiorgio Road to Houghton Road (V/C = 0.85, LOS "D"

It should be noted that the roadway segments along Bear Mountain Boulevard/SR-223 and Panama Lane segment indicated above, currently operation at LOS "E" and Future Year 2035 With Project Conditions are similar to Future Year 2035 Without Project Conditions, with these segments operating at LOS "F" under both scenarios.

Future Year 2035 With Project Roadway Improvements

Roadway improvements needed by the Year 2035 to maintain or improve the operational LOS of the street system in the vicinity of the Project are indicated in Table 4.16-11, *Future Roadway Improvements and Local Mitigation*. As mitigation for the Project, it is recommended that the Project pay fees in accordance with the RTIF program. For mitigation improvements not covered by the RTIF, it is recommended that the Project pay the proportionate share for the local mitigation improvements.

Table 4.16-11. Future Roadway Improvements and Local Mitigation

Roadway	Improvements Required by 2035 Without Project	Improvements Required by 2035 With Project	Project Share for Local Mitigation
Panama Lane – South Union Avenue to Cottonwood Road	Improve 4-lane Collector	No additional improvements required	0.55%
Panama Lane – East of Cottonwood Road	Improve to 4-Lane Collector	No additional improvements required	1.48%
Taft Highway/ SR-119 – West of Wible Road	Improve to 4-lane, undivided	No additional improvements required	6.28%
Taft Highway/SR-119 –Wible Road to Compagnoni Street/SR-99 SB Ramp	Improve to 4-Lane Collector	No additional improvements required	7.0%
Taft Highway/SR-119/ Panama Road – South H Street to South Union Avenue	Improve to 4-Lane Arterial	No additional improvements required	11.83%
Taft Highway/SR-119/ Panama Road – Compagnoni Street/ SR-99 SB Ramp to East of Cottonwood Road	Improve to 4-lane Collector	No additional improvements required	10.72%
DiGiorgio Road – West of Chevalier Road (Project Entrance #1)	No additional improvements required	Construction 2-lane Collector	100%
DiGiorgio Road – Chevalier Road (Project Entrance #1) to South Union Avenue	No additional improvements required	Construction 2-lane Collector	100%
Cottonwood Road – North of Panama Lane	Improve to 4-Lane Collector	No additional improvements required	2.5%
Houghton Road – SR-99 SB Ramp to SR-99 NB Ramp	No additional improvements required	Improve to 4-Lane Collector	75.62%
Houghton Road – SR-99 NB Ramp to Chevalier Road	No additional improvements required	Improve to 6-Lane Arterial	82.14%
Houghton Road – Project Entrance #5 to South Union Avenue	No additional improvements required	Improve to 4-Lane Collector	62.15%
Chevalier Road – DiGiorgio Road to Houghton Road	No additional improvements required	Construct 2-Lane Collector	100%

-- = No percentage provided.

Source: Traffic Impact Study for 99 Houghton, McIntosh & Associates, November 2016.

If the existing operational LOS of a facility is below "C" prior to the addition of project generated traffic and the addition of project traffic substantially degrades the LOS further, then mitigation to

restore the facility to at least its existing operational LOS is deemed appropriate. The following intersection would improve their 2035 LOS levels with the proposed project, but LOS would remain below a "C":

- Panama Lane and S. Union Avenue (AM peak hour), has a LOS "E" under 2035 Future Without Project conditions, and a LOS "D" under 2035 Future with Project conditions;
- Hosking and Hughes (AM peak hour), has a LOS "F" under 2035 Future Without Project conditions, and a LOS "D" under 2035 Future with Project conditions;
- Hosking and South H. Street (AM Peak hour and PM Peak hour), have a LOS "F" under 2035 Future Without Project Conditions, and a LOS "E" under 2035 Future with Project conditions;
- Taft Highway/SR-119 and South H. Street (AM Peak hour), has a LOS "F" under 2035 Future Without Project conditions, and a LOS "D" under 2035 Future with Project conditions;
- Taft Highway/Panama Road and Cottonwood Road (AM Peak hour), has a LOS "F" under 2035 Future Without Project conditions, and a LOS "D" under 2035 Future with Project conditions; and
- Taft Highway/Panama Road and Cottonwood Road (PM Peak hour), has a LOS "F" under 2035 Future Without Project conditions, and a LOS "E" under 2035 Future with Project conditions.

Therefore, all study roadways would operate at an acceptable LOS (LOS "C" or better) under Future Year 2035 With Project conditions (in their mitigated configurations). Thus, with implementation of the recommended roadway improvements, implementation of the proposed Project would result in less than significant impacts on study area roadway segments under Future Year 2035 With Project conditions.

The following CMP intersections are included in the study area:

Existing

- Panama Lane and SR-99 Southbound Off-Ramp
- Panama Lane and SR-99 Northbound Off-Ramp
- Taft Highway/SR-119 and Wible Road
- Taft Highway/SR-119 and SR-99 Southbound Off-Ramp/Compagnoni Street
- Taft Highway/SR-119 and South H Street
- Taft Highway/SR-119/Panama Road and South Union Avenue
- Houghton Road and SR-99 Southbound Ramps/Costajo Street
- Houghton Road and SR-99 Northbound Ramps
- SR-99 Southbound Ramp and Costajo Street
- Bear Mountain Boulevard/SR-223 and Costajo Street

- Bear Mountain Boulevard/SR-223 and SR-99 Northbound Ramp
- Bear Mountain Boulevard/SR-223 and South Union Avenue
- Hosking Avenue and SR-99 Southbound Off-Ramp
- Hosking Avenue and SR-99 Northbound Off-Ramp

Future Year 2025 With Project CMP Intersection LOS

The AM and PM peak hour LOS of the study intersections, including the CMP intersections, under Future Year 2025 With Project conditions are outlined above. Based on established thresholds of significance, the addition of Project-generated trips would not result in significant impacts on CMP intersections and no mitigation is required.

Future Year 2035 With Project CMP Intersection LOS

The AM and PM peak hour LOS of the study intersections, including the CMP intersections, under Future Year 2035 With Project conditions are outlined above. Based on established thresholds of significance, the addition of Project-generated trips is anticipated to result in a significant impact at the following CMP study intersections under Future Year 2035 With Project conditions:

- Taft Highway/SR-119 and South H Street
- Houghton Road and SR-99 Southbound Ramps/Costajo Street
- SR-99 Southbound Ramp and Costajo Street

Mitigation measures, which involve improvements to the impacted CMP intersections, are recommended to reduce or eliminate traffic impacts for Future Year 2025 and 2035 With Project conditions.

Future Year 2025 With Project CMP Traffic Signal Warrants

The results of the signal warrant analysis under Future Year 2025 With Project conditions are outlined above. As indicated above, the traffic signal warrant is satisfied at the following CMP intersection under Future Year 2025 With Project conditions:

- Houghton Road and Chevalier Road (Warrants 1 and 3)

Future Year 2035 With Project CMP Traffic Signal Warrants

The results of the signal warrant analysis under Future Year 2035 With Project conditions are outlined above. As indicated above, the traffic signal warrant is satisfied at the following three CMP intersections under Future Year 2035 With Project conditions:

- Houghton Road and SR-99 Northbound Ramps (Warrants 1 and 3)
- Houghton Road and SR-99 Southbound Ramps/Costajo Street (Warrants 1 and 3)
- Bear Mountain Boulevard/SR-223 and South Union Avenue

Mitigation measures, which involve improvements to the impacted CMP intersections, are recommended to reduce or eliminate traffic impacts for Future Year 2025 and 2035 With Project conditions.

Conclusion

The proposed Project would contribute its pro-rata share for supplemental mitigation not covered under any regional transportation impact fee. The estimated supplemental mitigation amount, as determined by the Kern County Public Works Department, must be paid to the Kern County Public Works Department prior to recordation of any parcel map(s) or issuance of any grading or building permit if a parcel map is not required.

Mitigation Measures

MM 4.16-1: Supplemental Road Improvements. Prior to final approval of any Master Precise Development Plan or recordation of any parcel map, the project proponent will provide to the County a written statement of intent, which will detail the approach used to satisfy obligations for supplemental road improvements. This written statement of intent and method proposed will be approved by the Kern County Public Works Department- Development Review. The applicant will have three approaches to fulfill the road improvement responsibilities:

1. Lump Sum Payment: Any lump sum payment will be made prior to final approval of any Master Precise Development Plan, parcel map recordation or issuance of grading or building permits. All monies will be paid to the Kern County Roads Department. At the time of payment, the Kern County Roads Department will conduct a review of the distributed share amount and make adjustments, if required, based on increases to the construction cost index, other changes in standards or technology for required signalization or improvements, or updated development projects or proposals. The Kern County Roads Department may request, at a cost to be borne by the applicant, a supplemental traffic analysis to determine the correct lump sum payment.

2. Construction of Road Improvements: If, in an approved summary of intent, the Project Applicant seeks to construct road improvements in lieu of a lump sum payment, the improvements will be constructed and accepted by the County prior to issuance of the Certificate of Occupancy for the related building permits. Deviations from this sequence of events may be approved by the Kern County Roads Department.

3. Combination of Approach A and Approach B: The Project Applicant may choose to provide construction for certain roadway improvements and payment for others. This approach must be used in communication with the Kern County Roads Department.

4. All monies designated for roadway improvements shall initially be identified and calculated during processing of the Master Precise Development Plan or parcel map, whichever comes first. All final payments and or construction of

roadway improvements shall be completed at the issuance of any grading or building permit.

MM 4.16-2: Construction Traffic Control Plan. Prior to the issuance of construction or building permits, the project proponent shall:

1. Prepare and submit a Construction Traffic Control Plan to Kern County Public Works Department- Development Review and the California Department of Transportation offices for District 9, as appropriate, for approval. The Construction Traffic Control Plan must be prepared in accordance with both the California Department of Transportation Manual on Uniform Traffic Control Devices and Work Area Traffic Control Handbook and must include, but not be limited to, the following issues:

    a. Timing of deliveries of heavy equipment and building materials;

    b. Directing construction traffic with a flag person;

    c. Placing temporary signing, lighting, and traffic control devices if required including pedestrians and bicyclist; including, but not limited to, appropriate signage along access routes to indicate the presence of heavy vehicles and construction traffic;

    d. Ensuring access for emergency vehicles to the project sites;

    e. Temporarily closing travel lanes or delaying traffic during materials delivery, transmission line stringing activities, or any other utility connections;

    f. Maintaining access to adjacent property; and,

    g. Specifying both construction-related vehicle travel and oversize load haul routes, minimizing construction traffic during the AM and PM peak hour, distributing construction traffic flow across alternative routes to access the project sites, and avoiding residential neighborhoods to the maximum extent feasible.

2. Obtain all necessary encroachment permits for the work within the road right-of-way or use of oversized/overweight vehicles that will utilize county-maintained roads, which may require California Highway Patrol or a pilot car escort. Copies of the approved traffic plan and issued permits shall be submitted to the Kern County Planning and Natural Resources Department and the Kern County Public Works Department-Development Review.

3. Enter into a secured agreement with Kern County to ensure that any County roads that are demonstrably damaged by project-related activities are promptly repaired and, if necessary, paved, slurry-sealed, or reconstructed as per requirements of the state and/or Kern County.

4. Submit documentation that identifies the roads to be used during construction. The project proponent shall be responsible for repairing any damage to non-county-maintained roads that may result from construction activities. The project proponent shall submit a preconstruction video log and inspection report regarding roadway conditions for roads used during construction to the Kern County Public Work Department-Development Review and the Kern County Planning and Natural Resources Department.

5. Within 30 days of completion of construction, the project proponent shall submit a post-construction video log and inspection report to the County. This information shall be submitted in DVD format. The County, in consultation with the project proponent's engineer, shall determine the extent of remediation required, if any.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.16-3: The Project Would Cause an Increase in Operation-Related Safety Hazards or result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that would result in substantial safety risks.

By increasing traffic on area roadways, there is the potential to increase safety hazards by increasing vehicle turning movements and increasing potential for vehicle/pedestrian or vehicle/bicycle conflicts. However, with implementation of the mitigation measures MM 4.16-1 through MM 4.16-3, traffic controls will be included to help calm and control traffic where necessary, including signals, signage, sidewalks, crosswalks, and bicycle lanes, among other safety features. Therefore, impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.16.4: The Project Would Cause an Increase in Construction-Related Safety Hazards or Would Substantially Increase Hazards Due to a Design Feature (e.g., Sharp Curves or Dangerous Intersections) or Incompatible Uses (e.g., Farm Equipment).

No obstacles to sight distance are expected to result from Project construction. No sharp roadway curves currently exist in the proposed Project area, nor would such curves be created by the proposed Project. However, the maneuvering of construction-related vehicles and equipment among the general-purpose traffic on area roadways could cause safety hazards. This impact is considered potentially significant but can be reduced to a less than significant level with implementation of mitigation measure MM 4.16-2.

Mitigation Measures

Implement mitigation measure MM 4.16-2.

Level of Significance After Mitigation

Impacts would be less than significant.

Impact 4.16.5: The Project Would Result in Inadequate Emergency Access.

Anticipated construction-related traffic and circulation impacts would be considered a temporary nuisance that would cease upon completion of Project construction. Preparation of a detailed Traffic Management Plan (TMP) would be required prior to construction of the proposed Project. The TMP would delineate all road closures, provisions to maintain access to adjacent residential properties at all times, prior notices, adequate sign-postings, detours, provisions for pedestrian and bicycle transportation and permitted hours of construction activity. Proper detours and warning signs would be established along the proposed Project perimeter to ensure public safety. The TMP shall be devised so that construction would not interfere with emergency response or evacuation plans. With implementation of the TMP and mitigation measures, less than significant impacts are anticipated. Therefore, no significant impacts to vehicular and emergency access would occur during construction activities.

South Union Avenue, Houghton Road, and the DiGiorgio Road alignment provide the primary access to and from the proposed Project area. The design of the proposed access locations would allow for adequate vehicular and emergency access to public roadways. Project implementation would result in a less than significant impact in this regard.

Mitigation Measures

Implement MM 4.16-2.

Level of Significance After Mitigation

Impacts would be less than significant.

Impact 4.16.6: The Proposed Project Would Conflict with Adopted Policies, Plans or Programs Supporting Alternative Transportation (e.g., bus turnouts and bicycle racks).

As indicated in the Metropolitan Bakersfield General Plan Environmental Impact Report, as development and population increases within the Metropolitan Bakersfield area, the demand for alternative transportation (i.e., bus transit service, bikeways and pedestrian facilities) would increase. The Metropolitan Bakersfield General Plan Bikeway Master Plan is implemented to link schools, civic centers, service areas, parks, employment centers, and regional bike paths. As the proposed Project vicinity is mostly undeveloped land, or land currently under construction, there are no pedestrian and bicycle facilities in the area. However, as the proposed Project area becomes developed, adherence to General Plan roadway standards and policies would allow for adequate pedestrian and bicycle circulation.

Transit service within the Metropolitan Bakersfield area consists of approximately one percent of the total travel. In accordance with the goals and policies of the Metropolitan Bakersfield General Plan, the Project Applicant shall work with the GET and Kern Transit to locate bus stops as close as possible to the proposed Project site in an effort to provide residents with sufficient access to public transit service. Bus stops would most likely be placed on major arterials. Therefore, development of the proposed Project would not result in a significant impact to transit service in the proposed Project vicinity.

The County requires installation of sidewalks in conjunction with development. Sidewalks would be required to allow for safe and convenient pedestrian movement and would connect with sidewalks planned for adjacent developments. The proposed Project would construct internal roads to the County's roadway standards, which would include sidewalks on both sides of the streets. Therefore, with the proposed Project designed to City and County standards, there would be no impacts to pedestrian and bicycle circulation.

Development of the Project site in accordance with the goals and policies of the Metropolitan Bakersfield General Plan and site plan review by the County, GET and Kern Transit would serve to enhance alternative modes of transportation within the Project area. This would be a long-term beneficial impact.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

The analysis of cumulative impacts in this section included all of the cumulative projects discussed in Chapter 3, Project Description. Projections of future traffic conditions incorporate regional population and employment growth that is expected to occur by the future analysis year, independent of the proposed Project. Because of this, future condition scenarios (2035) without the proposed Project capture the effects of cumulative projects. Future condition scenarios (2035) with the proposed Project capture the effects of both cumulative projects and those of the proposed Project.

Cumulative projects plus anticipated growth in traffic volumes by the Year 2035 will cause 21 intersections to operate below acceptable LOS (without the proposed Project). Additionally, by 2025, future traffic conditions without the Project would result in five (5) intersections meeting signal warrants under future peak hour traffic loads. By 2035, future traffic conditions without the Project would result in an additional zero (0) intersections meeting signal warrants under future peak hour traffic loads. Future cumulative projects and ambient growth would cause 17 studied roadway segments to operate below acceptable LOS in their existing configurations for Future Year 2035 Without Project conditions (LOS "D" or below for the Metropolitan Bakersfield General Plan).

The proposed Project would add 32,053 vehicle trips per day to the existing and future year conditions. With the addition of this Project traffic, six of the intersections that will operate at

acceptable LOS under future traffic loads (2035) will drop below acceptable LOS when Project traffic is added to future peak hour traffic (2035 with project). The proposed Project traffic would also result in 14 intersections meeting signal warrants under future peak hour traffic loads. In addition, three studied roadway segments would operate below acceptable LOS (LOS "C" for Metropolitan Bakersfield General Plan) in their existing configurations under Future Year 2035 With Project conditions. When added to future cumulative conditions, the Project-generated traffic would result in the continued worsening of existing intersections that are at or above operating capacity. However, many of the improvements identified above will be necessary even without the addition of Project-generated traffic. The proposed Project shall contribute its proportionate share of costs to construct necessary improvements required due to future traffic growth projections in the study area.

Additionally, the proposed Project is located approximately 1.10 miles southeast of the Bakersfield City limits, within the Metropolitan Bakersfield General Plan in Kern County. Therefore, it is anticipated that trips generated will utilize the Metropolitan Bakersfield transportation system. The cumulative impacts of the existing and proposed growth in the Metropolitan Bakersfield area on the transportation system has been the subject of various studies since the development of the Transportation Impact Fee (TIF) in 1992. The Kern County Public Works Department and City of Bakersfield Public Works Department have worked with Kern COG since that time to identify major improvements and seek funding for completion of the appropriate segments to ensure roadway capacity. In 1997, the Metropolitan Bakersfield Major Transportation Investment Strategy (MTIS) was completed to identify overall transportation needs and develop a long-term improvement plan. Mass transit options including increased bus systems, transportation systems management, and commuter/light rail transit were considered in the study. However, the MTIS concluded that in Metropolitan Bakersfield, stand-alone mass transit solutions would not provide the same benefits that improvements to the roadway network would provide. The inefficient roadway system, lacking connectivity, was the primary transportation element in need of significant improvement.

The physical constraints that affect the alignment and design of an efficient regional transportation system include:

- the Kern River cutting diagonally across Bakersfield from northeast to the southwest that inhibits both north-south and east-west travel;
- SR-99, which divides Bakersfield east and west;
- SR-58, which divides the east side of Bakersfield into north and south;
- the mainline of both the BNSF and the UPRR run through Bakersfield, dividing the west from the northwest, the northeast from the southwest, and splitting central Bakersfield;
- existing development that breaks up continuity and numerous canals and branch rail lines, which must be crossed to provide a functional roadway network.

To address these challenges, in 2000–2001, Kern County, the City of Bakersfield, Caltrans, and Kern COG jointly commissioned the Bakersfield System Study to perform a comprehensive evaluation of the region's roadway network. The results of that study are reflected in the current adopted circulation element of the Metropolitan Bakersfield General Plan. It identifies a regional network of freeways, parkways, arterials, and collectors that when fully implemented are proposed to provide regional mobility and reduced congestion. Estimates for full buildout of all the necessary regional

improvements, along with additional facilities such as Seventh Standard Road, the South Beltway, and the Snow Road interchange with SR-99, range from $2 to $3 billion in today's dollars. Although construction of regional roadways has occurred with money from TIF, development-constructed improvements, and federal and state highway money, the freeways have not been completed.

The accelerated growth from 2002 to 2004 in the Metropolitan Bakersfield area of 4.7 percent per year resulted in housing construction and amendments to the plan that required road network improvements that are still in the design stage. Environmental clearance, design, right-of-way (ROW) acquisition and construction of a new freeway requires 10 to 15 years to complete. Given the size and scope of required improvements, the impacts from project amendments in the noncore area of the Metropolitan Bakersfield area are significant and cannot be accommodated by the TIF program or the localized supplemental funding proposed by the Bakersfield System Study. While a regional network has been identified, the issues of timing (when the actual improvements will be completed) and funding (guaranteed sources of money that will increase to match inflation) are still considered potentially significant.

Kern County and the City of Bakersfield have commenced a comprehensive update of the Metropolitan Bakersfield General Plan that will include a complete review of the circulation element and propose solutions to resolve the cumulative impacts past 2030. As an interim solution, the Kern County Public Works Department, in consultation with the City of Bakersfield, has reviewed the proposed regional network along with the known funding sources. The proposed future circulation system includes all existing and future arterials, based on the sectional grid system, constructed to their ultimate six-lane width. It also includes a freeway system composed of all existing and currently proposed facilities, constructed to a width of up to 10 lanes as needed. The proposed future freeway system includes the following facilities:

- West Beltway
- Westside Parkway (Completed)
- Centennial Corridor
- Fruitvale Avenue at SR-65 connection/extension
- Snow Road at SR-99 interchange
- South Beltway
- North Beltway (north of Seventh Standard Road)

The issues to be examined include a realistic assessment of the design and available funding over the next 30 years against the background that the County does not have a dedicated sales tax for transportation funding, the funding from the STIP is limited by competition among agency requests across California, federal money (Thomas Road Improvement Program) will not build complete infrastructure, and local matching funds were limited.

Funding for Regional Transportation Improvements

Local Sales Tax

State law provides that a countywide sales tax on goods and services can be applied with two-thirds voter approval for use in operation, maintenance, and construction of transportation projects. The County is then deemed a self-help county and receives priority consideration during state and federal funding allocations. Currently, 19 counties in California are self-help counties. Kern COG estimates that a countywide 0.5-cent sales tax would generate $931.6 million over a 20-year period, while a 1-cent tax would generate $1.8 billion over the same time period. Such funding is then used to match funding for state and federal allocations and to finance local projects that will reduce critical congestion points. Kern County voters failed to pass a proposed 0.5-cent sales tax in 1989 and 2006. There are no legal limits on the number of times the measure may be qualified for the ballot.

Other Local Sources

Supplemental impact fees for regional impacts could be assessed on all new proposals in the metropolitan Bakersfield area under the jurisdiction of the County. An example of this approach is San Joaquin County, which assesses two different fees to address regional and local connectively improvements.

Additional funding could be generated by conditioning development proposals to create geographical funding districts such as bridge and thoroughfare districts or capital facilities districts that would assess new homes for regional improvements. Given the regional nature of the circulation system, identifying the facilities and appropriate segments for assessment that would comply with legal requirements for equity and nexus could be difficult.

In addition to matching funding of over $100 million that the City of Bakersfield has allocated from revenue, Kern County has approved a financing plan that will generate $148 million for transportation projects. Presented to the Board of Supervisors on December 4, 2007, the plan proposes to issue bonds that will provide a framework for debt financing. The financing plan includes the following projects that have been identified in priority order with estimated cost and time periods when bond proceeds will be needed:

1. Seventh Standard Road Corridor from SR-99 to Santa Fe Way (SR-43)	$34.3 million, 12 months
2. Local Transportation Projects	$ 42.3 million, 12 months
3. Thomas Road Improvement Program, County Match	$ 72.0 million, 6 years
Total	**$148.6 million**

This funding could provide immediate construction dollars to implement projects to relieve critical congestion points and ensure timely implementation of TRIP. In addition, the proposed financing plan includes setting aside funds ranging in amounts from $9.5 million to $17.5 million annually to defray future capital costs associated with the transportation projects.

Conclusion

All roadway segments would operate at acceptable LOS under cumulative conditions. In addition, required mitigation measures would result in acceptable LOS for all intersections. Roadway and intersection improvements require participation in the RTIF Program. However, given the uncertainty of the timing and/or ultimate implementation of the recommended improvements which require pro-rata, fair share funding from various sources, along with those improvements necessary within Metropolitan Bakersfield, the proposed Project's contribution would result in significant and unavoidable impacts.

Mitigation Measures

Implement mitigation measure MM 4.16-2.

Level of Significance after Mitigation

Cumulative impacts would be significant and unavoidable.

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Section 4.17

Utilities

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Section 4.17
Utilities

4.17.1 Introduction

This section addresses impacts of the proposed Project pertaining to demand for operational utilities (i.e., water, sewer/wastewater, stormwater control, solid waste disposal, electricity, and natural gas). For each of the utilities addressed in this section, existing infrastructure and levels of service are described, as are improvements that would be required to accommodate the proposed Project. A Public Services Report was prepared by McIntosh & Associates in October 2008 (refer to Appendix N, *Original Technical Studies*). A subsequent Public Services Report was prepared by McIntosh & Associates in June 2017 (Appendix J, *Public Services Report*), and most recently, a Water Supply Assessment was prepared by Yarne & Associates, Inc. in January 2019 [Appendix H, *99 Houghton Industrial Park SB 610 Water Supply Assessment (WSA*)].

4.17.2 Environmental Setting

Water Resources

The existing water purveyor for the proposed Project, who currently provides irrigation water solely for agricultural purposes, would not service the Project site with domestic water. Instead, potable water would be provided to the Project site by the California Water Service Company (Cal Water). Cal Water supplies water service to 1.7 million Californians through 435,000 connections in a total of 24 Districts. The proposed Project is located approximately 0.5 miles from the southern boundary of the Cal Water Bakersfield District (District) near the intersection of State Route (SR-99) and West Curnow Road. In 2015, an Urban Water Management Plan (UWMP) was prepared for the District, but because the proposed Project site is outside the current District boundaries, it was not specifically included in the UWMP. Because the proposed Project was not included in the UWMP, a WSA was prepared to address water service requirements. The information in the WSA was based on the 2015 UWMP, which is the most recent UWMP for the District, as well as information from Cal Water that was compiled from the most recent 2016-2017 data. This information has been used for the analysis in the RDEIR.

Cal Water would require approval from the California Public Utility Commission (CPUC) to expand its service area to include the proposed Project. Cal Water plans on submitting an application to the CPUC and receiving approval for the service extension in mid to late 2019.

Sewer Services

The Metropolitan Bakersfield area is served by five major wastewater treatment facilities: the City of Bakersfield Treatment Plant No. 2, the City of Bakersfield Treatment Plant No. 3, the North of River Sanitary District (NORSD) Treatment Plant, the Mount Vernon/Panorama District Plant and the Lamont Public Utility District Plant (located outside the Metropolitan Bakersfield boundary).

The proposed Project site area has never been served by a sewer system. Currently, neighboring residential and commercial properties are served by individual, privately-owned septic systems. A private package sewer treatment plant is proposed to provide services for the Project site.

Solid Waste

Solid waste is a mixture of items discarded as useless or unwanted arising from residential, commercial, industrial, institutional, agricultural, industrial and mining activities. These wastes include construction and demolition-generated (C&D) waste as well as inert wastes. The general waste classifications utilized by the Kern County Waste Management Department are:

- Non-hazardous solid waste consists mostly of household garbage, commercial wastes, agricultural waste and litter.
- Special waste, which is any waste that requires special handling, includes infectious waste, pesticide containers, sewage sludge, oilfield waste, household hazardous waste, and asbestos waste.
- Designated waste is a waste that consists of or contains pollutants that could be released at concentrations in excess of applicable water quality objectives and standards or hazardous waste that has been granted a variance from hazardous waste management requirements.
- Hazardous waste is a waste that, because of its quantity, concentration, physical, chemical, or infectious characteristics, may either (a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or (b) pose a substantial present or potential hazard to human health or the environment when improperly managed.
- Industrial wastes are hazardous and non-hazardous by-products produced by oil and gas extraction, pesticide, paper, petrochemical, rubber, plastics, electronics, and other industries.

Not all of the above-defined wastes may be disposed of at a landfill. State law regulates the disposal of wastes at landfills. Refer to the following section for a description of appropriate disposal methods of waste generated at the proposed Project site.

Kern County is responsible for meeting the California Integrated Wastewater Management Act of 1989, Assembly Bill 939 (AB 939). AB 939 requires that cities and counties reduce the amount of solid waste being sent to landfills by 50 percent by January 1, 2000, and it requires cities and counties to prepare AB 939 solid waste planning documents. These documents include the Source Reduction and Recycling Element (SRRE), the Household Hazardous Waste Element (HHWE), and the Non-Disposal Facility Element (NDFE). All three of these documents have been approved for Kern County, as well as an Integrated Waste Management Plan approved February 1998 by the California Integrated Waste Management Board [California Integrated Waste Management Board (CIWMB) 2009]. The Kern County Integrated Waste Management Plan is the long-range planning document for landfill facilities.

C&D waste is heavy, inert material. These are processed and reused in construction and improvement projects. Three sites, all in the City of Bakersfield have been approved to accept these wastes. Since C&D waste is heavier than paper and plastic, it is more difficult for the counties and cities to reduce the tonnage of disposed waste. For this reason, C&D waste has been specifically targeted by the State of California for diversion from the waste stream. Projects that will generate C&D waste should emphasize deconstruction and diversion planning, rather than demolition. Deconstruction is the planned, organized dismantling of a prior construction project, which allows maximum use of the

deconstructed materials for recycling in other construction projects and sends a minimum of the deconstruction material to landfills.

The Kern County Waste Management Department administers or sponsors the following recycling programs that contribute towards meeting the State-mandated solid waste diversion goals:

- Recycling programs at landfills to recycle or divert a wide variety of products, such as wood waste, cathode ray tubes, tires, inert materials, appliances, etc.
- Kern County and the City of Bakersfield operate drop-off recycling centers for household recyclables located within the unincorporated metropolitan area and within the City. County and City drop-off recycling centers may be used by both County and City residents.
- Financial assistance for the operation of the City of Bakersfield Green Waste Facility.
- Kern County Special Waste Facility provides disposal of household hazardous waste services to all Kern County residents.
- Cosponsors semi-annual Bulky Waste Collection Events, which are held in the Bakersfield area and are available to both County and City residents.
- Participates, jointly with the City of Bakersfield, on a Christmas Tree Recycling campaign.
- Cosponsors, jointly with the Community Clean Sweep, a Telephone Book Recycling program.
- Sponsors the Community Clean Sweep to conduct summer workshops called "Trash to Treasure", which educates children on recycling and other Kern County Waste Management Department programs.
- Operates, in collaboration with the Community Clean Sweep, an innovative elementary school education program called "Clean Kids Hit the Road Puppet Show".
- Provides recycling trailers to churches, schools and non-profit organization.

Solid waste generated from the proposed Project would be collected by solid waste hauler Price Environmental Services, Inc. For additional details regarding solid waste services, refer to Appendix J, Public Services Report.

Landfills

Refuse collected by the franchise hauler is transported to one of two landfills, the Metropolitan Bakersfield Sanitary Landfill (MBSL) at Bena, located approximately 18 miles east of downtown Bakersfield, or Shafter-Wasco Sanitary Landfill. The Kern County Waste Management Department (KCWMD) opened the MBSL in 1992.

According to the City of Bakersfield Solid Waste Division, refuse from the proposed Project would be deposited at the Bena Landfill located at 2951 Neumarkel Road in Caliente, California and the Shafter-Wasco Sanitary Landfill located at 17621 Scofield Avenue in Shafter, California. Refuse collection services for the proposed Project is operated and managed by Price Environmental Services, Inc.

Bena Landfill has reported the remaining capacity at 22,174,654 tons and the landfill is projected to accommodate solid waste for 26.8 years and is currently scheduled for closure in 2038. Shafter-

Wasco Landfill has reported the remaining capacity at 3,671,755 tons and is projected to accommodate solid waste for 16.4 years.

Should the California Integrated Waste Management Board (CIWMB) grant additional permits to develop the remainder of the site and waste diversion stabilizes at 50 percent, the potential total capacity for the Bena Landfill site exceeds 60 years. The Shafter-Wasco Sanitary Landfill is estimated to reach capacity by July 2024.

Electrical Services

Most of the County's electrical energy is consumed by residential, commercial, industrial, agricultural, and transportation uses. Electric power supply and distribution for the proposed Project area is furnished by Pacific Gas & Electric (PG&E). Two PG&E substations, Old River Substation and Panama Substation presently serve the proposed Project area. Existing PG&E electrical distribution facilities are located on the south side of DiGiorgio Road, on the northeast side of SR-99, along the north side of Houghton Road, and on the west side of South Union Avenue with a little intrusion into the area from South Union Avenue and Houghton Road.

Four pole-mounted electrical transformer locations were observed on the proposed Project site. PG&E is the owner of the transformers and should be contacted for their removal prior to Project site development.

Natural Gas

Natural gas is primarily consumed by the City's residential land uses for heating and cooking purposes. The entire proposed Project site is within PG&E's service territory; therefore, natural gas will be provided by PG&E. Currently, there is approximately 5,000 linear feet of PG&E Transmission Line 300B located in the northeast corner of the proposed Project. There is also a six-inch diameter gas distribution line located on the east side of the proposed Project.

4.17.3 Regulatory Setting

At the federal level, the United States Environmental Protection Agency (U.S. EPA) promulgates regulations that protect surface waters under the Water Pollution Control Act Amendments of 1972, commonly referred to as the Clean Water Act. These federal regulations, published in the Federal Register and codified in Code of Federal Regulations Title 40, establish wastewater treatment policies, effluent requirements for surface water disposal, and requirements for biosolids management and disposal. Regulations also set forth pretreatment requirements for preventing pollutants from entering publicly owned treatment works at levels that could interfere with treatment operation or solids management.

Federal

Clean Water Act (CWA)

At the federal level, the United States Environmental Protection Agency (U.S. EPA) promulgates regulations that protect surface waters under the Water Pollution Control Act Amendments of 1972,

commonly referred to as the Clean Water Act. These federal regulations, published in the Federal Register and codified in Code of Federal Regulations Title 40, establish wastewater treatment policies, effluent requirements for surface water disposal, and requirements for biosolids management and disposal. Regulations also set forth pretreatment requirements for preventing pollutants from entering publicly owned treatment works at levels that could interfere with treatment operation or solids management.

Safe Drinking Water Act

The Safe Drinking Water Act of 1974 (SDWA) gave the U.S. EPA the authority to set standards for contaminants in drinking water supplies. The U.S. EPA was required to establish primary regulations for the control of contaminants that affected public health and secondary regulations for compounds that affect the taste, odor, and aesthetics of drinking water. Under the provisions of SDWA, the California Department of Health Services (DHS) has primary enforcement responsibility. Title 22 of the California Administrative Code establishes DHS authority and stipulates State drinking water quality and monitoring standards.

State

California Department of Resources Recycling and Recovery (CalRecycle) Formerly California Integrated Waste Management Board (CIWMB)

CalRecycle is the State agency designated to oversee, manage, and track California's 76 million tons of waste generated each year. It is one of the six agencies under the umbrella of the California Environmental Protection Agency. CalRecycle develops regulations to control and manage waste, for which enforcement authority is typically delegated to the local government. The board works jointly with local government to implement regulations and fund programs.

Assembly Bill (AB) 939 and Senate Bill (SB) 1016

The California Integrated Waste Management Act of 1989, or Assembly Bill (AB) 939, established the Integrated Waste Management Board, required the implementation of integrated waste management plans, and mandated that local jurisdictions divert at least 50 percent of all solid waste generated (from 1990 levels), beginning January 1, 2000, and divert at least 75 percent by 2010. Projects that would have an adverse effect on waste diversion goals are required to include waste diversion mitigation measures to assist in reducing these impacts to less-than-significant levels. With the passage of Senate Bill (SB) 1016 (the Per Capita Disposal Measurement System) in 2006, only per capita disposal rates are measured to determine if a jurisdiction's efforts are meeting the intent of AB 939.

Assembly Bill (AB) 341

In response to reducing commercial solid waste that is landfilled, the State Legislature passed AB 341 declaring that it is the policy goal of the State that not less than 75 percent of solid waste generated be source separated, reduced, recycled, or composted by the year 2020. AB 341 sets forth the requirements of the statewide mandatory commercial recycling program which defines that a business, including any commercial or public entity, generating four cubic yards or more of commercial solid waste per week are required to recycle. Businesses are required to take one or any

combination of the following actions in order to reuse, recycle, or otherwise divert solid waste from disposal:

- Subscribe to a source separated recycling service with a regional franchise hauler authorized to provide service for the area in which the business is located;
- Subscribe to a mixed solid waste recycling service with a regional franchise hauler authorized to provide service for the area in which the business is located;
- Self-recycle and certify compliance with Kern County Ordinance No. G-8337.

Assembly Bill (AB) 1826

AB 1826, created to drive the recycling of yard trimmings and food scraps, became effective April 2016. The bill requires businesses generating a specified amount of organic solid waste per week to arrange for recycling for that material. This bill will also require the contract or work agreement between a business and a gardening or landscaping service to require the organic waste generated by those services to comply with the requirements of the law. Business within the County would be required to comply with any codes/regulations promulgated from AB 1826.

California Green Building Standards Code

Construction- and demolition-generated (C&D) waste is heavy, inert material. This material creates significant problems when disposed of in landfills. Since C&D debris is heavier than paper and plastic, it is more difficult for counties and cities to reduce the tonnage of disposed waste. For this reason, C&D waste debris has been specifically targeted by the State of California for diversion from the waste stream.

The California Green Building Standards Code (Standards Code) will apply to the construction related activities of this project. The purpose of the Standards Code is to improve public health, safety, and general welfare by enhancing the design and construction of buildings using building concepts that have a positive environmental impact and encouraging sustainable construction practices. Provisions of the Standards Code shall apply to the design and construction of building structures subject to State regulation.

Per Code Section 708.3 – Construction Waste Reduction, Disposal, and Recycling of the Standards Code, a commercial entity is to recycle and/or salvage for reuse a minimum of 50 percent of the nonhazardous construction and demolition debris, or meet a local construction and demolition waste management ordinance, whichever is more stringent.

State Water Resources Control Board

The National Pollution Discharge Elimination System (NPDES) was established per the 1972 amendments to the Federal Water Pollution Control Act, or CWA, to control discharges of pollutants from point sources (Section 402). Amendments to the CWA created a new section to the Act, which is devoted to stormwater permitting (Section 402[p]), with individual states designated for administration and enforcement of the provisions of the CWA and the NPDES permit program. The SWRCB issues both general construction permits and individual permits under this program.

Biosolids generated during wastewater treatment are regulated by the State under SWRCB Water Quality Order No. 2004-0012-DWQ, titled the "Final General Waste Discharge Requirements for Land Application of Biosolids for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and Land Reclamation Activities." This order, implemented under the federal biosolids rules set forth in 40 CFR Part 503, applies to all land application of Class A and Class B biosolids as well as "exceptional quality" biosolids-derived mixtures consisting of 50% or more biosolids. The order establishes permitting, monitoring, and reporting requirements. Local ordinances, described below, would also regulate the disposal of biosolids in Kern County.

Central Valley Regional Water Quality Control Boards

The primary responsibility for the protection of water quality in California rests with the State Water Resources Control Board (SWRCB) and nine regional water quality control boards (RWQCBs). The SWRCB sets Statewide policy for the implementation of State and Federal laws and regulations. The RWQCBs adopt and implement Water Quality Control Plans (Basin Plans) that recognize regional differences in natural water quality, actual and potential beneficial uses, and water quality problems associated with human activities. The jurisdiction of the Central Valley RWQCB extends from the Oregon border, over the valley and foothills, through the Central Valley, to the border with Los Angeles County.

California Department of Water Resources (DWR)

The DWR is a department within the California Resources Agency. The DWR is responsible for the State's management and regulation of water usage.

California Water Code Section 13260

California Water Code Section 13260 requires any person who discharges waste, other than into a community sewer system, or proposes to discharge waste that could affect the quality of waters of the State, to submit a report of waste discharge to the applicable RWQCB. Any actions of the proposed Project that would be applicable under California Water Code Section 13260 would be reported to the Central Valley Regional Water Quality Control Boards (Central Valley RWQCB).

Porter-Cologne Water Quality Control Act

The Porter Cologne Act, passed in 1969, acts in concert with the Federal CWA. The act established the SWRCB and divided the State into nine regions, each overseen by an RWQCB. The SWRCB is the primary State agency responsible for protecting the quality of the State's surface and groundwater supplies; however, much of its daily implementation authority is delegated to the nine RWQCBs. The Project Area is under the jurisdiction of the Central Valley RWQCBs.

The Porter Cologne Act provides for the development and periodic review of water quality control plans (basin plans) that designate beneficial uses of California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters. Basin plans are primarily implemented by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met. Basin plans, updated every three years, provide the technical basis for determining waste discharge requirements, taking enforcement actions, and evaluating clean water grant proposals. The act also assigns responsibility for implementing CWA Sections 401, 402, and

303(d) to the SWRCB and RWQCBs. There are two basin plans in the Central Valley RWQCB region, the Water Quality Control Plan for the Sacramento and San Joaquin Rivers and the Water Quality Control Plan for the Tulare Lake Basin.

Assembly Bill (AB) 1881

AB 1881 expanded previous legislation related to landscape water use efficiency. AB 1881, the Water Conservation in Landscaping Act of 2006, enacted landscape efficiency recommendations of the California Urban Water Conservation Council (CUWCC) for improving the efficiency of water use in new and existing urban irrigated landscapes in California. AB 1881 required the DWR to update the existing Model Local Water Efficient Landscape Ordinance and local agencies to adopt the updated model ordinance or an equivalent. The law also requires the California Energy Commission to adopt performance standards and labeling requirements for landscape irrigation equipment, including irrigation controllers, moisture sensors, emission devices, and valves to reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy or water.

Assembly Bill (AB) 2882

AB was passed in 2008 and encourages public water agencies throughout California to adopt conservation rate structures that reward consumers who conserve water. AB 2882 clarifies the allocation-based rate structures and establishes standards that protect consumers by ensuring a lower base rate for those who conserve water.

Sustainable Groundwater Management Act of 2014

In 2014, California enacted the Sustainable Groundwater Management Act (SGMA; Water Code Section 10720 et seq.). SGMA, and related amendments to California law, require that all groundwater basins designated as high or medium priority in the DWR California Statewide Groundwater Elevation Monitoring (CASGEM) Program, and that are subject to critical overdraft conditions, must be managed under a new Groundwater Sustainability Plan (GSP) or a coordinated set of GSPs, by January 31, 2020. High or medium priority basins that are not subject to a critical overdraft must be regulated under one or more GSPs by 2022. Where GSPs are required, one or more local Groundwater Sustainability Agencies (GSAs) must be formed to implement applicable GSPs. A GSA has the authority to require registration of groundwater wells, measure and manage extractions, require reports and assess fees, and to request revisions of basin boundaries, including establishing new subbasins. GSAs must have been formed for high and medium priority basins by June 2017. All of the Kern County Subbasin has been included in exclusive GSA's as mandated by SGMA.

The 2.8 million acres of valley portion of Kern County has been designated a high priority and the 250,000 acres of the Indian Wells Valley sub-basin which includes the City of Ridgecrest and China Lake Naval Weapons Station has been classified a medium priority basin. Both are under mandatory requirements to form a GSA (or multiple GSA's) and create a GSP that achieves sustainability in 20 years.

Each GSP must include a physical description of the covered basin, such as groundwater levels, groundwater quality, subsidence, information on groundwater-surface water interaction, data on

historical and projected water demands and supplies, monitoring and management provisions, and a description of how the plan will affect other plans, including city and county general plans Under the Act, the GSA is authorized to restrict pumping, levy assessments and fees and undertake water quality and quantity projects to rebalance the basin. The DWR must adopt regulations for the preparation of a GSP by January 2016. Emergency regulations for the preparation of the GSP's were approved by the California Water Commission on May 18, 2016. As defined by the Act, "sustainable groundwater management" means that groundwater use within basins managed by a GSP will not cause any of the following "undesirable results:" (a) chronic lowering of groundwater levels (not including overdraft during a drought, if a basin is otherwise managed); (b) significant and unreasonable reductions in groundwater storage; (c) significant and unreasonable seawater intrusion; (d) significant and unreasonable degradation of water quality; (e) significant and unreasonable land subsidence; and (f) surface water depletions that have significant and unreasonable adverse impacts on beneficial uses (Water Code Section 10721(w)).

Kern County is a member of the following GSA's: Cuyama Basin Groundwater Sustainability Agency, Indian Wells Valley Groundwater Authority and Kern Groundwater Authority which manages a portion of the valley sub-basin. The Valley portion of Kern County also is managed by the Kern River Groundwater Sustainability Agency which is comprised of the City of Bakersfield, Kern Delta Water District and Improvement District No. 4 of the Kern County Water Agency. An additional nine GSA's have been formed to sustainably manage their respective portions of the Kern County subbasin.

Note: Effective December 11, 2018, the County of Kern withdrew from the Kern Groundwater Authority. The Kern County Water Agency (KCWA) was brought in as a cooperative member of Joint Powers Agreement to manage the white spaces. Five GSA's are preparing GSP's to manage the Kern subbasin per a Kern County Subbasin Coordination Agreement.

Recycled Water Policy

On February 3, 2009, by Resolution No. 2009-0011, the SWRCB adopted a Recycled Water Policy in an effort to move towards a sustainable water future. In the Recycled Water Policy states "we declare our independence from relying on the vagaries of annual precipitation and move towards sustainable management of surface waters and groundwater, together with enhanced water conservation, water reuse and the use of stormwater."

The following goals were included in the Recycled Water Policy:

- Increase use of recycled water over 2002 levels by at least one million acre-feet per year by 2020 and at least two million acre-feet per year by 2030.
- Increase the use of stormwater over use in 2007 by at least 500,000 acre-feet per year by 2020 and at least one million acre-feet per year by 2030.
- Increase the amount of water conserved in urban and industrial areas by comparison to 2007 by at least 20 percent by 2020.
- Included in these goals is the substitution of as much recycled water for potable water as possible by 2030.

The Recycled Water Policy provides direction to the RWQCBs regarding issuing permits for recycled water projects, addresses the benefits of recycled water, addresses a mandate for use of recycled water and indicates the SWRCB will exercise its authority to the fullest extent possible to encourage the use of recycled water.

The Recycled Water Policy also indicates that some groundwater basins contain salts and nutrients that exceed or threaten to exceed water quality objectives established in basin plans and states that it is the intent of this Recycled Water Policy that all salts and nutrients be managed on a basin-wide or watershed-wide basis through development of regional or sub-regional management plans. Finally, the Recycled Water Policy addresses the control of incidental runoff from landscape irrigation projects, recycled water groundwater recharge projects, anti-degradation, control of emerging constituents and chemicals of emerging concern and incentives for use of recycled water.

In accordance with the provisions of the Recycled Water Policy, a Constituents of Emerging Concerns (CEC) Advisory Panel was established to address questions about regulating CECs with respect to the use of recycled water. The CEC Advisory Panel's primary charge was to provide guidance for developing monitoring programs that assess potential CEC threats from various water recycling practices, including groundwater recharge/reuse and urban landscape irrigation. On June 25, 2010, the CEC Advisory Panel provided recommendations to the SWRCB and California Department of Public Health in their Final Report "Monitoring Strategies for Chemicals of Emerging Concern in Recycled Water – Recommendations of a Scientific Advisory Panel". The SWRCB used those recommendations to amend the Recycled Water Policy in 2013 (SWRCB Resolution No. 2013-003).

The April 2013 amendment provides direction to the RWQCBs on monitoring requirements for CECs in recycled water. The monitoring requirements pertain to the production and use of recycled water for groundwater recharge reuse by surface and subsurface application methods, and for landscape irrigation. The amendment identifies three classes of constituents to monitor:

- Human health-based CECs: CECs of toxicological relevance to human health.
- Performance indicator CECs: An individual CEC used for evaluating removal through treatment of a family of CECs with similar physicochemical or biodegradable characteristics.
- Surrogates: A measurable physical or chemical property, such as chlorine residual or electrical conductivity, that provides a direct correlation with the concentration of an indicator compound. Surrogates are used to monitor the efficiency of CEC treatment.

Only groundwater recharge reuse facilities will be required to monitor for CECs and surrogates. Surface application and subsurface application facilities will have different mandatory CECs and a different monitoring schedule. Monitoring is not required for recycled water used for landscape irrigation projects that qualify for streamlined permitting unless monitoring is required under the adopted salt and nutrient management plan. Streamlined permitting projects must meet the criteria specified in the Policy including: compliance with Title 22, application at agronomic rates, compliance with any applicable salt and nutrient management plan, and appropriate use of fertilizers.

Senate Bills 610 (Chapter 643, Statutes of 2001) and 221 (Chapter 642, Statutes of 2001)

SB 610 and SB 221 are companion measures that seek to promote more collaborative planning among local water suppliers and cities and counties. They require that water supply assessments occur early in the land use planning process for all large-scale development projects. If groundwater is the supply source, the required assessments must include detailed analyses of historic, current, and projected groundwater pumping and an evaluation of the sufficiency of the groundwater basin to sustain a new project's demands. They also require an identification of existing water entitlements, rights, and contracts and a quantification of the prior year's water deliveries. In addition, the supply and demand analysis must address water supplies during single and multiple dry years presented in 5-year increments for a 20-year projection. Under SB 221, approval by a county of a subdivision of more than 500 homes requires an affirmative written verification of a sufficient water supply.

California Water Conservation Executive Orders

Beginning in January 2014, Governor Jerry Brown issued three Executive Orders (EOs), B-26-14, B-28-14, B-29-15, B-37-16, and B-40-17 regarding water supply, water demand, and water use within the State during severe drought conditions. EO B-29-15, issued April 1, 2015, sets limitations not only for existing land uses and water supply systems, but also for new construction. Some of these restrictions include:

- The Water Board shall prohibit irrigation with potable water of ornamental turf on public street medians. (EO B-29-15, Save Water, Action #6)
- The Water Board shall prohibit irrigation with potable water outside of newly constructed homes and buildings that is not delivered by drip or microspray systems. (EO B-29-15, Save Water, Action #7)
- The California Energy Commission shall adopt emergency regulations establishing standards that improve the efficiency of water appliances, including toilets, urinals, and faucets available for sale and installation in new and existing buildings. (EO B-29-15, Increase Enforcement Against Water Waste, Action #16)

In addition, EO B-29-15 requires that DWR update the State Model Water Efficient Landscape Ordinance through expedited regulation by the end of 2015. This ordinance will increase water efficiency standards for new and existing landscapes through more efficient irrigation systems, greywater usage, on-site stormwater capture, and by limiting the portion of landscapes that can be covered in turf (EO B-29-15, Increase Enforcement Against Water Waste, Action #11).

On November 13, 2015, Governor Brown issued EO B-36-15, which upheld the previous EOs, and directed the SWRCB to extend of urban water use restrictions through October 31, 2016 based on drought conditions known through January 2016. The SWRCB issued Emergency Regulations on February 2, 2016, in compliance with EO B-36-15. These emergency regulations maintain the current tiers of required water reductions; however, additional adjustments in response to stakeholders; equity concerns were included in the Emergency Regulations.

In addition, DWR and the U.S. Bureau of Reclamation finalized the 2016 Drought Contingency Plan that outlines State Water Project and Central Valley Project operations from February through November 2016. The 2016 Drought Contingency Plan was developed in coordination with staff from State and federal agencies. The 2016 Drought Contingency Plan communicates overarching goals for 2016 water management and the potential operations needed to achieve those goals.

In May 2016, Governor Brown issued EO B-37-16, which upheld the previous EOs, and directs local agencies to provide new permanent water use targets for each urban water supplier and concrete improvements to drought preparedness. The order bolstered the State's drought resilience and preparedness by establishing longer-term water conservation measures that include permanent monthly water use reporting, new urban water use targets, reducing system leaks and eliminating clearly wasteful practices, strengthening urban drought contingency plans and improving agricultural water management and drought plans. Local agencies are required to publicly disclose the projections and calculations used to determine their conservation standards, and to continue monthly water conservation reporting. EO B-37-16 calls for wise water use and less water waste to become permanent changes to prepare for more frequent and persistent periods of limited water supply. On April 7, 2017, EO B-40-17 lifted the drought emergency in all California counties except Fresno, Kings, Tulare, and Tuolumne counties. EO B-40-17 builds on EO B-37-16, which continues to remain in effect, to continue to make water conservation a way of life in California.

Local

Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan Public Services and Facilities Elements include relevant goals and policies related to utilities. Refer to Table 4.17-1, *Metropolitan Bakersfield General Plan Goals and Policies for Utilities*, below.

Table 4.17-1. Metropolitan Bakersfield General Plan Goals and Policies for Utilities
Goals and Policies: Public Services and Facilities Element
General Utilities
Policy #5: Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent.
Water Distribution
Goal #1: Ensure the provision of adequate water service to all developed and developing portions of the planning area.
Policy #3: Require that all new development proposals have an adequate water supply available.
Sewer Services
Goal #3: Provide trunk sewer availability to and treatment/disposal capacity for all metropolitan urban areas, to enable cessation or prevention of the use of septic tanks where such usage crates potential public health hazards or may impair groundwater quality, and to assist in the consolidation of sewerage systems. Provide sewer service for urban development regardless of jurisdiction.
Solid Waste
Goal #1: Ensure the provision of adequate solid waste disposal services to meet the demand for these services in the Planning area.

Table 4.17-1. Metropolitan Bakersfield General Plan Goals and Policies for Utilities
Goals and Policies: Public Services and Facilities Element
Storm Drainage
Goal #1: Ensure the provision of adequate storm drainage facilities to protect Planning area residents from flooding resulting from stormwater excess.
Street Lighting
Goal #1: Provide uniform and adequate public lighting for all developed and developing portions of the Planning area.
Policy #4: Require developers to install street lighting in all new development in accord with adopted city standards and county policies.

4.17.4 Impacts and Mitigation Measures

Thresholds of Significance

The Kern County California Environmental Quality Act (CEQA) Implementation Document and Kern County Environmental Checklist state that a project could potentially have a significant effect if it:

- Exceeds wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- Requires or results in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which would cause significant environmental effect;
- Requires or results in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Has insufficient water supplies available to serve the Project from existing entitlement and resources and new or expanded entitlement is needed;
- Results in a determination by the wastewater treatment provider which serves or may serve the Project that it does not have adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments;
- Is served by a landfill that does not have sufficient permitted capacity to accommodate the Project's solid waste disposal needs; and/or
- Does not comply with federal, state, and local statues and regulations related to solid waste.
- Exceeds the capacity of the electrical and natural gas facilities within the project area.

Impact 4.17-1: The Project Would Exceed Wastewater Treatment Requirements of the Applicable Regional Water Quality Control Board.

With the future urban development of the site, the proposed Project would result in an increase in wastewater in the form of stormwater runoff. The discharge of materials other than stormwater from a particular site is prohibited. With urban development projects, the pollutants of concern include silt and sediment, oil and grease, floatable trash, nutrients (including fertilizers), heavy metals, pathogens

(such as coliform bacteria) and other substances. Referred to as "controlled pollutants", discharge of these substances into waters of the United States, are prohibited.

Future proposed developments that involve grading and construction would contribute to an increase in pollution discharge. Individual development projects would be required to mitigate short-term construction impacts pursuant to the National Pollutant Discharge Elimination System (NPDES) criteria and standards on a project-by-project basis. The purpose of the NPDES permit is to ensure the Project area will eliminate or reduce construction-related sediments and pollutants during stormwater runoff. Construction sediment erosion can be adequately controlled through the application of standard construction Best Management Practices (BMPs). The goal of BMPs is to capture and treat "first flush" stormwater run-off generated by surrounding and on-site watersheds. Water quality management BMPs for grading and construction scenarios may include the use of sand bags and straw bales for run-off diversion and velocity reduction, mulch topping, hydro-seeding and siltation fencing to prevent soil loss and measures to minimize vehicular leaking and spilling. Implementation and compliance with the NPDES requirements would reduce construction-related impacts to water quality to less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.17-2: The Project Would Require or Result in the Construction of New Water or Wastewater Treatment Facilities or Expansion of Existing Facilities, the Construction of Which Would Cause Significant Environmental Effects.

The implementation of the proposed Project would result in the generation of wastewater on the property. The proposed Project is located outside of the Metropolitan Bakersfield boundary and is not served by a sewer system. The proposed Project would require the construction of a new wastewater package plant facility that could cause significant environmental effects. Based on the wastewater generation rate for general commercial and industrial uses utilized by the County of Kern, the proposed Project would result in the generation of a normal, unpeaked flow of approximately 1.46 million gallons per day, with a peak flow maximum generation of approximately 2.91 million gallons per day of wastewater. Implementation of applicable mitigation measures would reduce impacts to less than significant.

Additional infrastructure would be required to accommodate the proposed Project. A water service line would be extended from an existing 12" Cal Water main located on the east side of Wible Road at the intersection with Engle Road (CR 918), then east along an alignment along the section line, currently a disturbed unimproved dirt dairy access road within the County's road reservation, to the intersection of S. H St. and DiGiorgio Road (CR 704), then continue east and across S.R. 99 to the northwest corner of the proposed project site along DiGiorgio Road. If needed by Cal Water, a second water main extension would begin at the current end of the 12" water main located on the south side of Shafter Road at the east side of the General Shafter Elementary School, continue east along Shafter

Road in an existing right-of-way to the intersection with Costajo Road, then continue east and across S.R. 99 to the intersection with Chevalier Road in existing right-of-way, then continue north in existing right-of-way to the south side of the proposed project north of Houghton Road. A treated water service line would be constructed from the southwest corner of the proposed WWTP westerly under S.R. 99, continuing to the Kern Island Canal and the Kern Island Recharge Basins located near the northwest corner of S. H Street and Houghton Road as an outfall location for excess treated recycled water. It should be noted, although the specific volumes are unknown at this time, the developer intends to work with KDWD to accept any unused recycled water for either blending with irrigation canal water for agricultural irrigation or recharging groundwater at the nearby groundwater recharge basin. This would not require any new infrastructure beyond that already analyzed in the RDEIR but would assist in groundwater recharge.

As development progresses within the Project site water distribution infrastructure would be installed. Water infrastructure within the interior of the proposed Project would occur in areas that would be disturbed as part of the Project and none of these improvements would have an effect on an environmental resource beyond those disclosed in any other section of this RDEIR. The proposed improvements would be required to comply with all applicable development standards required by Kern County. This would ensure that impacts associated with the expansion of water facilities would be less than significant.

Mitigation Measures

MM 4.17-1: All special equipment for the proposed Project, such as package treatment plants, their appurtenances, and their effluent disposal areas and methods shall be designed, located, and constructed in coordination with the Kern County Public Works Department, so as to preclude contamination, pollution, nuisance, and structural and mechanical instability.

MM 4.17-2: **Package Treatment and Disposal Facilities.** Proposals and plans for package treatment and disposal facilities shall be subject to the review and approval of:

1. The State and County Environmental Health Services Departments for design and contamination aspects;

2. The Regional Water Quality Control Board for elements of pollution and nuisance; and

3. The Kern County Public Works Department for structural and mechanical integrity. Special structures, such as pump stations, pressure lines and sags, etc. shall be subject to the approval of the Kern County Public Works Department and the maintaining District.

MM 4.17-3: **Wastewater Package Plant Facility.** The new wastewater package plant facility shall be constructed according to State specifications, with coordination of Kern County Public Works and Kern County Environmental Health Services Departments and shall be operated in such a way as to not contaminate the underlying unconfined aquifer.

MM 4.17-4: **Water System.** All facilities of the water system shall be designed and constructed to comply with Kern County Development Standards and approved by the Kern County Public Works Department.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.17-3: The Project Would Require or Result in the Construction of New Stormwater Drainage Facilities or Expansion of Existing Facilities.

The development of industrial uses and associated landscaping and roadways would alter the drainage pattern within the proposed Project site through the introduction of impervious surfaces. Water that is anticipated to drain off-site would be required by the County to drain to storm drain structures, including detention or retention basins. Drainage collection facilities within the proposed Project would be constructed as development occurs and would be designed in accordance with local improvement standards and specifications. A stormwater drainage study may be needed to determine the size of a retention basin and optimal pipeline sizes that are needed to accommodate stormwater from the proposed project. This master drainage system would be designed to contain on-site waters within conveyance structures by appropriate means and that are acceptable to Kern County. Drainage waters shall be prevented from flowing onto adjacent properties or topping over the street system. Site improvement standards for drainage areas would be determined by the County of Kern as a function of the Precise Development Plan, Conditional Use Permit, or land division procedure. This would ensure that all drainage facilities are designed to accommodate runoff stormwater.

Mitigation Measures

Implementation of Mitigation Measure MM 4.7-8, as described in Section 4.7, *Geologic and Seismic Hazards Implement*

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.17-4: The Project Would Have Insufficient Water Supplies Available to Serve the Project from Existing Entitlement and Resources and New or Expanded Entitlement is Needed.

Kern Delta Water District (KDWD) supplies surface water for agricultural irrigation from the Kern Island Canal via an irrigation ditch. The project site has two agricultural wells that supply groundwater. It is estimated that 50% of the irrigation supply is from wells and the other 50% from KDWD surface waters. These sources; however, would not serve the Project site with domestic water. The proposed Project would be served by the Cal Water Bakersfield District upon approval of the application to the CPUC for the service extension to the Project site. Water supply for the District comes from groundwater; untreated local surface water purchased from the City of Bakersfield and treated by Cal Water; and treated local surface water and imported water purchased from KCWA.

Past water demand within the District was calculated between 2015 to 2017 based on seven use categories that included single family, multi-family, commercial, industrial, institutional/ governmental, other, and loses. In 2015 total system demand was 55,033 AFY, and 57,559 AFY, and 62,218 AFY, in 2016 and 2017, respectively. It should be noted that in May of 2015, the Emergency Regulations adopted by the State Water Resources Control Board were in effect and later extended by Executive Order B-37-16. The Bakersfield District was ordered to reduce potable water use by 32 percent over this period and reduced water use approximately by approximately 32.1 percent. However, in 2017 with the end of the drought water use increased at a greater percentage than the year before by approximately 4,659 AFY compared to 2,526 AFY.

Projected water uses within the District is predicated on unrestricted demands under normal weather conditions and is shown in Table 4.17-2 *Bakersfield District Projected Water Demand*, through 2040. Projected water demands are based on customer category and are estimated based on anticipated demand of future services that are based on historical growth rates in the District and the UWMP. In addition, anticipated water demand accounts for weather-normalized historical use, adjusted for future expected water savings from water efficiency requirements of plumbing codes and District conservation programs. The projected average annual growth rate in services across all customer categories is approximately 0.9 percent.

Table 4.17-2. Bakersfield District Projected Water Demand

Use	(AFY)				
	2020	2025	2030	2035	2040
Single Family	49,340	52,107	54,974	57,574	60,273
Multi-Family	3,748	3,859	40,020	4,166	4,334
Commercial	11,976	12,209	12,486	12,651	12,825
Industrial	49	50	50	50	50
Institutional/Governmental	6,690	7,281	7,898	8,492	9,130
Other	216	219	221	221	221
Losses	5,763	6,153	6,543	6,892	7,257
Total	**77,781**	**81,878**	**86,191**	**90,019**	**94,088**

Source: Yarne & Associates, 2019

Cal Water determined water use rates for industrial uses similar in classification to those of the proposed Project on a gallon per day per square foot of development (gallons/day/ft2). The WSA evaluated water use rates for industrial businesses that are similar to those that would occur under the proposed Project. The use rates ranged from 0.0042 to 0.1590 gallons/day/ft^2 and result in an average consumption of 0.0816 gallons/day/ft^2. Based on the total proposed Project square footage, 4,101,174, the resulting demand is approximately 334,660 gallons/day

Commercial office space water usage was estimate using a representative office complex at 0.00834 gallons/day/ft2. Because the specific square footage for the commercial component of the proposed Project is not known, the areas were estimated to be 65 % retail (0.20) + 15% restaurants (1.10) + 20% (office space) (0.00834) = 0.297 gallons/day/ft2. This results in an estimated commercial water use for the proposed Project is of 151,720 gallons/day. Taken in sum with the Industrial development the total water use at build out in 2025 would be approximately 486,380 gallons/day or 544.5 AFY.

As indicated in the WSA, prepared by Yarne & Associates, during the 6-year period from 2010 to 2015 the average annual agricultural water demand on the Project site was 977.2 acre-feet per year

(AFY). Existing groundwater recharge on the site is estimated to be, on average, 25% of the irrigated amount. Based on this, the total water lost to evapotranspiration after being applied for irrigation is approximately 732 AFY. Considering the proposed Project, at build out, would use approximately 544.5 AFY, the proposed Project would require approximately 187.5 AFY less water than the existing uses. The following discussion outlines existing and projected future water supplies compared to Project demand.

The 544.5 AFY equates to approximately 0.66% of projected 2025 Bakersfield District demand (81,191 AFY). In 2040, the proposed Project demand would be approximately 0.57% of the projected 2040 Bakersfield District demand (94,088 AFY). In addition, water demand within the District is project to increase by approximate 26,799 AFY between 2015 and 2025 (81,878 - 55,079). The proposed Project would account for approximately 2.0% of that increase.

The proposed Project includes a wastewater treatment facility to meet Title 22 requirements and use recycled water for landscape irrigation and other non-potable uses. The initial irrigation water requirement for landscaped areas of the proposed Project is estimated to be 39 AFY and at project build out would be approximately 86.7 AFY. This would be supplied entirely by recycled water, which would further reduce the proposed Project's water demand.

The effect of substituting recycled water for potable water further reduces the proposed Project's water demand. Conservatively, estimating that the 39 AFY for landscape irrigation are not included in the estimated project build out demand and that later uses substitute recycled water for potable water (47.7 AFY), this would result in a further reduction of water use by the proposed Project compared to existing agricultural. Accordingly, the proposed Project would reduce water demand, by 187.5 AFY + 47.7 = 235.2 AFY.

The proposed project also was evaluated to determine water use for normal year, single dry year, and multiple dry year periods. Table 4.17-3 *Multiple Dry Years Supply and Demand Comparison* shows the projected supply and demand totals for multiple dry years based on the conservative assumption that demand will increase slightly for a 3-year drought period even though the most recent drought experience (2012 – 2016) shows the opposite. Demand in 2015 decreased by 27.6% compared to demand in 2013 as discussed above. Although treated surface water supplies were reduced due to lower quantities of surface runoff and storage, the difference was made up by groundwater. Importantly, due to very effective conservation programs and public responsiveness ground water pumping decreased by 12,109 AF - the amount pumped in 2014 was 45,499 AF and in 2015 it was 33,390 AF.

Table 4.17-3: Multiple Dry Years Supply and Demand Comparison (AF)

		2020	2025	2030	2035	2040
First Year	Supply Totals	79,717	83,915	88,335	92,259	96,429
	Demand Totals	79,717	83,915	88,335	92,259	96,429
	Difference	0	0	0	0	0
Second Year	Supply Totals	79,717	83,909	88,329	92,252	96,422
	Demand Totals	79,717	83,909	88,329	92,252	96,422
	Difference	0	0	0	0	0

Third Year	**Supply Totals**	79,717	82,851	87.215	91,089	95,207
	Demand Totals	79,717	82,851	87,215	91,089	95,207
	Difference	**0**	**0**	**0**	**0**	**0**
Source: Yarne & Associates						

Cal Water coordinates on an ongoing basis with other water agencies in Kern County to optimize use of surface and groundwater water supplies. Cal Water concludes that for the next 21 years (2019 – 2040), the Bakersfield District will have adequate water supplies to meet projected demands associated with the proposed Project and those of all existing customers and other anticipated future customers for normal, single dry year and multiple dry year conditions (Yarne & Associates, 2019). While adequate water supply is anticipated, MM 4.17-4 related to water supply and the following mitigation measure will help ensure water use is within a reasonable range for future Project uses.

MM 4.17-5: **Water Meters.** Water meters shall be installed on all facilities. Once operations of the first facility constructed on-site have commenced, the Master Developer or subsequent future land owners shall be required to submit annual reports to the Kern County Planning Department and the Kern County Environmental Health Services Department detailing the annual water usage on-site.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.17-5: The Project Would Result in a Determination by the Wastewater Treatment Provider Which Serves or May Serve the Project That it Does Not Have Adequate Capacity to Serve the Project's Projected Demand in Addition to the Provider's Existing Commitments.

As noted above, no sewer lines are currently located on-site and no wastewater is conveyed from the proposed Project site. Currently, neighboring residential and commercial properties are served by individual, privately-owned septic systems. A private package sewer treatment plant is proposed to provide services for the Project site. Implementation of applicable mitigation measures and service fees would reduce impacts to water facilities to less than significant levels.

Mitigation Measures

Implement Mitigation Measures MM 4.17-1 through MM 4.17-3.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.17-6: The Project Would be Served by a Landfill That Has Sufficient Permitted Capacity to Accommodate the Project's Solid Waste Disposal Needs.

Implementation of the proposed Project would result in an increase demand for solid waste services and generate additional solid waste disposed of at landfills. As noted above, the City of Bakersfield

Solid Waste Division has indicated that solid waste generated by the proposed Project would go to the Bena Landfill and the Shafter-Wasco Sanitary Landfill. Although C&D waste impacts are short-term and cease upon construction completion, C&D waste disposed of at either landfill would decrease the remaining capacity available. This is considered a potentially significant impact; however, recycling of C&D waste would reduce the amount of waste disposed of at landfills and contribute to the recycling goals set forth by Kern County and AB 939. For any C&D waste disposed of at a landfill, the Kern County Waste Management Department charges a fee of up to $54.50 per ton for the disposal of construction waste. Implementation of the required mitigation measures below would reduce impacts to less than significant in this regard.

Based on an average generation rate for light- and medium-industrial properties of 6 pounds (lb) of refuse per square foot annually, and general commercial/highway commercial properties of 7 lb of refuse per square foot annually, the proposed Project would result in the generation of approximately 37 tons of refuse per day or approximately 13,519 tons per year. The total waste generated during the course of one year of construction (255 working days) is estimated at approximately 12,883 tons, and the daily total is estimated at 50.5 tons (McIntosh & Associates 2017).

As a worst-case situation, it is assumed that all of the project-generated refuse would be deposited at the Bena Landfill. Based on growth projections, 22,174,654 tons of capacity is available at the Bena Landfill, and it is anticipated to have capacity for approximately 26.8 years. Based on the remaining capacity and the anticipated life of the landfill, the average amount of solid waste deposited at the landfill is approximately 827,412 tons per year or 2,267 tons per day over 26.8 years. The solid waste generated by the proposed project would increase refuse deposited at the Bena Landfill by approximately 1.63 percent. This increase in considered a nominal impact on the remaining capacity of the Bena Landfill, and the Landfill would have the available capacity to serve the proposed Project. As identified under Section 4.15, *Public Services*, the proposed Project is subject to the Public Facilities Mitigation Program and mitigation measures have been included that would result in less than significant impacts in this regard.

Mitigation Measures

MM 4.17-6: **Recycling On-Site.** During construction, demolition debris and construction wastes shall be recycled to the extent feasible.

1. An on-site recycling coordinator will be designated by the Project Applicant/ Developer to facilitate recycling of all construction waste through coordination with the on-site contractors, local waste haulers, and/or other facilities that recycle construction/demolition wastes.

2. The name and phone number of the coordinator will be provided to the Kern County Waste Management Department prior to issuance of building permits

3. The on-site recycling coordinator will also be responsible for ensuring that wastes requiring special disposal are handled according to state and County regulations that are in effect at the time of disposal.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.17-7: The Project Would Comply with Federal, State, and Local Statues and Regulations Related to Solid Waste.

Refer to Section 4.11, *Land Use and Planning*, Table 4.11-2, for a brief explanation of how the proposed Project complies with the goals and policies of the Metropolitan Bakersfield General Plan. The proposed Project would be required to comply with all federal, state, and local statues and regulations related to solid waste. Implementation of the required mitigation measures would help local jurisdictions comply with Assembly Bill 939. Therefore, implementation of the proposed Project would result in less than significant impacts in this regard.

Mitigation Measures

Implement Mitigation Measure MM 4.17-6.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.17-8: The Project Would Exceed the Capacity of the Electrical and Natural Gas Facilities Within the Project Area.

Electrical Services

The proposed Project site is currently served by PG&E's Old River Substation and Panama Substation. According to PG&E, based on the rough size of proposed facilities, the proposed Project would result in a demand for approximately 20 Megawatts (Mw); however, more information is needed. Estimates for electric demands are based on the square footages of the proposed facilities. PG&E has indicated the existing electrical facilities are not adequate to accommodate the proposed Project. PG&E anticipates the Project would result in impacts to existing electric facilities, and that the Old River and Panama Substation be overloaded, as well as distribution facilities in the area. These facilities would need to be upgraded and new distribution and substation equipment would be required to serve the proposed Project. Potential impacts may be reduced if main lines adjacent to roadways are brought to the ultimate width at the initiation of proposed Project construction and if utility easements are made readily available as needed; however, more information is needed to determine specifically what will be required.

Construction of the proposed Project would require temporary electrical power supply for certain equipment and lighting. The proposed Project would also require electricity for street lighting along the roadway. County development standards require street lights at intersections, and at mid-block, where streets are greater than 600 feet in length, with the exception of some industrial areas in which street lights are required only at intersections. For new development, the County does not install street lights, thus, the County requires a developer to install lights and dedicate them to the County.

Street lights installed at the proposed Project are expected to be provided by PG&E at the company's Rate Schedule LS-1 Class A rate (LS-1A). In utilizing the LS-1A rate PG&E would install, own, and maintain the entire street lighting system. The connections would be constructed in accordance with the requirements of the County and PG&E. Therefore, implementation of recommended mitigation measures will ensure that adequate electricity is provided to the Project site; therefore, resulting in a less than significant impact.

Natural Gas

As noted above, the entire proposed Project is in PG&E gas service territory. Approximately 5,000 linear feet of PG&E Transmission Line 300B is located in the northeast corner of the proposed Project. According to PG&E, the proposed Project's gas needs will be supplied by the PG&E distribution system, either by the six-inch pipeline located on the east side of the Project site, on the west side of South Union Avenue, or a new distribution line throughout the development from the adjacent regulating stations. The PG&E Transmission Line 300B would not provide natural gas to the proposed Project. The average estimated gas consumption is calculated at 0.5 million cubic feet per hour (MCFH) for every 2,500 square feet of commercial building space. Therefore, the proposed Project would consume approximately 922.60 MCFH of natural gas (0.5 MCFH per 2,500 SF x 4,613,004 SF). PG&E would prefer that the request for service include all gas appliances in order to calculate a more accurate load.

It is anticipated that new distribution pipelines would be required to accommodate the proposed Project. Where necessary, natural gas pipelines would be installed to serve the proposed Project at the expense of the Project Applicant/Developer. The Project Applicant/Developer would be required to consult with PG&E early in the planning stages to ensure adequate facilities are incorporated into the Project design. New connections would be constructed by the proposed Project in accordance with the requirements of the County of Kern and PG&E. PG&E would not allow new users to connect to the existing natural gas facilities unless there is adequate capacity and supplies to accommodate the proposed Project. Implementation of the recommended mitigation measures will ensure that adequate natural gas supplies and facilities exist prior to Project construction; therefore, resulting in a less than significant impact in this regard.

With respect to safety, the on-site transmission pipeline is under high pressure, and like others, has the potential to rupture, resulting in uncontrolled releases of natural gas. A pipeline rupture could result in environment contamination and human health effects in the residential areas, once they are developed. For safety reasons, State regulations prohibit the construction of any structures directly over the pipeline, and a right-of-way (ROW) is usually established. The width of the ROW is negotiated between the property owner and the pipeline operator and usually ranges between 20 to 50 feet. Shared ROWs may span 60 to 70 feet. Vegetation around and over pipelines may be restricted. Compliance with Federal, State and applicable local regulations would reduce future potential impacts health and safety related to pipelines to less than significant levels.

Mitigation Measures

MM 4.17-7: **Electrical Services.** Prior to approval of a Master Precise Development Plan or modification to an existing precise development plan on-site, the Master Developer or future land owner shall coordinate with Pacific Gas and Electric Company

(PG&E) staff early in the planning stages to ensure that adequate facilities are incorporated into the Project design.

1. Prior to issuance of grading and building permits the Project proponent shall coordinate with PG&E staff to determine the specific requirements regarding any potential electric service or facility issues needed to adequately accommodate the proposed Project. The Project proponent shall comply with and adhere to all requirements identified by PG&E to full mitigate impacts to electric services and facilities, as needed as Project construction progresses.

MM 4.17-8: **Natural Gas.** Prior to approval of a Master Precise Development Plan or modification to an existing precise development plan on-site, the Master Developer or future land owner shall coordinate with Pacific Gas and Electric Company (PG&E) staff early in the planning stages to ensure that adequate facilities are incorporated into the Project design.

1. Prior to issuance of grading and building permits the Project proponent shall coordinate with PG&E staff to determine the specific requirements regarding any potential natural gas service or facility issues needed to adequately accommodate the proposed Project. The Project proponent shall comply with and adhere to all requirements identified by PG&E to fully mitigate impacts to natural gas services and facilities, as needed as Project construction progresses.

MM 4.17-9: **PG&E Notification.** The Project proponent shall notify PG&E six months prior to any construction activities in the immediate vicinity of PG&E Transmission Line 300B.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

Significant cumulative impacts to public services would occur if the cumulative projects would overburden the public service agencies and if utility providers were unable to provide adequate services. The cumulative projects would substantially increase the demand for public service providers and utility servers. However, public agencies and utilities have the opportunity to respond to an inquiry for information regarding potential increase in demand on their services. Development fees are assessed on a project-by-project basis to mitigate for the increase in demand on public services and utilities. Incorporation of the mitigation measures would reduce impacts from the proposed Project, in conjunction with other projects in the area, to a less than significant cumulative level.

Mitigation Measures

Implement Mitigation Measures MM 4.17-1 through MM 4.17-9.

Level of Significance after Mitigation

Impacts would be less than significant.

Section 4.18

Wildfire

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Section 4.18
Wildfire

4.18.1 Introduction

The purpose of this section is to identify, to the extent feasible, the potential for wildland fires in connection with the proposed Project site and to identify potential risks to human health, including future residents surrounding the site, users of the proposed Project site, workers and construction workers. A Wildfire Assessment was prepared by McIntosh & Associates in April 2019. See Appendix P, *Wildfire Assessment*.

4.18.2 Environmental Setting

The proposed Project site is undeveloped and is used mainly for agricultural purposes. As discussed in *Section 4.11, Land Use and Planning*, a steel storage building associated with agricultural activities is located in the eastern portion of the site, near South Union Avenue (SR-204). There is one plugged and abandoned oil well located within the proposed Project boundaries (Big McKittrick Oil Company "Sea Cliff-Houghton" 1). In addition, one active, diesel-powered irrigation well, one idle irrigation well, and one domestic well are located on-site. As discussed in *Section 4.9, Hazards and Hazardous Materials*, a Pacific Gas and Electric (PG&E) natural gas transmission pipeline, number L-300B, traverses the site at a diagonal from northwest to southeast. Six pole-mounted electrical transformers (PMT) were observed within and adjacent to the proposed Project boundaries. Existing adjacent land uses include vacant land and agricultural uses to the north, agricultural uses and a small cluster of single-family residential homes to the east, SR-99 to the west, and agricultural uses and an automobile wrecking yard located south/southeast of proposed Project site.

4.18.3 Regulatory Setting

Federal

There are no relevant federal regulations in regard to wildfires.

State

Senate Bill 1241

Senate Bill 1241 requires the legislative body of a city of county to adopt a comprehensive, long-term general plan that includes various elements, including a safety element for the protection of the community from unreasonable risks associated with among other things, wildland and urban fires. The safety element requires for state responsibility areas (SRA), as defined, and very high fire hazard severity zones (FHSZ) as defined in California Government Code (CGC) §51177 & 51178 that is not a SRA, to be updated as necessary to address the risk of fire in these areas pursuant to CGC §65302(g)(3).

California Environmental Quality Act

CEQA, PRC §21000, et seq., was amended in 2018 to address numerous legislative changes to CEQA, to clarify certain portions of existing CEQA Guidelines, and to update the CEQA Guidelines to be consistent with recent court decisions.

Impacts of wildfire to development and a development's contribution to the potential creation of wildfire risk at the Wildland-Urban Interface (WUI) are now addressed as a separate "Environmental Factor" to be addressed in the initial study checklist in Appendix G. The Natural Resources Agency expanded the requirements of SB 1241 to also include development projects "near" the SRA and Very High FHSZs.

California Building Standards Codes

The State of California provides minimum standards for building design through the California Building Code (CBC). The CBC is based on the International Building Code (IBC), which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis) and has been modified to address particular California concerns. The primary codes with respect to development in or near the WUI include the California Building Code, Chapter 7A "Materials and Construction Methods for Exterior Wildfire Exposure" and the California Fire Code, Chapter 49 "Requirements for Wildland-Urban Interface Fire Areas". These codes require what materials are required to be used for construction for any Building Permit submitted after January 1, 2009 within the geographical areas with FHSZs designated as Very High, High, or Moderate in SRA's and Very High within Local Response Areas (LRA). Maps of these areas were developed in 2007 for California and each county.

Local

Kern County Wildland Fire Management Plan

The Kern County Wildland Fire Management Plan documents the assessment of wildland fire situations throughout the SRAs within the County. The Kern County Fire Department Wildland Fire Management Plan provides for systematically assessing the existing levels of wildland protection services and identifying high-risk and high-value areas that are potential locations for costly and damaging wildfires. The goal of the plan is to reduce costs and losses from wildfire by protecting assets at risk through focused pre-fire management prescriptions and increasing initial attack success. Based on this assessment, preventive measures are implemented, including the creation of wildfire protection zones.

Kern County Building and Construction Ordinance (Title 17 of the Ordinance Code of Kern County)

Chapter 17.32 Fire Code

Kern County has adopted, by reference, portions of the California Building Standards Code and the International Fire Code, with modifications and amendments. The

purpose of this code is to prescribe the minimum requirements necessary to establish a reasonable level of fire safety to protect life and property from hazards created by fire, explosion, and dangerous conditions.

The Kern County Fire Code defines a hazardous fire area as any land that is covered with grass, grain, brush, or forest and situated (e.g., in an inaccessible location) so that a fire originating upon such land would present an abnormally difficult job of suppression and would result in great and unusual damage through fire or the resulting erosion.

Chapter 17.34 Wildland-Urban Interface Code

Kern County has adopted, by reference the Urban Wildland Interface Code, published by the International Fire Code Institute, with modifications and amendments. The purpose of this code is to safeguard life and property and maintain public welfare to a reasonable degree by addressing hazards related to wildland fire exposures and fire exposures from adjacent structures, and to prevent structure fires from spreading to wildland fuels.

Metropolitan Bakersfield General Plan (MBGP)

The Metropolitan Bakersfield General Plan cites policies to provide decision-makers with long-range guidance affecting the future character of the Metropolitan Bakersfield planning area. The elements within the Metropolitan Bakersfield General Plan provide goals, policies and implementation measures in order to reduce impacts related to public safety. Applicable wildfire goals and policies relative to the proposed Project are listed in Table 4.18-1, *Metropolitan Bakersfield General Plan Goals and Policies for Wildfires*, below.

Table 4.18-1. Metropolitan Bakersfield General Plan Goals and Policies for Wildfires

Goals and Policies: Public Safety Element
Goal #1: Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry.
Goal #2: Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development of metropolitan police and fire facilities and services.
Goal #3: Provide for the coordinated planning and development of service areas for police and fire protection to ensure an equitable burden of responsibility between County and City in Metropolitan Bakersfield.
Goal #4: Assure that fire, hazardous substance regulation and emergency medical service problems are continuously identified and addressed in a proactive way, in order to optimize safety and efficiency.
Policy #4: Monitor, enforce and update as appropriate all emergency plans as needs and conditions in the Planning area change, including the California Earthquake Response Plan, the Kern County Evacuation Plan, and the City of Bakersfield Disaster Plan.
Policy #6: Promote fire prevention methods to reduce service protection costs and costs to the taxpayer.
Policy #9: Restrict, after appropriate public hearings, the use of fire-prone building materials in areas defined by the fire services as presenting high-conflagration risk.

4.18.4 Impacts and Mitigation Measures

Methodology

The potential impacts associated with the proposed project are evaluated on a qualitative basis through a comparison of existing conditions within the proposed Project site and the anticipated Project effects. The potential for impacts from wildfires would occur if the effect described under the criteria below occurs. The evaluation of Project impacts is based on professional judgment, analysis of the County's hazards/hazardous materials policies, and the significance criteria established by Appendix G of the State CEQA Guidelines, which the County has determined to be appropriate criteria for this Recirculated Draft EIR.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant impact. Such an impact would occur if the proposed Project would:

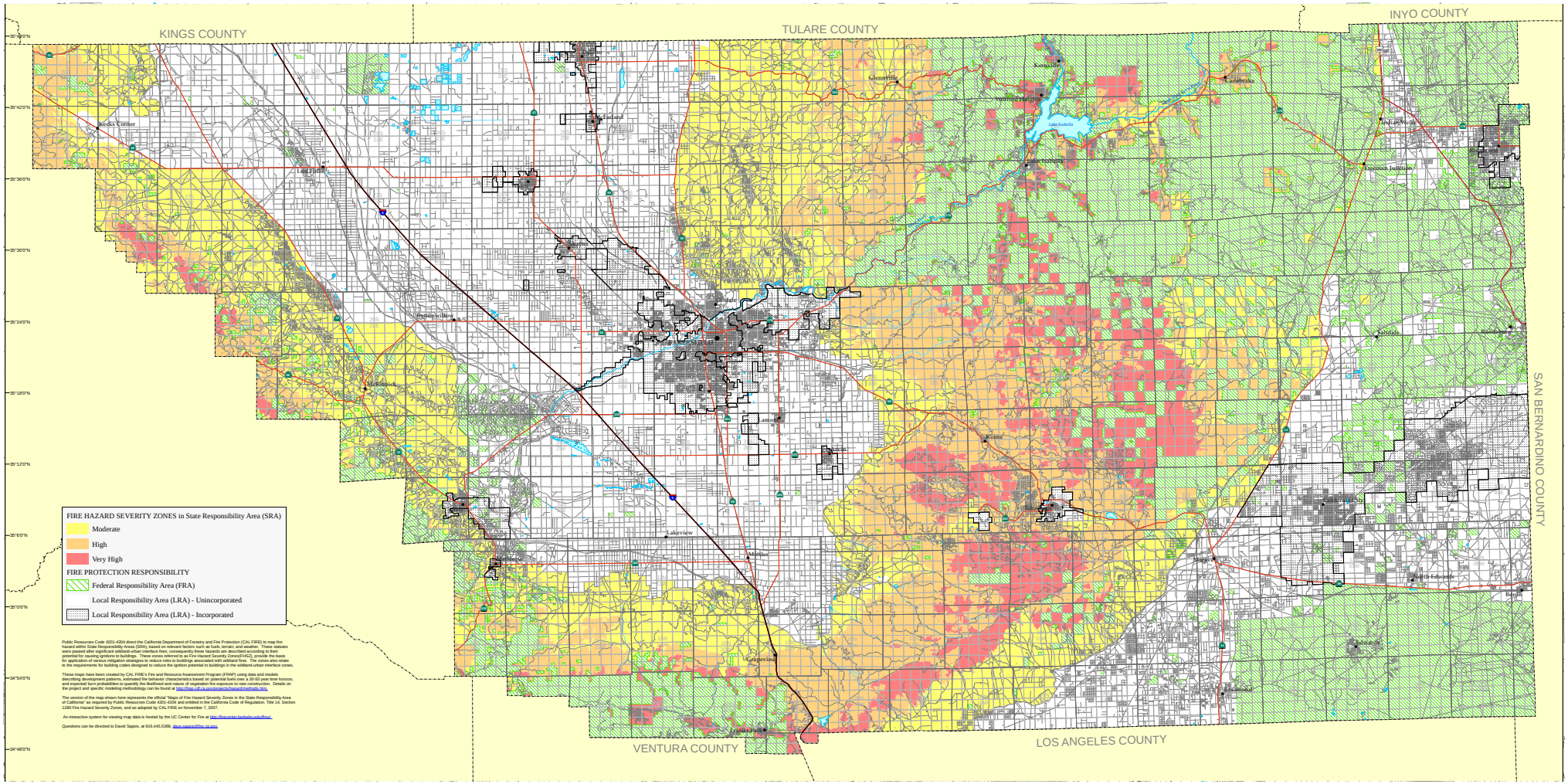
- Substantially impair an adopted emergency response plan or emergency evacuation plan;
- Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire;
- Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment;
- Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

The analysis of the existing environment and the impact analysis indicate that this proposed Project could result in a significant environmental impact if it would result in impacts from wildfires that would, if not mitigated, adversely affect the public health and safety of future residents, surrounding residents and workers.

Project Impacts

Impact 4.18-1: The Project Would Substantially Impair an Adopted Emergency Response Plan or Emergency Evacuation Plan.

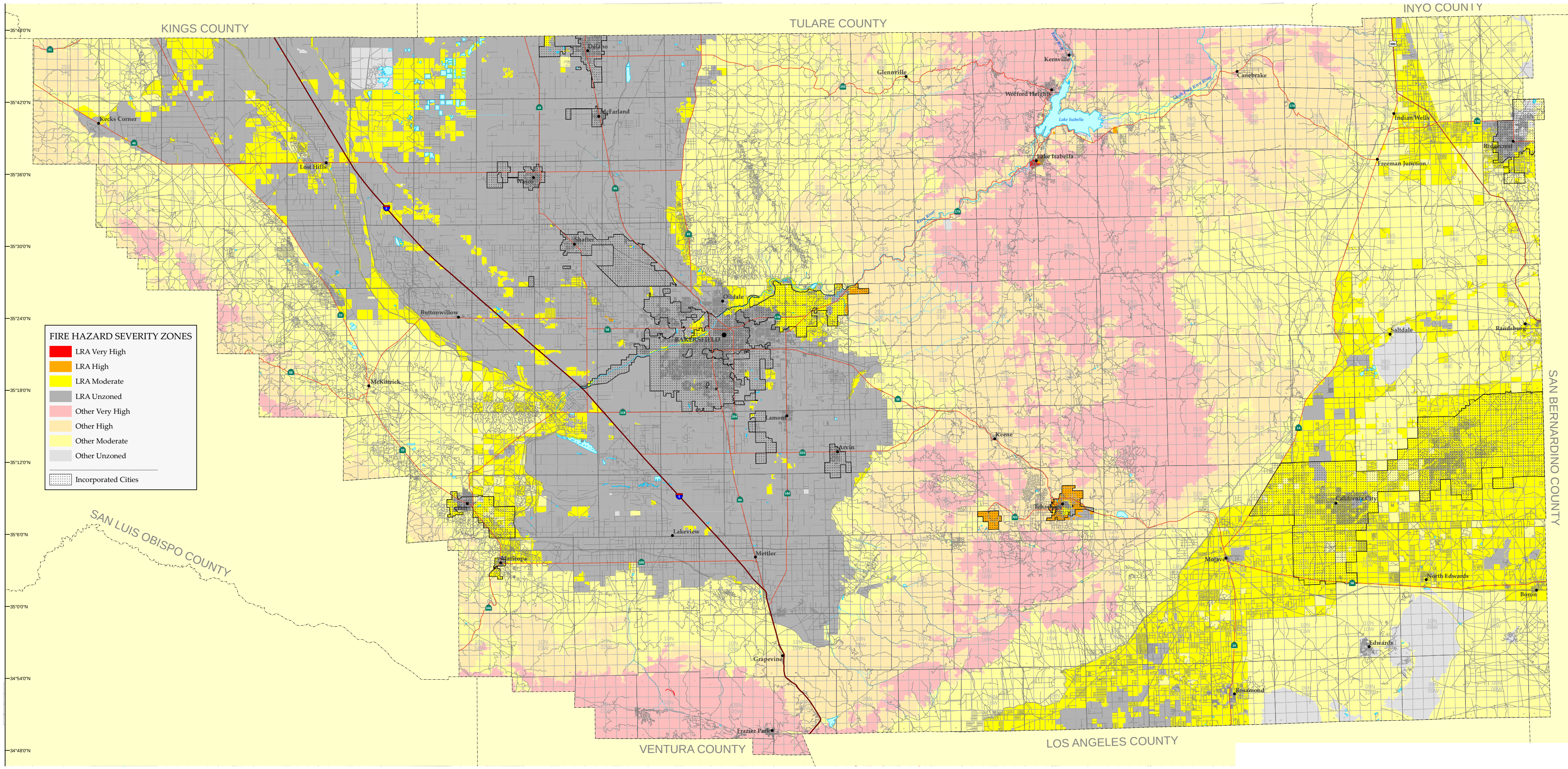
According to the Kern County Wildland Fire Management Plan, the proposed Project is located within the "Valley" Fuel Plan Management Area and the "Agricultural, non-wildland" classification for FHSZ. The Wildfire Assessment prepared by McIntosh & Associates shows that that proposed Project is not located within or adjacent to a SRA or a Very High FHSZ as shown in Figure 4.18-1, *Fire Hazard Severity Zones in SRA* and Figure 4.18-2, *Fire Hazard Severity Zones in LRA*. In



99 HOUGHTON INDUSTRIAL PARK PROJECT
CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07
AGRICULTURAL PRESERVE #13 EXCLUSION

Fire Hazard Severity Zones in SRA

Figure 4.18-1



99 HOUGHTON INDUSTRIAL PARK PROJECT

CUP #5, CUP #6, GPA #1, ZCC #2, MAP 143-07

AGRICULTURAL PRESERVE #13 EXCLUSION

Fire Hazard Severity Zones in LRA

Figure 4.18-2

addition, there is no information in the record to date that indicates the proposed Project would interfere with the operation of any roadway, facility, or area that would be used as part of an emergency response plan or emergency evacuation plan. Thus, impacts would be less than significant and mitigation is not required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.18-2: The Project Would Due to Slope, Prevailing Winds, and Other Factors, Exacerbate Wildfire Risks, and Thereby Expose Project Occupants to, Pollutant Concentrations from a Wildfire or the Uncontrolled Spread of a Wildfire.

The proposed Project site is located adjacent to vacant land and agricultural uses to the north, agricultural uses and a small cluster of single-family residential homes to the east, SR-99 to the west, and agricultural uses and an automobile wrecking yard located south/southeast of proposed Project site. The on-site topography is flat. According to windrose data for the Project area, wind generally travels from the northwest and travels at 8.05 miles per hour (NRCS, 2003). Therefore, the general wind patterns toward the Project site are from other agricultural sites that would not be susceptible to wildland fires. This fact would reduce the impact to the Project site from the uncontrolled spread of wildfire. In addition, the proposed Project is not located within or adjacent a SRA or a Very High FHSZ as discussed in Impact 4.18-1. Thus, impacts would be less than significant.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.18-3: The Project Would Require the Installation or Maintenance of Associated Infrastructure (Such As Roads, Fuel Breaks, Emergency Water Sources, Power Lines or Other Utilities) That May Exacerbate Fire Risk or That May Result In Temporary or Ongoing Impacts to The Environment.

As discussed in *Sections 4.16 Transportation and Traffic and 4.17, Utilities*, the proposed Project would require the extension of utilities and other infrastructure, such as roadways, into the Project site. These extensions are needed to provide services for the proposed future uses. Natural gas and electricity would be supplied by PG&E. Natural gas and electric improvements would be constructed only after planning and coordination with PG&E to ensure that services could be efficiently, and safety delivered to the project site. As part of these efforts, any extension and any connections or new infrastructure would be built in accordance with the requirements of the County of Kern and PG&E. Cal Water would provide water services to the project site and would require approval from the California Public Utility Commission (CPUC) to expand its service area to include the proposed Project. Water service lines would be extended into the project site and improvements also would be made in some adjacent roadways and previously disturbed areas. The construction of new on-site roadways also would be required, and some off-site roadway and transportation improvements would be made to ensure adequate traffic service is maintained.

The proposed Project is surrounded by areas that are predominantly under agricultural production or consist of rural residential uses. or industrial and heavy commercial uses that are themselves not in wildland areas and are not susceptible to wildland fires. In addition, the addition of roads internal to the Project site would allow emergency response personnel to access the Project area, if necessary to suppress fires, if they occur. Further, the Kern County Fire Department, as part of the County's environmental review process, will review all plans to ensure they contain adequate fire suppression, fire access, and emergency evacuation.

Thus, coordination with PG&E regarding natural gas and electric improvements, improvements in the circulation system, and adherence to standard City and Fire Department policies would reduce impacts are less than significant. In addition, *Section 4.17 Utilities*, includes MM 4.17-7 through MM 4.17-9, which require, as part of the Master Precise Development Plan and any electric or natural gas utility improvements, coordination with PG&E to ensure improvements adhere to all requirements and to provide adequate time to review plans for potential conflicts with existing utility locations or demand on service. Implementation of these measures would ensure impacts remain less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Impact 4.18-4: The Project Would Expose People or Structures to Significant Risks, Including Downslope or Downstream Flooding or Landslides, as a Result of Runoff, Post-Fire Slope Instability, or Drainage Changes.

As described in *Section 4.10, Hydrology and Water Quality*, potential hazards related to downstream flooding are less than significant. The proposed Project site is not located within a 100-year flood hazard area. The proposed Project is located within the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Zone X, which is described by FEMA as an area determined to be outside the 0.2 percent annual chance floodplain. Due to this small percentage, it is not anticipated that flooding hazards would occur within the Project site. In addition, as described in *Section 4.7 Geology and Seismic Hazards*, the proposed Project area is flat and not susceptible to landslides. Thus, impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

Cumulative Impacts

The incremental effects of the proposed Project related to wildfire, if any, are anticipated to be minimal, and any effects would be site specific. Compliance with Federal, State, and local regulations would ensure that impacts from wildfires are avoided or controlled to minimize the risk to the public on a project-by-project basis, as the cumulative projects are constructed. Therefore, the proposed Project would not result in incremental effects to wildfire that could be compounded or increased when considered together with similar effects from other past, present, and reasonably foreseeable probable future projects. The proposed Project would not result in cumulatively considerable impacts to or from wildfires.

Mitigation Measures

No mitigation measures are required.

Level of Significance after Mitigation

Impacts would be less than significant.

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Chapter 5

Consequences of Project Implementation

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Chapter 5
Consequences of Project Implementation

5.1 ENVIRONMENTAL EFFECTS FOUND TO BE LESS THAN SIGNIFICANT

Section 15128 of the CEQA Guidelines requires that an EIR contain a statement briefly indicating the reasons that various, possible, new significant effects of a project were determined not to be significant, and were therefore not discussed in detail in the RDEIR. The County has engaged the public to participate in the scoping of the environmental document.

The contents of this Recirculated Draft EIR were established based on an NOP/IS prepared in accordance with the CEQA Guidelines, as well as public and agency input that were received during the scoping process. The comments to the NOP/IS are found in Appendix A. Those specific issues that are found to have no impact or less-than-significant impacts during preparation of the NOP/IS do not need to be addressed further in this RDEIR. Based on the findings of the NOP/IS and the results of scoping, a determination was made that this RDEIR must contain a comprehensive analysis of all environmental issues identified in Appendix G of the CEQA Guidelines. After further study and environmental review in this Recirculated Draft EIR, the following environmental impacts (both project-specific and cumulative) were determined to be less than significant or could be reduced to less-than-significant levels with mitigation measures:

- aesthetics,
- biological resources,
- cultural resources,
- energy,
- geologic and seismic hazards,
- hazards and hazardous materials,
- hydrology and water quality,
- land use and planning,
- mineral resources,
- population and housing,
- public services,
- utilities, and
- wildfire

5.2 SIGNIFICANT ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Section 15126.2(b) of the CEQA Guidelines requires that the EIR describe any significant impacts, including those that can be mitigated but not reduced to less-than-significant levels. Potential environmental effects of the proposed Project and proposed mitigation measures are discussed in detail in Chapter 4 of this RDEIR. The impacts described in Table 5-1 *Summary of Significant Impacts of the Proposed* Project, would result in significant and unavoidable impacts, even with the incorporation of feasible mitigation measures that attempt to reduce impacts to less-than-significant levels.

Table 5-1. Summary of Significant Impacts of the Proposed Project

Resources	Project Impacts	Cumulative Impacts
Agricultural Resources	The conversion of approximately 314.30 acres of agricultural farmland is considered **significant and unavoidable.**	Although the Metropolitan Bakersfield General Plan has various Land Use policies that direct development to encourage site compatibility with surrounding uses, the cumulative loss of agricultural land results in a significant and unavoidable impact. Notwithstanding this conclusion, Project implementation, when combined with the potential loss of other agricultural lands within the Planning area, over time, would remain a **significant and unavoidable** cumulative impact.
Air Quality	Surrounding sensitive receptors could potentially be exposed to substantial ROG pollutant concentrations from the proposed Project. In addition, operational impacts would result in **significant and unavoidable** impacts of ROG, NO_x, CO, and PM_{10} emissions.	While all feasible and reasonable mitigation has been included, however, the proposed mitigation measures do not result in a reduction of ROG, NO_x, CO, and PM_{10}, below the thresholds. Therefore, the remaining unmitigated emissions and related health effects are considered **cumulatively significant and unavoidable.**
Greenhouse Gases	Project-related greenhouse gases impacts would be reduced to **less than significant** levels with incorporation of mitigation measures.	The cumulative impacts of the proposed Project on global climate change are not known with certainty; therefore, cumulative impacts on global climate change and associated health effects are considered **significant and unavoidable.**
Noise	Given a specific Project use is not currently proposed, and the fact that permitted uses within the M-1 and M-2 Zone Districts allow for operations to be conducted outside of a fully enclosed building, the proposed Project may result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies. Impacts are considered **significant and unavoidable.**	While all feasible and reasonable mitigation has been included, noise levels at 14 roadway segments a result of the proposed Project and at 15 roadway segments considering the project with past, present and reasonably, would be significant. In addition, noise levels at one residence in proximity to the proposed Project would exceed thresholds. Therefore, even with the implementation of all feasible mitigation, impacts would be both **significant and unavoidable and cumulatively significant and unavoidable**
Transportation and Traffic	Project-related transportation and traffic impacts would be reduced to **less than**	Given the uncertainty of the timing and/or ultimate implementation of the recommended improvements which

	significant levels with incorporation of mitigation measures.	require pro-rata, fair share funding from various sources, along with those improvements necessary within Metropolitan Bakersfield, the proposed Project's contribution would result in **significant and unavoidable impacts.**

5.3 IRREVERSIBLE IMPACTS

Section 15126.2(c) of the CEQA Guidelines defines the nature of an irreversible impact as an impact that uses nonrenewable resources during the initial and continued phases of the project. Irreversible impacts can also result from damage caused by environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to ensure that such consumption is justified.

Build-out of the proposed Project would commit nonrenewable resources during construction and ongoing utility services. During the operations of the proposed Project, oil, gas, and other nonrenewable resources would be consumed. Therefore, an irreversible commitment of nonrenewable resources would occur as a result of long-term operation under the proposed Project. However, assuming that those commitments occur in accordance with the adopted goals, policies, and implementation measures of the Metropolitan Bakersfield General Plan, as a matter of public policy, those commitments have been determined to be acceptable. The Metropolitan Bakersfield General Plan ensures that any irreversible environmental changes associated with those commitments will be minimized.

5.4 SIGNIFICANT CUMULATIVE IMPACTS

According to Section 15355 of the CEQA Guidelines, the term cumulative impacts "...refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Individual effects that may contribute to a cumulative impact may be from a single project or a number of separate projects. Individually, the impacts of a project may be relatively minor, but when considered along with impacts of other closely related or nearby projects, including newly proposed projects, the effects could be cumulatively considerable. This RDEIR has considered the potential cumulative effects of the proposed Project along with other current and reasonably foreseeable projects. Impacts for the following have been found to be cumulatively considerable:

- agricultural resources;
- air quality;
- greenhouse gases;
- noise; and
- transportation and traffic.

5.5 GROWTH-INDUCING IMPACTS

The Metropolitan Bakersfield General Plan recognizes that certain forms of growth are beneficial, both economically and socially. CEQA associates development of new utilities and other infrastructure and public services with growth inducement. These facilities will be provided as an accommodation to proposed growth, and growth is expected to occur in the region. A project could induce population growth in an area either directly or indirectly. More specifically, the development of new homes or businesses could induce population growth directly, whereas the extension of roads or other infrastructure could induce population growth indirectly.

This proposed Project would not directly increase population or the housing stock. The Project proposes to amend the Metropolitan Bakersfield General Plan to allow for service industrial and light industrial uses. This allows for additional employment opportunities, which can lead to the relocation of people to jobs and ultimately and increase in population. However, the size of the labor force within Kern County and the current unemployment rates are considered to be sufficient for the current County population to accommodate jobs generated by the proposed Project. Additionally, the proposed Project site is in the vicinity of a Metropolitan Bakersfield General Plan designation for "intensified activity center," and anticipates development of the southern activity center and surrounding areas. Therefore, the introduction of industrial uses on the Project site would not create a growth-inducing impact.

Chapter 6

Alternatives

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CHAPTER 6
ALTERNATIVES

6.1 INTRODUCTION AND OVERVIEW

The California Environmental Quality Act (CEQA) requires that an EIR include a discussion of reasonable project alternatives that would "feasibly attain most of the basic objectives of the project, but would "avoid or substantially lessen any significant effects of the project, and evaluate the comparative merits of the alternatives" (CEQA Guidelines Section 15126.6). This chapter identifies potential alternatives to the proposed Project and evaluates them, as required by CEQA.

Key provisions of the CEQA Guidelines on alternatives (Section 15126.6(a) through (f)) are summarized below to explain the foundation and legal requirements for the alternatives analysis in the RDEIR.

- "The discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly" (15126.6(b)).
    - "The specific alternative of 'no project' shall also be evaluated along with its impact" (15126.6(e)).
    - "The no project analysis shall discuss the existing conditions at the time the Notice of Preparation is published, and at the time the environmental analysis is commenced, as well as what would reasonably be expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services. If the environmentally superior alternative is the 'no project' alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives" (15126.6(e)(2)).
    - "The range of alternatives required in an EIR is governed by a 'rule of reason' that require the EIR to set forth only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project" (15126.6(f)).
    - "Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability or infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent)" (15126.6(f)(1)).
    - For alternative locations, "only locations that would avoid or substantially lessen any of the significant effects of the project need be considered for inclusion in the EIR" (15126.6(f)(2)(A)).

- "An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (15126.6(f)(3)).

Per the CEQA Guidelines Section 15126.6(d), additional significant effects of the alternatives are discussed in less detail than the significant effects of the Project as proposed.

For each alternative, the analysis: 1) Describes the alternative; 2) Analyzes the impact of the alternative as compared to the proposed Project; 3) Identifies the impacts of the Project which would be avoided or lessened by the alternative; 4) Assesses whether the alternative would meet most of the basic Project objectives; and 5) Evaluated the comparative merits of the alternative and the Project.

6.2 APPLICANT PROJECT OBJECTIVES

As described in Section 3.4, the following objectives have been established for the proposed Project and will aid decision makers in the review of the Project and associated environmental impacts:

- Facilitate quality development that is consistent with and implements the goals of the Kern County General Plan and Metropolitan Bakersfield General Plan.
- To develop the site consistent with the provisions of the Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards.
- Assure adequate planning for all community facilities including circulation improvements, drainage facilities, water, and wastewater facilities.
- Ensure that the project, in and of itself, does not contribute to the conversion of adjacent agricultural areas.
- Cluster commercial retail uses that provide goods and services near an interchange with SR-99 to accommodate interstate freight and reduce traffic congestion and air emissions.
- Accommodate new development that channels land uses in a phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.
- Address community circulation, both vehicular and pedestrian, utilizing available capacity with the existing circulation system, and provide fair-share system improvements to deficient intersections or road segments.
- Facilitate a planned development and related in-line tenants consistent with the market objectives of the applicant and its tenants.
- Accommodate growth within the proposed Project while balancing environmental considerations.
- Provide an industrial center at the Houghton Road and SR-99 interchange in the southern metropolitan area adjacent to the City that would provide a broad range of goods and services that serve the regional market area.

- Allow for the development of a variety of commercial and industrial centers which are differentiated by their function, intended users and level of intensity.
- Provide new industrial development that captures the economic demands generated by the marketplace.
- Provide new development that will assist the County of Kern in obtaining fiscal balance in the years and decades ahead.

6.3 PROPOSED PROJECT SUMMARY

The proposed Project includes a General Plan Amendment (GPA) and concurrent Change of Zoning District (ZCC) to modify the existing MBGP land use designations, and the Kern County Zoning Ordinance classifications on the 314-acre Project site. In addition, the Project includes a petition to exclude the Project site from Agricultural Preserve No. 13. The GPA and ZCC would allow for development of a light to medium industrial park containing approximately 4,613,004 square feet (net building area) of warehousing, distribution, and retail showroom uses. Table 6-1, *Existing and Proposed Land Use and Zoning*, below, provides the proposed GPA and ZCC summary for the proposed Project.

Table 6-1. Proposed Project Site and Surrounding Land Uses

Existing MBGP Land Use Designations	Proposed MBGP Amendment (Land Use Designations)	Existing Zone Classification	Proposed Zone Change (Zone Classification)	Gross Acres
R-IA (Resource-Intensive Agriculture) HC (Highway Commercial)	GC (General Commercial)	A (Exclusive Agriculture)	C-2 PD (General Commercial, Precise Development Combining)	22
	LI (Light Industrial)		M-1 PD (Light Industrial, Precise Development Combining)	108
	SI (Service Industrial)		M-2 PD (Medium Industrial, Precise Development Combining)	159
	HC (Highway Commercial)		CH PD (Highway Commercial, Precise Development Combining)	25
			Total	**314***

Numbers have been rounded to the nearest whole number.
* Petition for Exclusion from Agricultural Preserve No. 13

6.4 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

Alternatives may be eliminated from detailed consideration in an EIR if they fail to meet most of the project objectives, are infeasible, or do not avoid or substantially lessen any significant environmental effects (CEQA Guidelines, Section 15126.6[c]). Alternatives that are remote or speculative, or the effects of which cannot be reasonably predicted, also do not need to be considered (CEQA Guidelines, Section 15126[f][2]). Kern County considered several alternatives to reduce impacts on agriculture, air quality, greenhouse gas emissions, noise, or transportation and traffic. Per CEQA, the lead agency

may make an initial determination as to which alternatives are feasible and warrant further consideration and which are infeasible. The following alternative was initially considered but were eliminated from further consideration in this RDEIR because it does not meet project objectives and/or are infeasible.

Alternate Site Alternative

In developing a reasonable range of alternatives, the County considered the potential for an alternate site. To meet the project objectives, the applicant would be required to find a comparable site within Kern County that would meet most of the project objectives. Key project attributes considered included a site adjacent to, or in close proximity of, a major interstate freeway, close proximity to an existing water supply conveyance system, and close proximity to dry utilities (e.g., natural gas, electricity and telecommunication lines), all of which avoid the need for substantial off-site infrastructure construction with related impacts. A further key attribute is a site that is adjacent, or within very close proximity, to existing residential land uses that provide residential and related community land uses for employees. The project site must also be of sufficient size to provide industrial and commercial land uses as well as a water treatment facility and wastewater treatment facility to achieve key objectives such as providing an industrial center that serves a regional market need in the southern metropolitan area. The site would also have to be available for acquisition (e.g., listed as for sale by one land owner). Finally, to serve as a CEQA alternative, it would also need to avoid or significantly reduce at least one project-level or cumulative impact.

There were no alternative sites that met these criteria. For example, to avoid or substantially reduce project-related agricultural impacts (including cumulative impacts or conversion of adjacent agricultural land to non-agricultural land), the alternate site location would need to be in an area with minimal land identified as prime farmland, unique farmland, or farmland of statewide importance, as well as with minimal land currently under agricultural cultivation. In addition, it would need to be proximate to residential land uses to provide appropriate workforce, thus reducing the need for new housing on nearby agricultural land. An alternate site within the Kern County would result in land that is considered prime farmland, unique farmland, or farmland of statewide importance, much of which is currently under agricultural cultivation within the San Joaquin Valley or grazing and other agricultural cultivation within the Mojave Desert. Such a site would have greater agricultural impacts than the project site, and both State and County laws and policy have long discouraged large scale urbanized conversion of agricultural lands.

Alternate sites within existing cities within the County were not considered because these cities already have or have planned for industrial and commercial land uses, and would not achieve a key project objective of developing commercial and industrial centers in close proximity to residential areas, for the workforce, as well as being located in areas proximate to backbone infrastructure.

If an alternate site were identified, development of the project on an alternate site would have similar, if not greater, environmental impacts with respect to cumulative impacts that are more generally linked to air quality and greenhouse gas emissions, noise, and transportation and traffic. Alternate sites in more remote locations, not served by or immediately adjacent to proximate highway, water, and dry utility infrastructure would generally have greater project-level and cumulative impacts than

the proposed Project, based on the need for construction of infrastructure extensions to highway, water, and dry utility infrastructure.

The alternate site alternative has been rejected from further consideration because there were no alternative sites that have the attributes required to achieve key project objectives, and because if an alternate site was available it would likely have impacts that are generally similar to, or for some resources greater than, the 99 Houghton Industrial Park Project.

It should also be noted that, while CEQA requires an EIR to identify project alternatives, it does not require the EIR to identify alternative project locations. Per the CEQA Guidelines, an EIR must include a reasonable range of "alternatives to the project, *or* to the location of the project." (14 California Code of Regulations Section 15126.6(a)(emphasis added)). Applicable case law recognizes that CEQA grants lead agencies flexibility to elect to analyze either onsite or offsite alternatives, or both (Mira Mar Mobile Community v. City of Oceanside (2004) 119 Cal.App.4th 447, 491). There is no requirement under CEQA that an EIR always explore an alternative site, or offsite, alternative (California Native Plant Society v. City of Santa Cruz (2009) 177 Cal.App.4th 957, 933). Thus, CEQA does not require this RDEIR to analyze the Alternative Site Alternative.

6.5 ALTERNATIVES ANALYZED IN THIS RDEIR

The following five alternatives have been determined to represent a reasonable range of alternatives which have the potential to feasibly attain most of the basic objectives of the Project but which may avoid or substantially lessen any of the significant impacts of the proposed Project. The "Environmentally Superior" Alternative, as required by CEQA is described in Section 6.6, *"Environmentally Superior" Alternative*. These alternatives are analyzed in detail below:

- Alternative A "No Project/No Development" Alternative
- Alternative B "Buildout Existing General Plan Designation" Alternative
- Alternative C "Reduced Density" Alternative
- Alternative D "Reduced Project Size" Alternative

Table 6-2 *Summary of Development Alternatives*, provides a summary of the relative impacts and feasibility of each Alternative. A complete discussion of each Alternative is provided below.

Table 6-2. Summary of Development Alternatives

Alternative	Description	Basis for Selection and Summary of Analysis
Proposed Project	4,613,004 ft2 of light to medium industrial park, and highway and general commercial uses	
Alternative A No Project/No Development	• No GPA, ZCC, or development. • Existing agricultural uses are maintained	• Required by CEQA • Avoids need for GPA, ZCC, and CUPs • No agricultural preserve exclusion needed • No annexation • Avoids significant impacts

Table 6-2. Summary of Development Alternatives

Alternative	Description	Basis for Selection and Summary of Analysis
		• Does not meet 9 of the 13 Project objectives
Alternative B Buildout Existing General Plan Designation	• Existing land use, R-IA and HC, and zoning, A, designations remain • Develop 15 SFR, 7.6 acres of HC, approximately 132,422 ft2	• Required by CEQA • Avoids need for GPA and ZCC • No agricultural preserve exclusion needed • No annexation • Does not meet 7 of the 13 Project objectives
Alternative C Reduced Density	• Develop entire 314.30-acre site • Reduce development to 3,850,689 ft2 of medium and light industrial facilities	• May lessen some impacts • Does not avoid significant environmental impacts • Meets Project objectives, but not to the degree of the proposed Project
Alternative D Reduced Project Size	• Develop approximately 184.58 acres – area proposed as SI • 2,171,789 ft2 of Service Industrial/Medium Industrial facilities	• May lessen some impacts • Does not avoid significant environmental impacts • Meets most Project objectives, but not to the degree of the proposed Project.

Notes:

R-IA = Intensive Agriculture: minimum 20-acre parcel size; HC = Highway Commercial – Industrial;

A = Exclusive Agriculture; GPA = General Plan Amendment; ZCC = Zone Change; SI = SI – Service Industrial; FAR = Floor Area Ratio; ft^2 = square feet; SFR = single-family residential

Table 6-3. Comparison of Alternatives					
Environmental Resource	**Project**	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Agriculture: Convert Prime, Unique or Statewide important farmland	Significant / Unavoidable	Fewer	Fewer	Similar	Fewer but still Significant/Unavoidable
Agriculture: Other changes resulting in agricultural conversion	Significant / Unavoidable	Fewer	Similar	Similar	Similar
Agriculture: Cumulative conversion of agricultural or forest land	Significant / Unavoidable	Fewer	Fewer	Similar	Fewer but still Significant/Unavoidable
Air Quality: Operational Emission of ROG, NO_x, and CO	Significant / Unavoidable	Fewer	Fewer but still Significant/Unavoidable	Fewer but still Significant/Unavoidable	Fewer but still Significant/Unavoidable
Air Quality: Cumulative net increase of nonattainment pollutants	Significant / Unavoidable	Fewer	Fewer but still Significant/Unavoidable	Fewer but still Significant/Unavoidable	Fewer but still Significant/Unavoidable
Air Quality: Exposure of sensitive receptors to ROG, NO_x, and CO	Significant / Unavoidable	Fewer	Fewer but still Significant/Unavoidable	Fewer but still Significant/Unavoidable	Fewer but still Significant/Unavoidable
Air Quality: Total Cumulative Project Emissions	Significant / Unavoidable	Fewer	Fewer but still Significant/Unavoidable	Fewer but still Significant/Unavoidable	Fewer but still Significant/Unavoidable
Greenhouse Gas Emission: Cumulative effects	Significant / Unavoidable	Fewer	Fewer but still Significant/Unavoidable	Similar	Fewer but still Significant/Unavoidable
Noise: Expose Persons in Excess of Standards	Significant / Unavoidable	Fewer	Fewer	Fewer	Fewer
Noise: Expose Persons to Ground Borne Noise and Vibration	Significant / Unavoidable	Fewer	Fewer	Fewer	Fewer
Noise: Create Substantial Temporary Above Existing Levels	Significant / Unavoidable	Fewer	Fewer	Fewer	Fewer
Noise: Cumulative increase in noise	Significant / Unavoidable	Fewer	Fewer	Fewer	Fewer
Traffic: Cumulative increase in transportation and traffic impacts	Significant / Unavoidable	Fewer	Fewer	Similar	Fewer

Alternative A - "No Project/No Development" Alternative

The "No Project/No Development" Alternative assumes that the proposed GPA, ZCC and subsequent development would not be implemented. Under this scenario, the General Plan Land Use Designation on the Project site would remain R-IA (Resource-Intensive Agriculture) and HC (Highway Commercial); the zoning would remain A (Exclusive Agriculture). Additionally, this Alternative assumes that existing land uses on the Project site would remain unchanged, and, as such, would remain under agricultural production. Because the Project site would remain unchanged, few or no environmental impacts would occur. This Alternative serves as the baseline against which to evaluate the effects of the proposed Project and other Project Alternatives presented below.

Impacts Compared to Project Impacts

The following compares environmental impacts associated with Alternative A, the "No Project/No Development" Alternative, to those identified for the proposed Project.

Aesthetics

Under the "No Project/No Development" Alternative, the Project site would not be altered. Therefore, views across the Project site would remain unobstructed, and no additional lights are proposed. Therefore, under this Alternative no impacts to aesthetics, light and glare would occur.

Agriculture Resources

This Alternative would not alter the existing conditions within the Project site. Therefore, the site will remain under agricultural production and as fallow agricultural land. This Alternative would not require an agricultural preserve exclusion. Thus, no impacts to agricultural resources would occur.

Air Quality

Alternative A, the "No Project/No Development" Alternative, would not result in alterations to the land uses within the Project site. Therefore, any existing impacts to air quality that currently exist on-site will continue to occur, however, no new impacts to air quality would occur under this Alternative.

Biological Resources

Alternative A, the "No Project/No Development" Alternative, would not impact potential habitat for biological resources. The continued agricultural uses would not increase impacts on the biological resources currently within the Project site. No new impacts to biological resources would occur under this Alternative.

Cultural Resources

As this Alternative would not result in alterations to the ground surface within the Project site, no impacts to cultural resources would occur.

Energy Resources

Alternative A, the "No Project/No Development" Alternative, would not result in alterations to the land uses within the Project site. Therefore, any existing impacts to energy that currently exist on-site will continue to occur, however, no new impacts to energy would occur under this Alternative.

Geologic and Seismic Hazards

Under this Alternative, new structures would not be constructed. Therefore, impacts to structures as a result of geologic and seismic hazards would not occur under this Alternative.

Greenhouse Gases

Implementation of this Alternative would result the Project site remaining as cultivated and fallow agricultural land. The land use would remain the same; therefore, no impacts to greenhouse gas emissions would occur beyond what already exists.

Hazards/Hazardous Materials

Under this Alternative, the existing environmental conditions, including those that may be defined as either adverse or significant, would continue to prevail. This Alternative would continue to expose individuals to agricultural production related activities and their associated effects, and to nuisances (i.e., soil contamination, noise, dust). Therefore, no impacts to hazards/hazardous materials would occur under Alternative A, the "No Project/No Development" Alternative.

Hydrology and Water Quality

No industrial structures would be developed under this Alternative; therefore, no change in the usage of groundwater would occur, and no additional storm drain infrastructure would be required. Therefore, no impacts to hydrology and water quality would occur under this Alternative.

Land Use and Relevant Planning

This Alternative would not require a GPA or zone change, as it does not propose to develop the Project site. This Alternative would be consistent with the existing land uses identified in the Metropolitan Bakersfield General Plan. Implementation of this Alternative would not result in any improvements to the Project site; therefore, no impacts to land use would occur.

Mineral Resources

Under this Alternative this proposed Project site would remain under agricultural production and the on-site prospect well would remain. Therefore, under this Alternative no impacts to mineral resources would occur.

Noise

As no development is proposed on the Project site under this Alternative, no change in the existing noise on the Project site would occur.

Population and Housing

Under Alternative A, the "No Project/No Development" Alternative, no industrial structures would be constructed. This Alternative would not directly or indirectly induce an increase in population and would not displace houses or people because the 314.30-acre site would remain agricultural land. No impacts to population and housing would occur under this Alternative.

Public Services and Utilities

With implementation of Alternative A, the "No Project/No Development" Alternative, no industrial structures would be constructed. No changes in demand of public services and utilities would occur.

Traffic and Circulation

Development of this Alternative would not result in changes to average daily vehicle trips (ADT) as no development is proposed. Additionally, this Alternative would not result in impacts on the intersections and roadway segments surrounding the Project site. Overall, this Alternative would not result in an impact on circulation.

Wildfire

Under this alternative no development is proposed, and the existing land uses of the Project site would remain in agricultural production. The potential for the Project site to be affected by wildfire from adjacent areas would be the same and no changes or impacts associated with wildfire would occur.

Conclusion

Avoid or Substantially Lessen Project Impacts

No development would occur under this Alternative; therefore, Project related impacts under the environmental categories discussed above would not occur. Thus, all Project impacts would be avoided or lessened.

Attainment of Project Objectives

Alternative A, the "No Project/No Development" Alternative, does not meet the following Project objectives, as described in Section 6.2:

- Cluster commercial retail uses that provide goods and services near an interchange with SR-99 to accommodate interstate freight and reduce traffic congestion and air emissions.
- Accommodate new development that channels land uses in a phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.
- Address community circulation, both vehicular and pedestrian, utilizing available capacity with the existing circulation system, and provide fair-share system improvements to deficient intersections or road segments.

- Facilitate a planned development and related in-line tenants consistent with the market objectives of the applicant and its tenants.
- Accommodate growth within the proposed Project while balancing environmental considerations.
- Provide an industrial center at the Houghton Road and SR-99 interchange in the southern metropolitan area adjacent to the City that would provide a broad range of goods and services that serve the regional market area.
- Allow for the development of a variety of commercial and industrial centers which are differentiated by their function, intended users and level of intensity.
- Provide new industrial development that captures the economic demands generated by the marketplace.
- Provide new development that will assist the County of Kern in obtaining fiscal balance in the years and decades ahead.

Comparative Merits

This Alternative would reduce impacts compared to the proposed Project in all categories. However, this Alternative was rejected because it does not fulfill 9 of the 13 objectives of the proposed Project described in Section 6.2, *Applicant Project Objectives*.

Alternative B - "Buildout Existing General Plan Designation" Alternative

Under Alternative B, the "Buildout Existing General Plan Designation" Alternative, the Project site would be developed to the maximum intensity allowed under the existing General Plan land use designation. Implementation of this Alternative would consist of development on the 314.30-acre Project site under the current land use designation of R-IA (Resource – Intensive Agriculture) and HC (Highway Commercial). The R-IA designation allows the development of dwelling units at a density of one unit per 20 acres. The HC designation allows the development of 7.6 acres for commercial uses. Therefore, this Alternative would yield 15 single-family dwelling units and approximately 132,422 square feet of highway commercial facilities. This number is based on the allowable Floor Area Ratio (FAR) of 0.4. Therefore, 7.6 acres = 331,056 square feet. The maximum allowable building square footage would be 132,422 square feet (331,056 x 0.4 = 132,422).

Impacts Compared to Project Impacts

The following compares environmental impacts associated with Alternative B, the "Buildout Existing General Plan Designation" Alternative, to those identified for the proposed Project.

Aesthetics

Development of 15 residential units and approximately 132,411 square feet of highway commercial facilities associated with this Alternative would slightly alter views of and across the Project site from surrounding uses. Views of the Project site are currently of agricultural activities. Under this Alternative, these views would be replaced with views of fields subdivided into 20-acre parcels, with

one single-family dwelling unit developed on each parcel and the remaining land would consist of approximately 132,411 square feet of highway commercial. This Alternative would result in a less than significant impact related to aesthetics, light and glare due to the limited development proposed and the limited addition of lighting.

Agriculture

As a limited amount of development would be allowed under this Alternative, minor impacts to agricultural uses would occur. However, approximately 306.71 acres of the Project site would remain under agricultural production. This acreage could potentially be broken down into 20-acre parcels, which could remain in agricultural production. In addition, this Alternative would not require an agricultural preserve exclusion. Therefore, impacts would be less than the impacts for the proposed Project.

Air Quality

Implementation of this Alternative would result in 15 residential units and approximately 132,422 square feet of highway commercial facilities; which would result in a reduction of construction activities and traffic trips. This lower intensity of development would result in a smaller amount of particulate matter greater than 10 microns (PM_{10}) being released during construction activities, compared to the proposed Project. Additionally, the smaller volume of Project-related traffic would result in lower air pollutant emissions associated with traffic. However, this Alternative would still result in a cumulatively significant impact to air quality given the increase in daily trips associated with the increased development.

Biological Resources

Alternative B, the "Buildout Existing General Plan Designation" Alternative, would result in the development of up to 15 single-family residential units, with one unit per 20 acres, and 132,422 square feet of highway commercial on 7.6 acres. Impacts to biological resources would still occur; however, they would be reduced from that of the proposed Project because of the lower intensity of development. Individual dwelling unit locations could be customized as to avoid biologically sensitive areas. The area designated for highway commercial land uses is in the southwest corner of the Project site, adjacent to Houghton Road and SR-99. Overall, this Alternative would result in reduced impacts when compared to the proposed Project; however, compliance with the Metropolitan Bakersfield Habitat Conservation Plan (MBHCP) would be required.

Cultural Resources

This Alternative would have a reduced footprint size because of the introduction of up to 15 dwelling units and a maximum of 132,422 square feet of highway commercial facilities. Therefore, the intensity of development would be less, and less ground disturbing activities would be required. However, similar mitigation measures identified for the proposed Project would be applicable to this Alternative to reduce potential impacts to undocumented cultural and paleontological resources within the areas of the site to be developed.

Energy

Implementation of this Alternative would result in the construction of 15 residential units and 132,422 square feet of highway commercial; which would result in a reduction of construction activities and traffic trips as compared to the proposed Project. The reduced intensity of project development would reduce the amount of energy needed for construction as well as operation of the proposed Project. The reduced ultimate size of the proposed Project also would reduce the overall demand for energy needed for project operation over the long-term. However, the Alternative would include residential uses but a reduction in overall population and vehicle trips. This would result in decreased energy use compared to the proposed Project. This Alternative also would be required to comply with all state and local regulations pertaining to energy reduction and use of alternative energy sources. Although conformance to the green energy requirements would still be required for this Alternative, this would result in further reduced impacts associated with Energy use.

Geologic Resources

Under this Alternative, residential structures would be introduced to the Project site. The site conditions within the development area would remain the same as the proposed Project. Therefore, the geologic resources impacts would be similar to those identified for the proposed Project, including seismic activity, soil erosion and soil conditions. Any existing regulations and mitigation measures identified for the proposed Project would be applicable to this Alternative.

Greenhouse Gases

Implementation of this Alternative would result in the construction of 15 residential units and 132,422 square feet of highway commercial; which would result in a reduction of construction activities and traffic trips as compared to the proposed Project. Additionally, the smaller volume of Project-related traffic would result in substantially lower air pollutant emissions associated with traffic. Although smaller, greenhouse gas emission impacts would need to be mitigated in order to reduce the business as usual (BAU) greenhouse gas emissions by 29 percent to be consistent with the standards established by the California Air Resources Board and the California Global Warming Solutions Act of 2006. Therefore, greenhouse gas emissions impacts would be similar to the proposed Project.

Hazards/Hazardous Materials

Similar to the proposed Project, implementation of Alternative B, the "Buildout of the Existing General Plan" Alternative, would result in potentially significant impacts on public health and safety. With the development of approximately 15 residences and 132,422 square feet of highway commercial, this Alternative would reduce the potential of the transport of hazardous materials. Alternative B, "Buildout Existing General Plan Designation" Alternative, would have a similar impact on the existing PG&E pipeline as the proposed Project. In addition, closure of the prospect well would continue to be required. With the development of 15 single-family homes and 132,422 square feet of highway commercial facilities, this Alternative would expose individuals to similar effects associated with agricultural land uses (i.e., soil contamination, noise, dust). This Alternative would replace a large number of people working on-site, with a smaller number of workers and a small number of people living within the Project boundaries; therefore, public health and safety

impacts would be similar to those of the proposed Project. The mitigation measures identified for the proposed Project would be included in this Alternative.

Hydrology and Water Quality

Development in accordance with the existing General Plan Designation would result in similar impacts to the proposed Project. No change in the usage of groundwater would occur, similar to the proposed Project**.** Implementation and compliance with the NPDES, SUSMP and BMP requirements would reduce construction-related impacts on water quality to a less than significant level.

Land Use and Relevant Planning

This Alternative would not require a GPA, ZCC, annexation into the City, or an Agricultural Preserve exclusions as it proposes to develop the Project site in accordance with the current land use designation. This Alternative would be consistent with land uses identified in the General Plan. Implementation of this Alternative would provide a maximum of 132,422 square feet of highway commercial on 7.6 acres and up to 15 dwelling units on approximately 306.71 acres. The development intensity and subsequent environmental impacts would be less than those identified for the proposed Project.

Mineral Resources

This Alternative proposes to provide up to 132,422 square feet of highway commercial facilities and up to 15 dwelling units. The existing abandoned exploration well would not necessarily be required to be altered. Therefore, overall, this Alternative would result in reduced levels of impacts on mineral resources than the proposed Project, as access to the existing wells would remain available.

Noise

Under Alternative B, the Buildout Existing General Plan Designation Alternative, the Project site would be developed with up to 15 residences on 20-acre parcels and 132,422 square feet of highway commercial facilities. Mitigation measures similar to the proposed Project would be applied to ensure short-term construction impacts remain less than significant. This Alternative would introduce new noise-sensitive land uses as a result of the development of up to 15 dwelling units. Noise from introduced traffic would be reduced for the overall project site; however, the highway commercial would experience a higher volume of ingress and egress customers to the southwest corner of the Project site. The potential for increased noise due to higher traffic volumes at the highway commercial property would be minor. The development of residential instead of industrial land uses would reduce noise impacts as compared to the proposed Project. Therefore, overall, this Alternative would result in reduced noise impacts as compared to the proposed Project.

Population and Housing

Alternative B, the "Buildout Existing General Plan Designation" Alternative, would result in a direct increase in population because it would introduce 15 new residences to Kern County. These 15 residences could increase the Kern County Population by approximately 47 people, assuming an

average of 3.096 persons per household[1], an increase compared to the proposed Project. An increase of approximately 47 people is within the Metropolitan Bakersfield General Plan forecast for anticipated population growth for the area. The introduction of approximately 132,422 square feet of highway commercial development is less than the proposed Project. Impacts under Alternative B would be slightly more than those identified for the proposed Project because of the introduction of residential land uses.

Public Services and Utilities

Alternative B, the "Buildout Existing General Plan Designation" Alternative, would result in the introduction of approximately 15 dwelling units to the Project site. Highway commercial facilities would be provided in the southwest corner of the Project site. The introduction of residents would result in additional public service requirements not needed under the proposed Project. Utility services required may be reduced because there would be an overall reduction in the size of the proposed Project and the developed area within the site. Therefore, overall impacts to public services would be greater for this Alternative than the proposed Project; however, impacts to utilities would be reduced when compared to the proposed Project.

Traffic and Circulation

Development of this Alternative would have no industrial uses and would introduce 15 dwelling units and approximately 132,422 square feet of highway commercial. This changes the site population from employees to residents and a small number of employees, resulting in an overall smaller population within the Project site and consequently fewer average daily vehicle trips (ADT) as compared to the proposed Project. Because of the smaller number of trips when compared to the proposed Project, this Alternative would result in a less than significant impact on the intersections and roadway segments surrounding the Project site. Overall, Alternative B, the "Buildout Existing General Plan Designation" Alternative, would result in a lesser impact on circulation compared to the proposed Project.

Wildfire

This Alternative proposes to provide up to 132,422 square feet of highway commercial facilities and up to 15 dwelling units. Under this alternative, surrounding land uses would not change and the change in on-site land uses would not change the findings related to wildfires. Therefore, the potential for the Project site to be affected by wildfire from adjacent areas would be the same and no changes or impacts associated with wildfire would occur.

[1] Average persons per household as determined by the Department of Finance and discussed in this EIR under Section 4.14, *Population and Housing*. 15 residences * 3.156 persons per household = approximately 47 people.

Conclusion

Avoid or Substantially Lessen Project Impacts

This Alternative would lessen impacts associated with aesthetics, biological resources, land use and relevant planning, noise, public services, utilities and traffic and circulation. However, there would still be significant and unavoidable impacts ~~to~~ on cumulative air quality. Additionally, if septic systems were proposed, then there could be additional impacts to hydrology and water quality, that were not considered with the proposed Project.

Attainment of Project Objectives

Alternative B, the "Buildout Existing General Plan Designation" Alternative, does not necessarily meet the proposed Project objectives, but would require similar mitigation measures to those that are currently proposed. Generally, Alternative B does not meet the following objectives:

- Ensure that the project, in and of itself, does not contribute to the conversion of adjacent agricultural areas.
- Address community circulation, both vehicular and pedestrian, utilizing available capacity with the existing circulation system, and provide fair-share system improvements to deficient intersections or road segments.
- Facilitate a planned development and related in-line tenants consistent with the market objectives of the applicant and its tenants.
- Provide an industrial center at the Houghton Road and SR-99 interchange in the southern metropolitan area adjacent to the City that would provide a broad range of goods and services that serve the regional market area.
- Allow for the development of a variety of commercial and industrial centers which are differentiated by their function, intended users and level of intensity.
- Provide new industrial development that captures the economic demands generated by the marketplace.
- Provide new development that will assist the County of Kern in obtaining fiscal balance in the years and decades ahead.

Comparative Merits

This Alternative would reduce impacts compared to the proposed Project in the categories of aesthetics, agriculture, air quality, biological resources, greenhouse gases, land use and relevant planning, noise, public services and utilities and traffic and circulation; and would have equivalent impacts in the categories of cultural resources, geologic and seismic hazards, hazards/hazardous materials, hydrology and water quality, and mineral resources.

Alternative C - "Reduced Density" Alternative

Under Alternative C, the "Reduced Density" Alternative, the Project site would be developed under the LI (Light Industrial) and SI (Service Industrial) land use designation; however, the industrial facilities would be reduced in area. This Alternative would develop the entire 314.30-acre Project site; however, the square footage of industrial facilities would be reduced by approximately 25 percent. This results in the development of approximately 3,459,753 square feet of light and medium industrial facilities. The Project site would continue to require a GPA, ZCC, annexation, and exclusion from Agricultural Preserve Number 13.

Impacts Compared to Project Impacts

The following discussion evaluates the potential environmental impacts associated with Alternative C, the "Reduced Density" Alternative, compared to impacts of the proposed Project.

Aesthetics

Under this Alternative, the aesthetic impacts would be similar to the proposed Project. This Alternative would continue to develop the entire proposed Project site, therefore, even though the size of the facilities will be reduced, the site would result in similar impacts from site illumination and conversion of open space to a permanent urban environment. Short-term construction impacts would occur under this Alternative, such impacts would be considered equivalent to the proposed Project impacts. Impacts from urban decay would be slightly less than those resulting from the proposed Project because this Alternative would result in fewer industrial and showroom facilities. On a cumulative level, implementation of this Alternative would result in a similar to the proposed Project.

Agriculture

This Alternative would result in the loss of agricultural land over the entire Project site. Agricultural land uses would not occur under this alternative. An exclusion from Agricultural Preserve Number 13 would continue to be required. Therefore, impacts would remain significant and unavoidable.

Air Quality

The "Reduced Density" Alternative would construct approximately 3,459,753 square feet of medium industrial facilities. The reduced size of the facilities would ultimately reduce the number of workers at the site and would therefore have fewer vehicle trips, compared to the proposed Project. As a result, this Alternative would slightly reduce PM_{10} and air pollutant emissions, compared to the proposed Project. Mitigation measures addressing long-term Project emissions similar to the proposed Project would be implemented under this Alternative, therefore, impacts under this Alternative would be similar to those of the proposed Project. Construction impacts to air quality would be similar to the proposed Project.

Biological Resources

This Alternative would occupy the same land as the proposed Project, even though the industrial facilities would be reduced in size. The Alternative would result in similar impacts as the proposed Project. Similar to the proposed Project, development of the site under this Alternative would be

required to fully comply with the applicable provisions of the MBHCP to mitigate for the conversion of undeveloped land to an urbanized condition. Additionally, mitigation measures similar to those recommended for the proposed Project would be required to reduce potential biological impacts, especially to burrowing owl and San Joaquin kit fox. Impacts would be the same under this Alternative as the proposed Project.

Cultural Resources

Because Alternative C, the "Reduced Density" Alternative, would occupy the same land as the proposed Project, the impacts for cultural resources would continue to be less than significant because no cultural resources were identified. Additionally, mitigation measures required for grading and construction activities for the proposed Project would apply to the same activities for this Alternative and would therefore result in less than significant impacts on undiscovered cultural resources. With regard to cultural resources, Alternative C, the "Reduced Density" Alternative, would be neither environmentally superior nor environmentally inferior to the proposed Project.

Energy

Implementation of this Alternative would result a slightly "Reduced Density" of development of on the Project site resulting in a slight reduction in the overall energy use. Although there is a similar amount of land that would be disturbed, fewer structures would be constructed and this alternative includes a reduction in overall Project square footage. This Alternative would be required to comply with all state and local regulations pertaining to energy reduction and use of alternative energy sources. Although conformance to the green energy requirements would still be required for this alterative, overall, the reduced intensity of this Alternative would reduce the amount of energy needed compared to the proposed Project.

Geologic and Seismic Hazards

Since the Project area would occupy the same area as the proposed Project, the geologic and seismic hazard impacts would be equivalent to those identified for the proposed Project, including seismic activity, soil erosion and soil conditions. Alternative C, the "Reduced Density" Alternative, would have equivalent impacts as the proposed Project and the same existing regulations and mitigation measures identified for the proposed Project would be applicable to this Alternative.

Greenhouse Gases

Implementation of this Alternative would result in 3,459,753 square feet of industrial building space to be constructed on the proposed Project site. Construction would continue to occur on the entire property; therefore, construction emissions would be similar to the proposed Project. Because this Alternative would result in slightly fewer workers, a slight reduction in traffic trips would occur as compared to the proposed Project; therefore, the long-term air quality impacts would be slightly less than the proposed Project. Greenhouse gas emission impacts would need to be mitigated in order to reduce the business as usual (BAU) greenhouse gas emissions by 29 percent to be consistent with the standards established by the California Air Resources Board and the California Global Warming Solutions Act of 2006. Therefore, greenhouse gas emissions impacts would be similar to the proposed Project.

Hazards/Hazardous Materials

Similar to the proposed Project, implementation of Alternative C, the "Reduced Density" Alternative, would result in potentially significant impacts on public health and safety. This Alternative includes the disturbance of a portion of the Project site for development of 3,459,753 square feet of industrial building space, slightly less than the proposed Project; therefore, this Alternative would slightly reduce the potential of the transport of hazardous materials. This Alternative would have a similar impact on the existing PG&E pipeline as the proposed Project. In addition, closure of the prospect well would continue to be required. This Alternative would expose individuals to similar effects associated with agricultural land uses (i.e., soil contamination, noise, dust). This Alternative would slightly reduce the number of people working on-site; however, public health and safety impacts would be similar to those of the proposed Project. The mitigation measures identified for the proposed Project would be included in this Alternative.

Hydrology and Water Quality

Development in accordance with this Alternative would result in similar amounts of impervious surfaces and, therefore, similar amounts of runoff volumes compared to the proposed Project. Water consumption would be slightly less than water usage under the proposed Project; however, the impacts would remain similar to those of the proposed Project. As with the proposed Project, this Alternative would comply with standard County provisions related to the incorporation of sufficient storm drain infrastructure to reduce the amount of surface runoff. Implementation and compliance with the NPDES, SUSMP and standard BMP requirements would reduce construction-related impacts on water quality to a less than significant level. Mitigation measures similar to the proposed Project would be applied to ensure short-term water quality construction impacts remain less than significant.

Land Use and Relevant Planning

Implementation of this Alternative would continue to require a GPA, ZCC, annexation, and an agricultural preserve exclusion on 314.30 acres to allow the development of approximately 3,459,753 square feet of light and industrial facilities. Industrial facility square footage would be reduced by 25 percent as compared to the proposed Project. Annexation into the City and agricultural preserve exclusion would still be required. Land use impacts resulting from this Alternative would be similar to the proposed Project because the entire 314.30-acre site would continue to be developed.

Mineral Resources

Although Alternative C, the "Reduced Density" Alternative, would have less intensity of development, the abandoned exploration well would continue to require reabandonment. This Alternative would result in similar impacts to mineral resources as the proposed Project due to the presence of the abandoned exploration oil well on-site.

Noise

Under this Alternative, the number of vehicles would be reduced because the square footage of industrial facilities would be reduced. Therefore, the noise from vehicle trips would be reduced in

comparison to the proposed Project. Noise from implementing the Alternative would be reduced slightly when compared to the proposed Project, because the development intensity would be reduced by approximately 25 percent. Mitigation measures similar to the proposed Project would be applied to ensure short-term construction impacts remain less than significant. Overall, with implementation of noise mitigation measures, noise impacts would be the slightly reduced when compared to the proposed Project.

Population and Housing

Alternative C, the "Reduced Density" Alternative, would reduce the proposed Project size by approximately 25 percent, resulting in the development of approximately 3,459,753 square feet of medium and light industrial facilities. The labor force needed for this Alternative would be less than the labor force needed for the proposed Project. Therefore, the impacts under Alternative C would be less than those identified for the proposed Project. Impacts would remain less than significant.

Public Services and Utilities

The demand for public services and utilities generated at the Project site would be reduced by approximately 25 percent. The reduced square footage for industrial facilities would result in fewer employees and fewer industrial businesses within the Project site, which would in turn have lesser impacts on public services and utilities. All standard mitigation measures identified under the proposed Project would be required in order to reduce impacts to a less than significant level. Therefore, this Alternative would be neither environmentally superior nor environmentally inferior to the proposed Project.

Traffic and Circulation

The reduced amount of square footage for industrial building space developed under this Alternative would result in a slightly reduced number of employees and delivery trucks, which in turn would result in a slight decrease in average daily vehicle trips (ADT) compared to the proposed Project. Slightly fewer AM and PM peak hour trips and ADT would result in slightly reduced impacts on intersections and roadway segments within the area surrounding the Project site. The temporary impacts on transportation within the area surrounding the Project site would be similar to those with the proposed Project because the proposed construction activities would be similar and short in duration. The planned improvements and mitigation measures identified for the proposed Project would still be applicable under this Alternative in order to reduce impacts to a less than significant level. Overall, impacts on traffic and circulation from this Alternative would be similar to those associated with the proposed Project.

Wildfire

This Alternative would result in a reduced development intensity of the Project Site. Under this alternative; however, surrounding land uses would not change and on-site changes to land uses would not change the findings related to wildfires. Therefore, the potential for the Project site to be affected by wildfire from adjacent areas would be the same and no changes or impacts associated with wildfire would occur.

Conclusion

Avoid or Substantially Lessen Project Impacts

This Alternative would lessen impacts associated with air quality, noise, population and housing, and traffic/circulation.

Attainment of Project Objectives

This Alternative would meet the Project objectives stated in Section 6.2.

Comparative Merits

This Alternative would reduce impacts compared to the proposed Project in the categories of air quality, and noise, ~~and traffic and circulation;~~ and would have equivalent impacts in the categories of aesthetics, agriculture, biological resources cultural resources, geologic and seismic hazards, greenhouse gases, hazards/hazardous materials, hydrology and water quality, land use and relevant planning, mineral resources, population and housing, public services and utilities, and traffic and circulation.

Alternative D - "Reduced Project Size" Alternative

Under Alternative D, the "Reduced Project Size" Alternative, the Project site size would be reduced by approximately 50 percent and the square footage size would be reduced accordingly. Therefore, Alternative D would develop the 159-acre portion of the Project site designated to be SI (Service Industrial) with 2,306,502 square feet of medium industrial facilities, as identified in the proposed Project. The approximately 22-acre General Commercial parcel on the north, the 9.01-acre High Commercial parcel, and the approximately 107.72-acres on the east of the Project site to be designated LI (Light Industrial) would not be developed. Therefore, this Alternative assumes that existing land uses on the northern and eastern portions of the site would remain unchanged, and would remain under their current state as fallow and cultivated land. This Alternative would continue to require the GPA, ZCC, annexation, and Agricultural Preserve Exclusion.

Impacts Compared to Project Impacts

The following discussion evaluates the potential environmental impacts associated with Alternative D, the "Reduced Project Size" Alternative, compared to impacts of the proposed Project.

Aesthetics

Under this Alternative, the aesthetic impacts would be less than the proposed Project. Implementation of this Alternative would involve less development on approximately 159 acres of the proposed Project site and the remaining approximately155.3 acres would remain under the current land uses. Overall, decreasing the amount of developed land would potentially result in less impacts from site illumination and conversion of open space to a permanent urban environment. Short-term construction impacts would occur under this Alternative; however, impacts would be considered less than significant. On a cumulative level, implementation of this Alternative would result in a similar less than significant impact as the proposed Project.

Agriculture

This Alternative would result in development on the approximately 184.58 acres of the Project site. As a result, the amount of agricultural land that would be taken out of production for the development of the industrial facilities would be less than the proposed Project. This Alternative lessens the impact on agricultural resources because the total conversion of farmland would be approximately 50 percent of the proposed Project. However, similar to the proposed Project, impacts to agricultural resources would still result in a significant and unavoidable impact on agriculture resources because of the cumulative loss of agricultural land within Kern County. Alternative D, the "Reduced Project Size" Alternative, would reduce the amount of land taken out of agricultural production; however, significant and unavoidable impacts would remain, as compared to the proposed Project.

Air Quality

The "Reduced Project Size" Alternative would construct approximately 2,306,502 square feet of medium to light industrial facilities. The reduced size of the facilities would ultimately reduce the number of workers at the site and would therefore have fewer vehicle trips, compared to the proposed Project. As a result, this Alternative has the potential to reduce operational PM_{10} emissions by enough to be below the threshold of 15 tons per year. The 50 percent reduction is not expected to reduce other air pollutant emissions below the thresholds. Therefore, this Alternative could slightly, reduce air pollutant emissions, compared to the proposed Project. In addition, mitigation measures addressing long-term Project emissions similar to the proposed Project would be implemented under this Alternative, therefore, impacts under this Alternative would be slightly reduced but would remain very similar to those of the proposed Project. Construction impacts to air quality would be reduced by about half compared to the proposed Project.

Biological Resources

This Alternative would continue to provide industrial services by constructing approximately 2,306,502 square feet of medium industrial facilities. This is a reduction of approximately 50 percent. Development of the SI (Service Industrial) area would continue to impact San Joaquin kit fox, as the majority of the kit fox sign identified for the proposed Project are located within the SI area. However, this Alternative may be able to avoid impacts to burrowing owls, as they are located outside the SI proposed boundary. Overall, impacts to biological resources would be reduced. Although total impacts on sensitive species, and habitat would be less compared to the proposed Project, similar mitigation measures would still be required to reduce impacts to a less than significant level. In addition, this Alternative would be required to comply with the MBHCP.

Cultural Resources

This Alternative would occupy 159 acres of the proposed 314.30 acres of land that the proposed Project would occupy. Because no cultural resources were identified for the Project site, impacts to cultural resources would be the same under this Alternative as under the proposed Project. Mitigation measures required for grading and construction activities would apply to the same activities for this Alternative, and would therefore result in less than significant impacts on undiscovered cultural resources. Thus, this Alternative, with regard to cultural resources, would be similar to the proposed Project.

Energy

Implementation of this Alternative would reduce the project site by approximately 50 percent and reduce the energy demand by approximately 50 percent. This Alternative also would be required to comply with all state and local regulations pertaining to energy reduction and use of alternative energy sources. Therefore, overall the reduced intensity of this Alternative would reduce the amount of energy needed compared to the proposed Project.

Geologic Resources

This Alternative would result in similar geologic impacts to the proposed Project as the surrounding geologic environmental remains the same. Therefore, any development on the Project site is subject to the same impacts due to geologic conditions. Mitigation measures comparable to those recommended for the proposed Project would be incorporated into this Alternative to minimize impacts.

Greenhouse Gases

Implementation of this Alternative would result in 2,306,502 square feet of industrial building space to be constructed on the proposed Project site. Construction would continue to occur on the entire property, therefore construction emissions would be similar to the proposed Project. Because this Alternative would result in slightly fewer workers, a slight reduction in traffic trips would occur as compared to the proposed Project; therefore, the long-term air quality impacts would be slightly less than the proposed Project. Greenhouse gas emission impacts would need to be mitigated in order to reduce the business as usual (BAU) greenhouse gas emissions by 29 percent to be consistent with the standards established by the California Air Resources Board and the California Global Warming Solutions Act of 2006. Therefore, greenhouse gas emissions impacts would be similar to the proposed Project.

Hazards/Hazardous Materials

Similar to the proposed Project, implementation of Alternative C, the "Reduced Density" Alternative, would result in potentially significant impacts on public health and safety. This Alternative includes the disturbance of a portion of the Project site for development of 2,306,502 square feet of industrial building space, slightly less than the proposed Project; therefore, this Alternative would slightly reduce the potential of the transport of hazardous materials. This Alternative would have a similar impact on the existing PG&E pipeline as the proposed Project. In addition, closure of the prospect well would continue to be required. This Alternative would expose individuals to similar effects associated with agricultural land uses (i.e., soil contamination, noise, dust). This Alternative would reduce the number of people working on-site by approximately 50 percent; however, the overall public health and safety impacts would be similar to those of the proposed Project. The mitigation measures identified for the proposed Project would be included in this Alternative.

Hydrology and Water Quality

Development in accordance with this Alternative would result in similar amounts of impervious surfaces and, therefore, slightly smaller amounts of runoff volumes compared to the proposed Project.

Water consumption would be slightly less than water usage under the proposed Project; however, the impacts would remain similar to those of the proposed Project. As with the proposed Project, this Alternative would comply with standard County provisions related to the incorporation of sufficient storm drain infrastructure to reduce the amount of surface runoff. Implementation and compliance with the NPDES, SUSMP and standard BMP requirements would reduce construction-related impacts on water quality to a less than significant level. Mitigation measures similar to the proposed Project would be applied to ensure short-term water quality construction impacts remain less than significant.

Land Use and Relevant Planning

Implementation of this Alternative would continue to require a GPA, ZCC, annexation, and an agricultural preserve exclusion. Alternative D, the Reduced Project Size Alternative, would develop 2,306,502 square feet of medium industrial facilities on approximately 159 acres, approximately 50 percent of the original Project site. Development would occur on the portion of the Project site proposed to be SI (Service Industrial). The remaining 50 percent of the Project site, approximately 155.3 acres, would continue to be used for agricultural purposes. Land use impacts from Alternative D, the Reduced Project Size Alternative, would be proportionally reduced from those of the proposed Project.

Mineral Resources

Alternative D, the "Reduced Project Size" Alternative, would develop only the portion of the Project site proposed to be SI (Service Industrial). The development would not occur in the area of the abandoned well and therefore, reabandonment would not be required under this Alternative. Alternative D, the Reduced Project Size Alternative, would result in reduced impacts on mineral resources as compared to the proposed Project.

Noise

Noise impacts from development under Alternative D, the "Reduced Project Size" Alternative, would be reduced compared to those identified for the proposed Project. The noise that would result during construction activities would be similar to the level that would occur from development of the proposed Project but may occur over a shorter duration due to the small project size. Operational noise would be reduced from the proposed Project because the total square footage of industrial space would be less than the proposed Project. Noise from vehicle trips would also be reduced proportionately to the reduction in industrial facility space. Impacts to the residence along Lamb Avenue, west of South Union Avenue, would be reduced due to the increase distance between the residence and area to be developed. Mitigation measures similar to the proposed Project would be applied and could reduce impacts to less than significant level. Overall, impacts would be proportionally reduced from those of the proposed Project.

Population and Housing

Alternative D, the "Reduced Project Size" Alternative, would reduce the proposed Project size by approximately 50 percent, resulting in the development of approximately 2,306,502 square feet of medium industrial facilities. The labor force needed for this Alternative would, be less than the labor

force needed for the proposed Project. Therefore, the impacts under Alternative D would be less than those identified for the proposed Project.

Public Services and Utilities

This Alternative would develop approximately 50 percent of the Project site. The demand for public services and utilities generated at the Project site would be reduced by approximately 50 percent. The reduced square footage for industrial facilities would result in fewer employees and fewer industrial businesses within the Project site, which would in turn have lesser impacts on public services and utilities. All standard mitigation measures identified under the proposed Project would be required in order to reduce impacts to a less than significant level. Therefore, this Alternative would result in reduced impacts on public services and utilities when compared to the proposed Project.

Traffic and Circulation

The reduced amount of square footage for industrial building space developed under this Alternative would result in a slightly reduced number of employees and delivery trucks, which in turn would result in a slight decrease in average daily vehicle trips (ADT) compared to the proposed Project. Fewer AM and PM peak hour trips and ADT would result in a proportional reduction of impacts on intersections and roadway segments within the area surrounding the Project site. The temporary impacts on transportation within the area surrounding the Project site would be similar to those with the proposed Project because the proposed construction activities would occur in a similar area and require access from the same roadways, but would be shorter in duration. The planned improvements and mitigation measures identified for the proposed Project would still be applicable under this Alternative in order to reduce impacts to a less than significant level. Overall, impacts on traffic and circulation from this Alternative would be proportionally reduced compared to those associated with the proposed Project.

Wildfire

This Alternative would result in a reduced development intensity of the Project Site by approximately 50%. Under this alternative; however, surrounding land uses would not change and on-site changes to land uses, although reduced, would not change the impacts associated with wildfires. Therefore, the potential for the Project site to be affected by wildfire from adjacent areas would be the same and no changes or impacts associated with wildfire would occur.

Conclusion

Avoid or Substantially Lessen Project Impacts

This Alternative would reduce impacts to agriculture, air quality, land use and relevant planning, noise, and traffic/circulation.

Attainment of Project Objectives

Alternative D, the "Reduced Project Size" Alternative, does not meet the following Project objectives, as described in Section 6.2.

- Cluster commercial retail uses that provide goods and services near an interchange with SR-99 to accommodate interstate freight and reduce traffic congestion and air emissions.
- Provide an industrial center at the Houghton Road and SR-99 interchange in the southern metropolitan area adjacent to the City that would provide a broad range of goods and services that serve the regional market area.
- Allow for the development of a variety of commercial and industrial centers which are differentiated by their function, intended users and level of intensity.

Comparative Merits

This Alternative would reduce the impacts compared to the proposed Project in the categories of air quality, noise, and traffic and circulation; and would have equivalent impacts in the categories of aesthetics, agriculture, biological resources cultural resources, geologic and seismic hazards, greenhouse gases, hazards/hazardous materials, hydrology and water quality, land use and relevant planning, mineral resources, population and housing, public services and utilities, and traffic and circulation.

6.6 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The purpose of the Alternatives evaluation is to develop Project Alternatives that have fewer or no significant impacts compared to the proposed Project. CEQA Section 15126(d)(2) indicates that, if the "No Project/No Development" Alternative is the "Environmentally Superior" Alternative, then the EIR shall also identify an Environmentally Superior Alternative among the other Alternatives. In this case, Alternative A, the "No Project/No Development" Alternative (Existing Conditions), is the environmentally superior Alternative, as it would not result in environmental impacts associated with construction. However, Alternative A, the "No Project/No Development" Alternative, would not satisfy the Project's objectives.

Alternative B, "Buildout Existing General Plan Designation", Alternative C "Reduced Density", and Alternative D "Reduced Project Size", would each result in fewer or equivalent environmental impacts when compared to the proposed Project.

Alternative B "Buildout Existing General Plan Designation", would reduce impacts compared to the proposed Project in the categories of aesthetics, agriculture, air quality, biological resources, energy, greenhouse gases, land use and relevant planning, noise, public services and utilities and traffic and circulation; and would have equivalent impacts in the categories of cultural resources, geologic and seismic hazards, hazards/hazardous materials, hydrology and water quality, mineral resources, and wildfire. This Alternative would only partially satisfy the Project objectives, as no industrial land uses would be developed.

Alternative C "Reduced Density", would reduce impacts compared to the proposed Project in the categories of air quality, energy, noise, and traffic and circulation; and would have equivalent impacts in the categories of agriculture, biological resources cultural resources, geologic and seismic hazards, greenhouse gases, hazards/hazardous materials, hydrology and water quality, and land use and

planning, mineral resources, population and housing, public services and utilities, and wildfire. This Alternative would satisfy the Project objectives.

Alternative D "Reduced Project Size", would proportionally reduce the impacts compared to the proposed Project in the categories of air quality, energy, noise, traffic and circulation, agriculture, biological resources cultural resources, geologic and seismic hazards, greenhouse gases, hazards/hazardous materials, hydrology and water quality, land use and relevant planning, mineral resources, population and housing, public services and utilities, and wildfire. This Alternative could eliminate noise impacts to sensitive receptors, and could eliminate associated impacts with some air pollutant emissions. This Alternative, however, would not satisfy any of the Project objectives.

Although development of the Project site in accordance with one of these Alternatives would result in fewer environmental impacts, only one of the Alternatives would fulfill all of the proposed Project's objectives. In addition, one of the Alternatives would have the potential to avoid significant and unavoidable impacts to agricultural resources. Despite the reduced project specific impacts, implementation would not reduce significant and unavoidable cumulative impacts to agriculture, air quality, greenhouse gases, noise, or traffic.

Based on the reasons stated above, Alternative D, the "Reduced Project Size" Alternative, is the environmentally superior Alternative because it significantly reduces the amount of agricultural land impacted, while reducing other Project specific impacts.

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Chapter 7

Responses to Comments

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Chapter 7.0
Responses to Comments

This Chapter is being reserved for, and will be included with, the Final Environmental Impact Report (EIR).

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Chapter 8

Organizations and Persons Consulted

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Chapter 8
Organizations and Persons Consulted

Note: All of the below entities were either notified or contacted directly to ask for or directly receive consultation on their applicable area of expertise in respect to this proposed project. This may not be an all-inclusive list.

State of California

California Resource Agency

Department of Conservation

Office of Historic Preservation

Department of Parks and Recreation

Department of Water Resources

Department of Fish and Wildlife

Department of Health Services

Native American Heritage Commission

Public Utilities Commission

Department of Transportation Division of Aeronautics

Department of Transportation District 06

Department of Toxic Substances Control

Regional Water Quality Control Board Central Valley Region

Regional and Local

California Native Plant Society

Kern County Department of Agriculture

Kern County Public Works Department

Kern County Parks and Recreation

Kern County Planning and Natural Resources Department

Kern County Sheriff Department

Kern County Superintendent of Schools

Kern County Water Agency

Kern Council of Governments

Pacific Gas & Electric Company

San Joaquin Valley Unified Air Pollution Control District

Southern San Joaquin Valley Information Center

Southern California Gas Company

Southern California Edison

Native American Consultation

In accordance with Senate Bill 18 and the California Tribal Consultation guidelines, the appropriate native groups were consulted with respect to the project's potential impacts on Native American places, features, and objects. As of the writing of this report, Staff has not received any comments from consulted tribes with regard to the department's SB 18 request. Staff notes consultation with appropriate Native American groups per Senate Bill 18 requirements has occurred.

Chapter 9

Preparers

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Chapter 9
Preparers

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Chapter 10

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Chapter 10
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Draft
Environmental Impact Report

SCH# 2023110442

Volume 1

Chapters 1 through 11

IPG INDUSTRIAL PROJECT

by IPG Kern County 52 Holdings, LLC

(PP23405)

Precise Development Plan No. 72, Map No. 102
Zone Variance No. 57, Map No. 102

Kern County
Planning and Natural Resources Department
Bakersfield, CA

March 2025

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PLANNING AND NATURAL RESOURCES DEPARTMENT

Planning
Community Development
Administrative Operations

NOTICE OF AVAILABILITY FOR PUBLIC REVIEW AND HEARING ON THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED IPG INDUSTRIAL PROJECT

This is to advise that the Kern County Planning and Natural Resources Department has prepared a Draft Environmental Impact Report (EIR) for the project identified below. As mandated by State law, the minimum public review period for this document is 45 days.

PROJECT TITLE: IPG Industrial Project by IPG Kern County Holdings 52, LLC (PP23405); PD 72, Map 102; ZV 57, Map 102

PROJECT LOCATION: The project site is approximately 1.7 miles north of the City of Bakersfield, in unincorporated Kern County. The project site is located within the Kern County, Metropolitan Bakersfield General Plan (unincorporated Planning Area). The City of Shafter lies approximately 3.1 miles west of the project site, and the unincorporated community of Oildale borders the east side of the project site. The project site is situated approximately 1.4 miles northeast of State Route (SR) 99. The project site is located on the Oildale, California United States Geological Survey (USGS) 7.5-minute Topographic Quadrangle Map, Township 29 South, Range 27 East, Section 2.

DOCUMENT AVAILABILITY: The Draft EIR and the documents referenced in it are available for public review at the Planning and Natural Resources Department, which is located at 2700 "M" Street, Suite 100, in Bakersfield, CA 93301 or on the Department website at:

https://kernplanning.com/environmental-doc/ipg-industrial-project

PUBLIC COMMENT: The required Draft EIR public review period is 45 days.

March 7, 2025 – April 21, 2025

Written comments may be submitted to the project planner identified below prior to the close of the DEIR public review period on **April 21, 2025, at 5:00 p.m.** to:

Kern County Planning and Natural Resources Department
ATTN: Mark Tolentino, Planner III
2700 "M" Street, Suite 100, Bakersfield, CA 93301
Phone: (661) 862-5041
E-mail: TolentinoM@kerncounty.com

PUBLIC HEARING: A public hearing has been scheduled with the Kern County Board of Supervisors to consider a recommendation on the project and solicit comments on the adequacy and completeness of the analysis and proposed mitigation measures described in the Draft EIR. You may comment by providing testimony at the public hearing on:

DATE: **June 17, 2025**
TIME: **2:00 P.M. or soon thereafter**
LOCATION: **Chambers of the Board of Supervisors**
Kern County Administrative Center, First Floor
1115 Truxtun Avenue, Bakersfield, CA 93301

Comments may be provided at that hearing or prior to any action by the Board of Supervisors on any matter. The Board of Supervisors' decision is final.

If you challenge the action taken on this request in court, you may be limited to raising only those issues you or someone else raised at this public hearing, or in written correspondence delivered to the Planning and Natural Resources Department at, or prior to, the public hearing.

PROJECT DESCRIPTION: The proposed project would include the development of two single-story logistics facilities totaling approximately 923,130 square-feet (including 15,000 square-feet for dedicated office space) and associated improvements on approximately 49.05 acres of privately owned land in the central portion of unincorporated Kern County.

Implementation of the project as proposed include the following requests:

- **Precise Development Plan (PD No. 72, Map No. 102)** to allow construction and operation of a warehouse distribution and logistics facility within two single-story warehouses totaling 923,130 square feet, with 15,000 square feet of dedicated office space (Sections 19.36.020.E.2 and 19.36.020.D.1) on an approximate 49.05 acre Project site across two parcels in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District at the corner of Boughton Drive and Airport Drive:
    - **Building 1:** 655,690 square feet, including 10,000 square feet of dedicated office space
    - **Building 2:** 267,440 square feet, including 5,000 square feet of dedicated office space
- **Zoning Variance (ZV No. 57, Map No. 102)** to allow construction of a 56-foot-tall warehouse building where 35 feet is authorized (Section 19.76.080) in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District.

ENVIRONMENTAL REVIEW FINDINGS: Anticipated significant and unavoidable impacts on Air Quality, Greenhouse Gases, Noise, and Utilities (Water Supply)

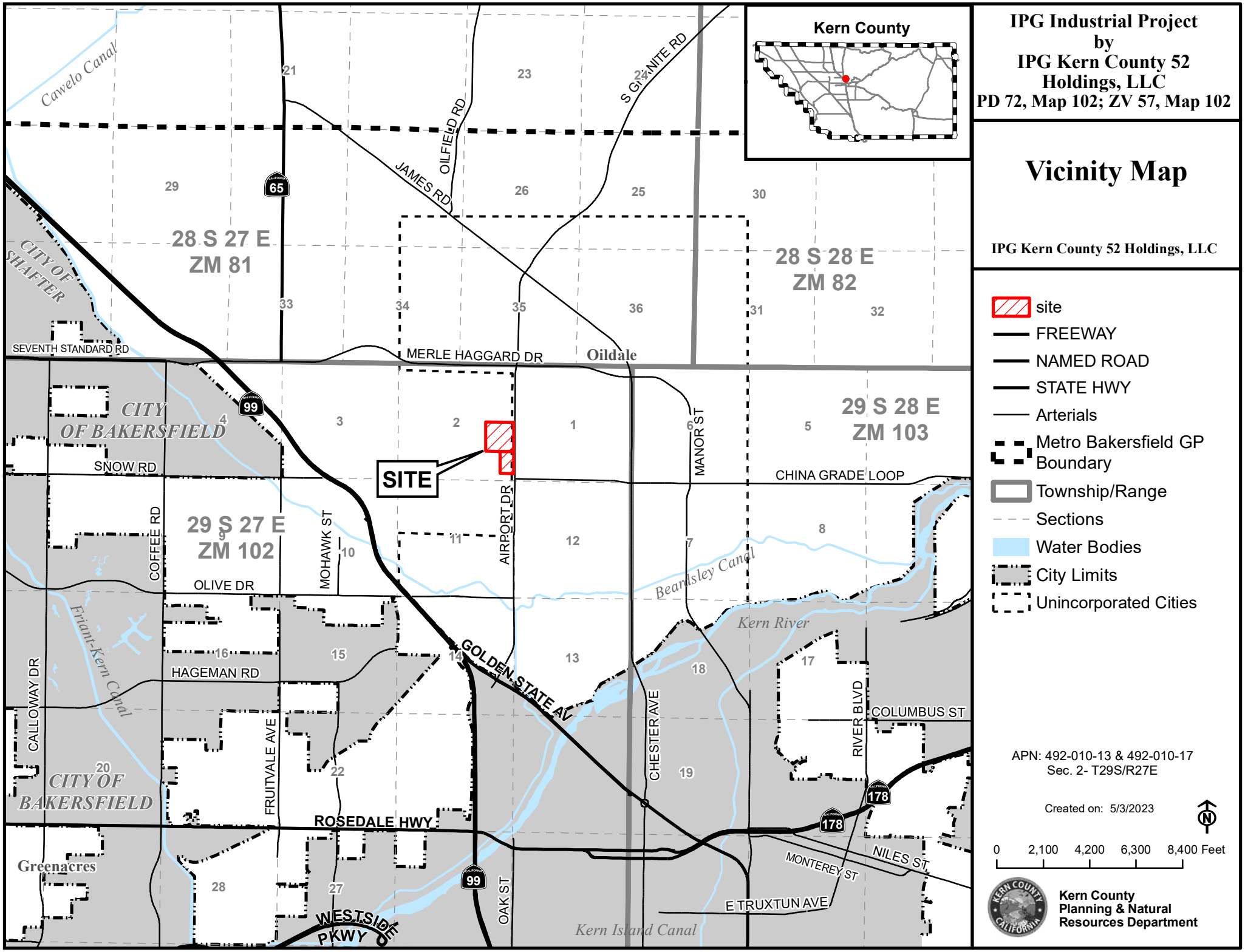
LORELEI H. OVIATT, AICP, Director
Planning and Natural Resources Department

To be published once only on next available date and as soon as possible

THE BAKERSFIELD CALIFORNIAN
THE SHAFTER PRESS

MFT (03/07/25)

cc: County Clerk (2) (with fee)
Environmental Status Board
Supervisorial District No. 1


Kern County
IPG Industrial Project
by
IPG Kern County 52
Holdings, LLC
PD 72, Map 102; ZV 57, Map 102
Vicinity Map
IPG Kern County 52 Holdings, LLC
site
FREEWAY
NAMED ROAD
STATE HWY
Arterials
Metro Bakersfield GP Boundary
Township/Range
Sections
Water Bodies
City Limits
Unincorporated Cities
APN: 492-010-13 & 492-010-17
Sec. 2- T29S/R27E
Created on: 5/3/2023
0 2,100 4,200 6,300 8,400 Feet
Kern County
Planning & Natural
Resources Department
28 S 27 E
ZM 81
28 S 28 E
ZM 82
29 S 28 E
ZM 103
29 S 27 E
ZM 102
SITE
CITY OF SHAFTER
CITY OF BAKERSFIELD
Oildale
Greenacres
Cawelo Canal
Friant-Kern Canal
Beardsley Canal
Kern River
Kern Island Canal
SEVENTH STANDARD RD
MERLE HAGGARD DR
SNOW RD
OLIVE DR
HAGEMAN RD
ROSEDALE HWY
WESTSIDE PKWY
CHINA GRADE LOOP
JAMES RD
OILFIELD RD
S GIANNITE RD
MANOR ST
AIRPORT DR
MOHAWK ST
COFFEE RD
CALLOWAY DR
FRUITVALE AVE
GOLDEN STATE AV
CHESTER AVE
RIVER BLVD
COLUMBUS ST
OAK ST
MONTEREY ST
NILES ST
E TRUXTUN AVE
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IPG Kern County Holdings LLC PD 72,
ZV 57, Map 102
cc: 03/07/2025

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Review

Kern County Airports Department

Kern County Administrative Officer

Kern County Public Works Department/
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Kern County Public Works Department/
Building & Development/Survey

Kern County
Env Health Services Department

Kern County Fire Dept
Cary Wright, Fire Marshall

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Local History Room

Kern County Library/Beale
Andie Sullivan

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Kern County Sheriff's Dept
Administration

Kern County Public Works
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Reporting

Kern County Public Works Department/
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IPG Kern County Holdings LLC PD 72, ZV 57, Map 102
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BAKERSFIELD CA 93308

112 020 06 00 0
SALAS ANASTACIO ORTEGA
2119 WINGLAND DR
BAKERSFIELD CA 93308

491 420 08 00 6
KAUR GURMEET
9345 VAL DI CHIANA DR
BAKERSFIELD CA 93314

491 491 03 00 9 **DUP**
KLASSEN FAMILY LTD PARTNERSHIP
2019 COVERDALE ST
BAKERSFIELD CA 93311

491 011 43 00 5
MARCIAL JOSE & MARIA TR
15930 STREBOR DR
BAKERSFIELD CA 93314-9326

491 420 01 00 5
MILLER CHRISTINA L & SHOFNER CAREY H JR
761 GREENWOOD MEADOW LN
BAKERSFIELD CA 93308-9815

491 420 04 00 4
MORTON JESSE W FAM TR
3569 MILITARY AV
LOS ANGELES CA 90034-6103

491 412 34 00 2
OUR TAPASYA LLC
3207 HILLTOP DR
VENTURA CA 93003

112 040 14 00 9
PEDROZA ESTELA OSCAR
407 17TH ST
BAKERSFIELD CA 93301-4917

491 420 06 00 0
RAYA AGUSTIN RAFAEL
825 GREENWOOD MEADOW LN
BAKERSFIELD CA 93308

491 420 10 00 1
RUEDA MAURICIO
841 GREENWOOD MEADOW LN
BAKERSFIELD CA 93308-9833

112 020 10 00 1
SANCHEZ JOSE A & COFFMAN M RENEE
2143 WINGLAND DR
BAKERSFIELD CA 93308-1611

491 412 49 00 6
SMITH ADOBE RANCH FAMILY L P
1547 34TH AV
SAN FRANCISCO CA 94122

491 420 18 00 5
SORENSEN JOSEPH L
836 GREENWOOD MEADOW LN
BAKERSFIELD CA 93308-9833

491 420 19 00 8
SPARKS PROP LLC
9206 BRUNELLO CT
BAKERSFIELD CA 93314

112 020 04 00 4
STUTZ BROOKE
2113 WINGLAND DR
BAKERSFIELD CA 93308-1611

491 011 42 00 2
TAKSBAK L P
3239 W ASHLAN AV
FRESNO CA 93722

491 420 24 00 2
TAMAYO NORMA CARILLO
808 GREENWOOD MEADOW LN
BAKERSFIELD CA 93308-9833

491 420 02 00 8
TEJADA JULIO & GUADALUPE
803 GREENWOOD MEADOW LN
BAKERSFIELD CA 93308

491 011 05 00 5
TSIBOUKAS CHRIS FAM TR
3301 W ROSECRANS AV
HAWTHORNE CA 90250-8226

492 010 12 00 5
VANDER WEERD INVESTMENTS
837 COMMERCIAL AV
TULARE CA 93274

491 420 20 00 0
VEREBELY SHANGELA D
13089 PEYTON DR APT C176
CHINO HILLS CA 91709-6018

491 540 01 00 0
WEST DAY LLC
6501 FRUITVALE AV
BAKERSFIELD CA 93308-2712

112 040 12 00 3
ZANINOVICH DOMINIC
200 EL CERRITO DR
BAKERSFIELD CA 93305-1304

491 492 08 00 1
13418 LIVINGSTON TR
PO BOX 261
PORT HUENEME CA 93044-0261

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Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH # 2023110442

Project Title: IPG Industrial Project by IPG Kern County 52 Holdings, LLC

Lead Agency: Kern County Planning and Natural Resources Department
Contact Person: Mark Tolentino, Planner III
Mailing Address: 2700 M Street, Suite 100
Phone: 661-862-5041
City: Bakersfield Zip: 93301
County: Kern County

Project Location: County: Kern City/Nearest Community: Bakersfield
Cross Streets: Airport Drive & Boughton Drive Zip Code: 93308
Longitude/Latitude (degrees, minutes and seconds): 35 ° 25 ′ 59.3394 ″ N / 119 ° 2 ′ 29.5074 ″ W Total Acres: 49
Assessor's Parcel No.: 492-010-13 and 492-010-17 Section: 2 Twp.: 29S Range: 27E Base: MDBM
Within 2 Miles: State Hwy #: SR-99 Waterways:
Airports: Meadows Field Railways: BNSF Schools: Wingland Elementary, North High School

Document Type:

CEQA: ☐ NOP ☒ Draft EIR NEPA: ☐ NOI Other: ☐ Joint Document
☐ Early Cons ☐ Supplement/Subsequent EIR ☐ EA ☐ Final Document
☐ Neg Dec (Prior SCH No.) ☐ Draft EIS ☐ Other:
☐ Mit Neg Dec Other: ☐ FONSI

Local Action Type:

☐ General Plan Update ☐ Specific Plan ☐ Rezone ☐ Annexation
☐ General Plan Amendment ☐ Master Plan ☐ Prezone ☐ Redevelopment
☐ General Plan Element ☐ Planned Unit Development ☒ Use Permit ☐ Coastal Permit
☐ Community Plan ☒ Site Plan ☐ Land Division (Subdivision, etc.) ☒ Other: Zone Variance

Development Type:

☐ Residential: Units Acres
☐ Office: Sq.ft. Acres Employees ☐ Transportation: Type
☐ Commercial: Sq.ft. Acres Employees ☐ Mining: Mineral
☒ Industrial: Sq.ft. 923,128 Acres 49.05 Employees 437 ☐ Power: Type MW
☐ Educational: ☐ Waste Treatment: Type MGD
☐ Recreational: ☐ Hazardous Waste: Type
☐ Water Facilities: Type MGD ☐ Other:

Project Issues Discussed in Document:

☒ Aesthetic/Visual ☒ Fiscal ☒ Recreation/Parks ☒ Vegetation
☒ Agricultural Land ☒ Flood Plain/Flooding ☒ Schools/Universities ☒ Water Quality
☒ Air Quality ☒ Forest Land/Fire Hazard ☒ Septic Systems ☒ Water Supply/Groundwater
☒ Archeological/Historical ☒ Geologic/Seismic ☒ Sewer Capacity ☒ Wetland/Riparian
☒ Biological Resources ☒ Minerals ☒ Soil Erosion/Compaction/Grading ☒ Growth Inducement
☐ Coastal Zone ☒ Noise ☒ Solid Waste ☒ Land Use
☒ Drainage/Absorption ☒ Population/Housing Balance ☒ Toxic/Hazardous ☒ Cumulative Effects
☒ Economic/Jobs ☒ Public Services/Facilities ☒ Traffic/Circulation ☐ Other: Tribal Cultural, Green House Gas

Present Land Use/Zoning/General Plan Designation:

Vacant/Light Industrial Precise Development Airport Approach Height Combining District (M-1 PD H)/ LI (Light Industrial)

Project Description: *(please use a separate page if necessary)*

The proposed project would include the development of two single-story logistics facilities totaling approximately 923,130 square-feet (including 15,000 square-feet for dedicated office space) and associated improvements on approximately 49.05 acres of privately owned land in the central portion of unincorporated Kern County.
Implementation of the project as proposed include the following requests:
• (PD No. 72, Map No. 102) to allow construction and operation an approximate 923,130 square foot warehouse, distribution and logistics facility within two (2) single-story warehouses (Building 1: 655,690 square feet, including 10,000 square foot office area; and Building 2: 267,440 square feet with 5,000 square foot office area) totaling 923,130 square feet, with 15,000 square feet of dedicated office space (Section 19.36.020.E.2 & 19.36.020.D.1) on an approximate 49.05 acre project site across two-(2-) parcels, in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District at the corner of Boughton Drive and Airport Drive.
• Zoning Variance (ZV No. 57, Map No. 102) to allow construction of a 56-foot-tall warehouse building where 35 feet is authorized (Section 19.76.080) in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District.

Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "**X**".
If you have already sent your document to the agency please denote that with an "**S**".

S	Air Resources Board		Office of Historic Preservation
	Boating & Waterways, Department of		Office of Public School Construction
	California Emergency Management Agency		Parks & Recreation, Department of
S	California Highway Patrol		Pesticide Regulation, Department of
S	Caltrans District # 6		Public Utilities Commission
S	Caltrans Division of Aeronautics	X	Regional WQCB # Central
S	Caltrans Planning	X	Resources Agency
	Central Valley Flood Protection Board		Resources Recycling and Recovery, Department of
	Coachella Valley Mtns. Conservancy		S.F. Bay Conservation & Development Comm.
	Coastal Commission		San Gabriel & Lower L.A. Rivers & Mtns. Conservancy
	Colorado River Board		San Joaquin River Conservancy
X	Conservation, Department of		Santa Monica Mtns. Conservancy
	Corrections, Department of		State Lands Commission
	Delta Protection Commission		SWRCB: Clean Water Grants
	Education, Department of	X	SWRCB: Water Quality
	Energy Commission		SWRCB: Water Rights
S	Fish & Game Region # Fresno		Tahoe Regional Planning Agency
	Food & Agriculture, Department of	S	Toxic Substances Control, Department of
	Forestry and Fire Protection, Department of	S	Water Resources, Department of
	General Services, Department of		
	Health Services, Department of		Other:
	Housing & Community Development		Other:
X	Native American Heritage Commission		

Local Public Review Period (to be filled in by lead agency)

Starting Date March 7, 2025 Ending Date April 21, 2025

Lead Agency (Complete if applicable):

Consulting Firm: WSP USA
Address: 401 B Street, Suite 1650
City/State/Zip: San Diego, CA 92101
Contact: Kristin Blackson
Phone: 858-264-7000

Applicant: IPG Kern County 52 Holdings, LLC - Attn: Craig Wilde
Address: 991C Lomas Santa Fe Drive, Suite 469
City/State/Zip: Solana Beach, CA 92075
Phone: 314-713-9516

Signature of Lead Agency Representative: /S/ **Date:** 03/07/2025

Authority cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code.

Draft
Environmental Impact Report

SCH# 2023110442

Volume 1

Chapters 1 through 11

IPG INDUSTRIAL PROJECT

by IPG Kern County 52 Holdings, LLC

(PP23405)

Precise Development Plan No. 72, Map No. 102
Zone Variance No. 57, Map No. 102

Kern County
Planning and Natural Resources Department
Bakersfield, CA

Technical Assistance by:

WSP USA, Inc.

March 2025

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Executive Summary

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Chapter 1

Executive Summary

1.1 Introduction

This Draft Environmental Impact Report (EIR) has been prepared by Kern County (County), the California Environmental Quality Act (CEQA) Lead Agency, to identify and evaluate potential environmental impacts associated with implementation of the proposed IPG Industrial Project (Precise Development Plan [PD] No. 72, Map No. 102; Zoning Variance [ZV] No. 57, Map No 102) (Project) by IPG Kern County 52 Holdings, LLC (Project proponent). The Project includes the construction and operation of a 923,130-square-foot warehouse distribution facility and associated improvements necessary to facilitate material handling equipment and storage on a 49.05-acre site.

The Draft EIR provides information about the environmental setting and impacts of the Project and alternatives to the Projects. It informs the public about the Project and its impacts and provides information to meet the needs of local, State, and federal permitting agencies that are required to consider the project. The Kern County will use the Draft EIR to determine whether to approve the requested entitlements.

This Executive Summary does the following:

- Summarizes the requirements of the CEQA Guidelines
- Provides an overview of the Project and alternatives to the Project
- Identifies the purpose of this EIR
- Outlines the potential impacts of the Project and recommended mitigation measures
- Discloses areas of controversy and issues to be resolved

1.2 Project Summary

The Project would include the development of a 923,130-square-foot single-story warehouse distribution facility and associated improvements on approximately 49.05 acres of privately owned land in the central portion of unincorporated Kern County. Implementation of the Project as proposed includes the following requests:

- **Precise Development Plan (PD No. 72, Map No. 102)** to allow construction and operation of a warehouse distribution and logistics facility within two single-story warehouses totaling 923,130 square feet, with 15,000 square feet of dedicated office space (Sections 19.36.020.E.2 and 19.36.020.D.1) on an approximate 49.05 acre Project site across two parcels in the M-1 PD

H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District at the corner of Boughton Drive and Airport Drive:

  - **Building 1:** 655,690 square feet, including 10,000 square feet of dedicated office space
  - **Building 2:** 267,440 square feet, including 5,000 square feet of dedicated office space

- **Zoning Variance (ZV No. 57, Map No. 102)** to allow construction of a 56-foot-tall warehouse building where 35 feet is authorized (Section 19.76.080) in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District.

1.3 Discretionary Entitlements Required

The Kern County Planning and Natural Resources Department, as the Lead Agency (according to CEQA Guidelines Section 15052) for the Project, has staff responsibility for the preparation of the Draft EIR and recommendations to the Project's decision-makers.

In addition to the discretionary approvals from the County, it may be necessary to obtain other discretionary entitlements, approvals, or permits from other public agencies with jurisdiction over aspects of the Project. This Draft EIR is also intended for use by responsible and trustee agencies or other agencies that may have jurisdiction, approval authority, or environmental review and consultation requirements for the Project.

While not exhaustive, the list of entitlements applicable to the Project includes the following:

Federal

- Federal Aviation Administration
  - Determination of No Hazard to Aviation

State

- Central Valley Regional Water Quality Control Board (RWQCB)
  - National Pollution Discharge Elimination System (NPDES) Construction General Permit
  - General Construction Stormwater Permit (Preparation of a SWPPP)
- California Department of Transportation (Caltrans)
  - Right-of-Way Encroachment
  - Permit for Transport of Oversized Loads (if required)

Local

- Kern County
  - Certification of Final Environmental Impact Report
  - Adoption of 15091 Findings of Fact and 15093 Statement of Overriding Considerations
  - Adoption of Mitigation Monitoring and Reporting Program
  - Approval of Precise Development Plan
  - Approval of Zoning Variance
  - Approval of Kern County Grading and Building Permits
  - Approval of Kern County Encroachment Permits
  - Approval of Fire Safety Plan
- San Joaquin Valley Air Pollution Control District
  - Authority to Construct (ATC)
  - Construction Fugitive Dust Control Plan
  - Permit to Operate (PTO)
  - Indirect Source Rule and Voluntary Emission Reduction Agreement
  - Other permits as required

1.4 Draft EIR Purpose and Use

An EIR is a public-information document that is used for planning and decision-making. This project-level Draft EIR analyzes the environmental impacts of the Project. The Kern County Planning Commission and Board of Supervisors will consider the information in this Draft EIR, including public comments and staff responses to those comments, during the public hearing process. The Kern County Board of Supervisors will make a final decision, which may be to approve, conditionally approve, or deny the Project.

The purpose of this Draft EIR is to identify the following:

- The significant potential impacts of the Project on the environment and how these impacts can be avoided or mitigated
- Unavoidable adverse impacts that cannot be mitigated
- Reasonable and feasible alternatives to the Project that would eliminate any significant adverse environmental impacts or reduce the impacts to a less-than-significant level

An EIR also discloses growth-inducing impacts, impacts found not to be significant, and significant cumulative impacts of past, present, and reasonably anticipated future projects. CEQA requires preparation of an EIR that reflects the independent judgment of the Lead Agency regarding the impacts, the level of significance of the impacts both before and after mitigation, and mitigation measures proposed to reduce the impacts.

A Draft EIR is circulated to Responsible Agencies, Trustee Agencies with resources affected by a project, and interested agencies and individuals. Public and agency review of a Draft EIR serves several purposes:

- Sharing expertise
- Disclosing agency analyses
- Checking for accuracy
- Detecting omissions
- Discovering public concerns
- Soliciting counterproposals

Reviewers of a Draft EIR are requested to focus on the sufficiency of the document in identifying and analyzing the possible impacts on the environment and ways in which the significant impacts of a project might be avoided or mitigated. Comments are most helpful when they suggest additional specific alternatives or mitigation measures that would provide better ways to avoid or mitigate significant environmental effects.

This Draft EIR is being distributed directly to agencies, organizations, and interested groups and people for comment during a 45-day formal review period in accordance with Section 15087 of the CEQA Guidelines. The Draft EIR process, including how members of the public can comment on this Draft EIR, is discussed further in Chapter 2, *Introduction*.

1.5 Project Overview

This section describes the local and regional setting, surrounding land uses, and the Project's objectives and characteristics. The Project is described in further detail below, with greater detail provided in Chapter 3, *Project Description*.

1.5.1 Regional Setting

Kern County is located between the Sierra Nevada Mountains to the east and the Coastal Range to the west, creating a valley that extends to both mountain ranges, with some foothill areas on the eastern side of the Sierra Nevada. The Project site is located in the central portion of unincorporated Kern County (**Figure 1-1**); approximately 1.7 miles north of the City of Bakersfield; 3.1 miles east of the City of Shafter; adjacent to the unincorporated community of Oildale; and within Section 2 of Township 29S and Range 27E.

1.5.2 Surrounding Land Use and Project Site Conditions

The 49.05-acre Project site comprises two individual parcels within the central portion of unincorporated Kern County. Land uses surrounding the Project site consist of industrial, commercial, transportation, and residential. The Assessor Parcel Numbers (APNs) for the site include 492-101-13 and 492-101-17, as shown in **Table 1-1**. **Table 1-2** identifies the adopted Metropolitan Bakersfield General Plan (MBGP) land use designations and map code designations, and the existing Kern County zoning classifications for the Project site as well as the areas north, south, east, and west of the site. The nearest sensitive receptor to the Project site is the Park Meadows Apartment community located approximately 103 feet east of the Project site.

Table 1-1: Project Assessor Parcel Numbers, Existing Land Uses, and Acreages

Parcel	APN	Zone Map	General Plan	Map Code Designation	Existing Zoning	Acres
1	492-101-13	102	Metro Bakersfield	LI	M-1 PD H	35.17
2	492-101-17	102	Metro Bakersfield	LI	M-1 PD H	13.88
Approximate Project Total Acreage						**49.05**

Key:
APN = assessor parcel number
LI = Light Industrial
M-1 = Light Industrial
PD = Precise Development
H = Airport Approach Height)

Table 1-2: Project Site and Surrounding Land Uses

	Existing Land Use	Existing Map Code Designation	Existing Zone Classification
Project Site	Vacant	LI	Light Industrial Precise Development Airport Approach Height Combining District (M-1 PD H)
North	Vacant	LI	Light Industrial Precise Development Airport Approach Height Combining District (M-1 PD H)
East	Residential, Storage, Restaurant	MC, GC	General Commercial Precise Development Combining District (C2 PD); High Density Residential – Precise Development Combining (R-3 PD); Medium Density Residential – Precise Development Combining (R-2 PD); Low Density Residential (R-1)
South	Shipping Centers, Transportation services	PT	Medium Industrial Airport Approach Height Combining District (M-2 H)

	Existing Land Use	Existing Map Code Designation	Existing Zone Classification
West	Airport, Transportation Services	PT	Medium Industrial Airport Approach Height Combining District (M-2 H)

Key:
C2 = General Commercial District
GC = General Commercial
H = Airport Approach Height
LI = Light Industrial
MC = Major Commercial
M-1 = Light Industrial
M-2 = Medium Industrial
PD = Precise Development
PT = Public Transportation
R-1 = Low Density Residential
R-2 = Medium Density Residential
R-3 = High Density Residential

1.5.3 Applicant-Provided Project Objectives

State CEQA Guidelines Section 15124(b) requires that a project description includes a clearly written statement of objectives. The statement of objectives should include the underlying purpose of the project and may discuss the project benefits. The following are the applicant-submitted objectives for the Project:

- Develop state-of-the-art warehouse and distribution facilities near major transportation corridor
- Meet regional demand for Class A industrial facilities that address local traffic patterns and needs
- Develop a visually appealing industrial project that is consistent with the provisions of the Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards
- Promote land use compatibility with adjacent airport-related uses by developing a warehouse and distribution facility
- Positively contribute to the local economy through new capital investment, the creation of new employment opportunities, expansion of the tax base, economic growth and development, and payment of development fees
- Site an industrial project in a location consistent with current and future market demands and that minimizes conflicts with surrounding uses

1.5.4 Project Characteristics

As noted previously, development would include a 923,130-square-foot warehouse logistics facility with associated site improvements. Development would include the construction of two single-story buildings: Building 1 would total 655,690 square feet, including 10,000 square feet of office space; and Building 2 would total 267,440 square feet with 5,000 square feet of office space. The overall facility would total 923,130 square feet.

The Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage, and logistics uses, with up to 20% of the facility used for cold storage. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage, handling and distribution for varied goods and materials used in commerce

including but not limited to finished products, consumer goods, parts, materials, tires, and tools typically found in a modern distribution/logistics facility consistent with a M-1 PD H Zone District. Any modification to the interior of the building (tenant improvements) would be subject to a plan review and require a building permit to ensure compliance with applicable codes (for example, building, fire, and plumbing codes).

Outdoor storage is not proposed as part of this Project. It is possible that certain allowable goods and products distributed from the Project would require particular fire protection measures with the Fire Department, including tire storage. These improvements would be required as part of the tenant-improvement approval process. However, all proposed uses will be required to comply with the applicable sections of the fire code (and all codes) prior to the issuance of a grading or building permit. The Project site is bounded by Merle Haggard Drive (north), Airport Drive (east), and Hanger Way (west and south), as shown in **Figure 1-1**. The Project would include all applicable site improvements on 49.05 acres of privately owned land, as shown in **Figure 1-2**.

Pursuant to Kern County Zoning Ordinance (KCZO) Section 19.36.020.E.2, the warehouse and distribution facility is permitted on a "by-right" basis; however, due to the inclusion of the Precise Development overlay, Section 19.56.130 requires a precise development plan for the overall Project. In addition, the KCZO requires approval for a variance, as the Project would exceed the building height allowed in the H (Airport Approach Height Combining) District.

Figure 1-2 shows Project components and they are described further in in Chapter 3, *Project Description.*

Figure 1-1: Regional Location

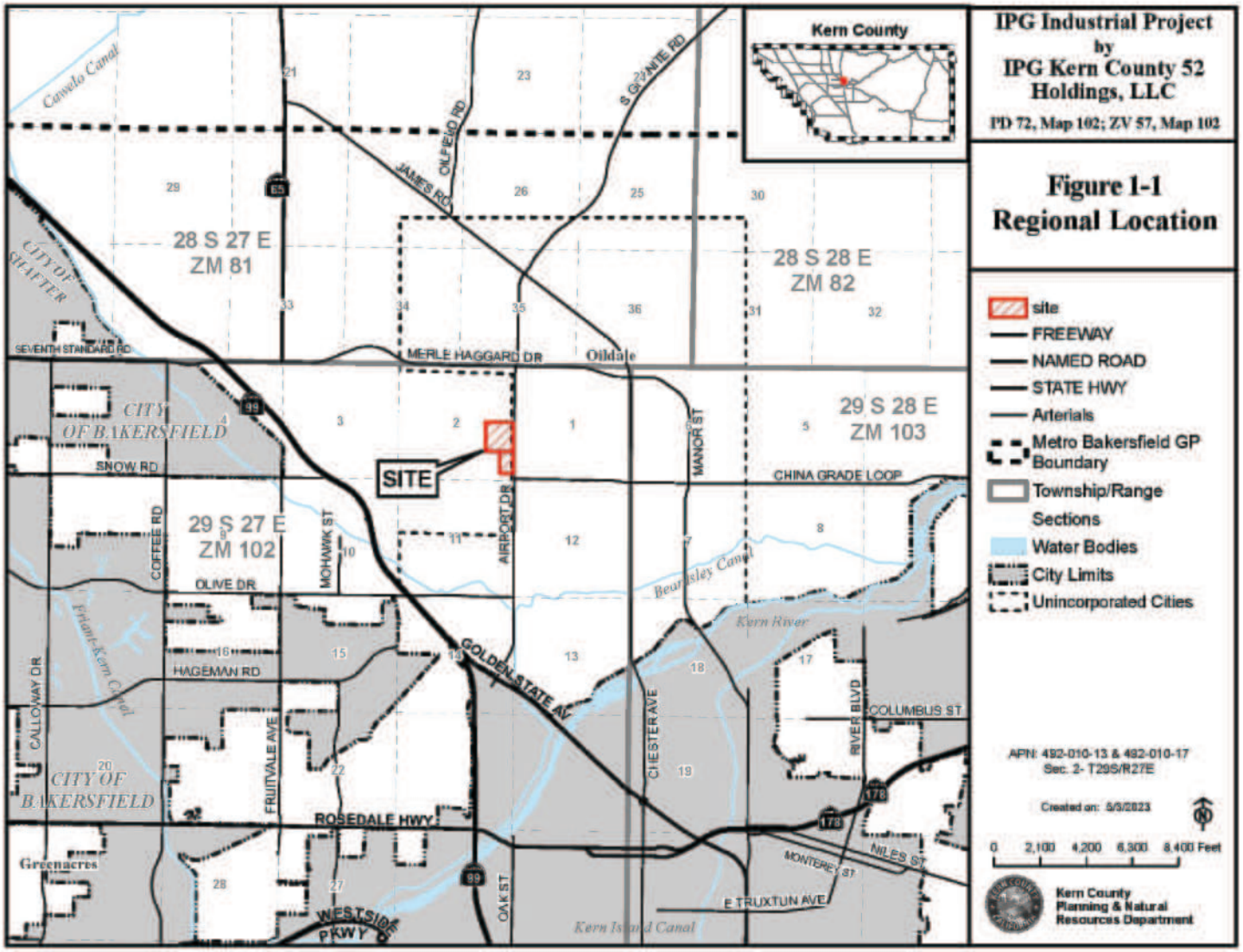
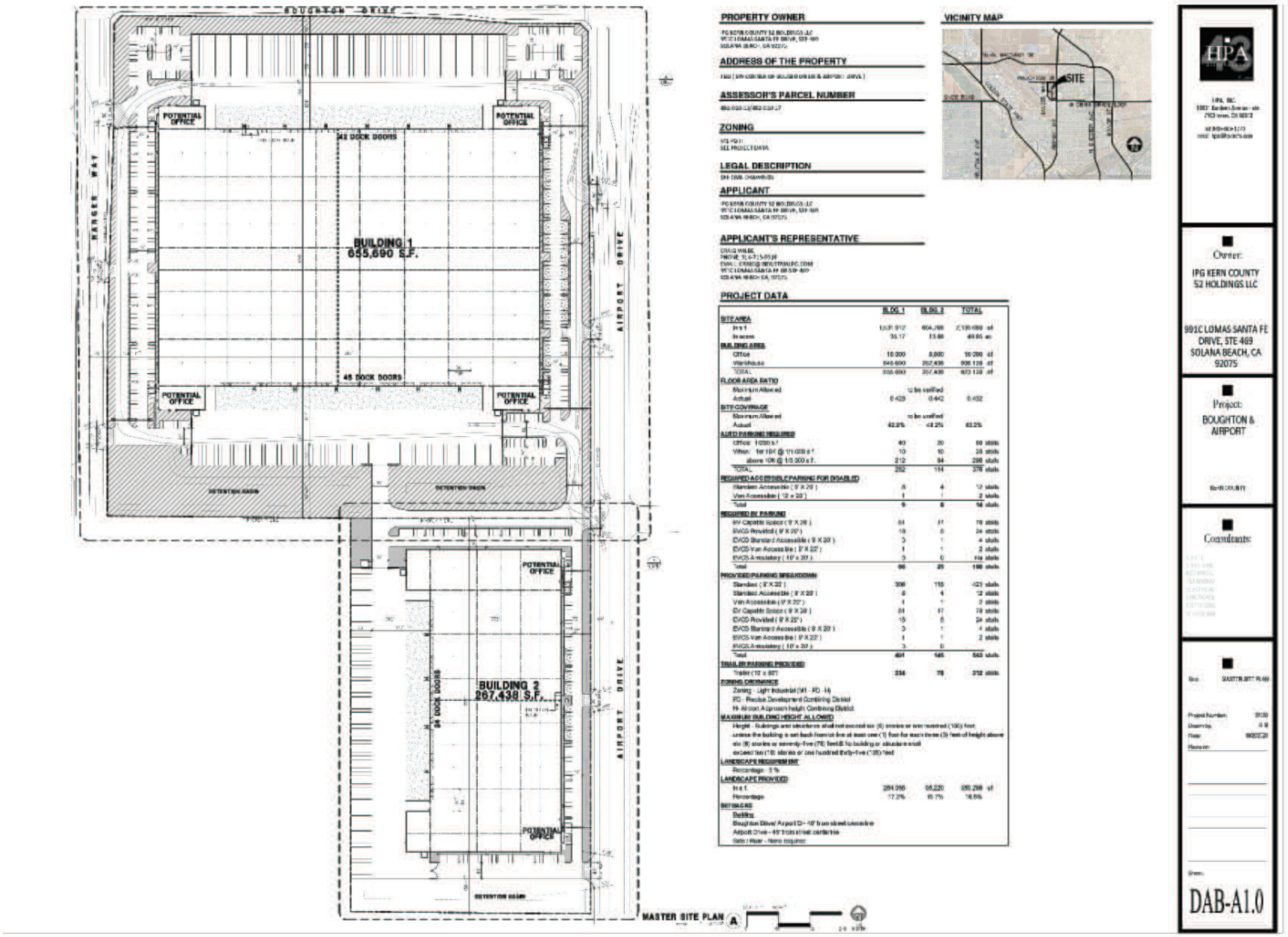


Figure 1-2: Proposed Precise Development Plan – Overall Site Plan



1.6 Environmental Impacts

CEQA Guidelines Section 15128 requires an EIR to contain a statement briefly indicating the reasons why any new and possibly significant effects of a project were determined not to be significant and were therefore not discussed in detail in the EIR. The County has engaged the public to participate in the scoping of the environmental document.

The contents of this Draft EIR were established based on a Notice of Preparation (NOP) prepared in accordance with the CEQA Guidelines and on public and agency input that was received during the scoping process. Comments received on the NOP are located in Appendix A.2 of this Draft EIR.

1.6.1 Impacts Not Further Considered in this Draft EIR

Based on the findings of the NOP and the results of scoping, a determination was made that this Draft EIR must contain a comprehensive analysis of all environmental issues identified in CEQA Guidelines Appendix G. No resource areas were eliminated from discussion through the initial study.

1.6.2 Impacts of the Project

Sections 4.1 through Section 4.20 in Chapter 4, *Environmental Setting, Impacts, and Mitigation Measures*, provide a detailed discussion of the environmental setting, impacts associated with the Project, and mitigation measures designed to reduce significant impacts to less than significant levels when feasible. The impacts, mitigation measures, and residual impacts for the Project are summarized in **Table 1-3**, located at the end of this chapter, and are discussed further in this subsection.

Impacts related to the following resource areas are evaluated in this Draft EIR for their potential significance:

- Aesthetics and Visual Resources
- Agricultural and Forest Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire

1.6.3 Environmental Effects Found to be Less Than Significant (Including Significant Impacts that can be Mitigated, Avoided, or Substantially Lessened)

Table 1-3 presents those impacts of the Project that were determined to be less than significant, or less than significant with the implementation of mitigation measures. Less than significant cumulative impacts are also included in this table. Sections 4.1 through 4.17 of this Draft EIR present detailed analysis of these impacts and describe the means by which the mitigation measures listed in **Table 1-3** would reduce impacts to a less than significant level.

Table 1-3: Summary of Project Impacts that are Less than Significant or Less than Significant with Mitigation

Impact	Mitigation Measures
Biological Resources (Project and Cumulative)	MM 4.4-1 through MM 4.4-12, and 4.9-1
Cultural Resources (Project and Cumulative)	MM 4.5-1 through 4.5-3
Energy (Project and Cumulative)	MM 4.3-3, MM 4.6-1, MM 4.6-2, MM 4.8-1 and MM 4.8-2
Geology and Soils (Project and Cumulative)	MM 4.7-1 through MM 4.7-11, and MM 4.10-1
Greenhouse Gas Emissions (Project)	MM 4.3-3, 4.3-5; MM 4.6-1 and MM 4.6-2; 4.8-1 and 4.8-2; MM 4.17-2
Hazards and Hazardous Materials (Project and Cumulative)	MM 4.4-3; MM 4.7-8; MM 4.9-1 through MM 4.9-13; MM 4.15-1; MM 4.17-1 through MM 4.17-5
Hydrology and Water Quality (Project and Cumulative)	MM 4.7-8; MM 4.9-3, MM 4.10-1 and MM 4.10-2; MM 4.19-3 and 4.19-4
Land Use and Planning (Project and Cumulative)	MM 4.1-3; MM 4.11-1 and MM 4.11-4
Noise (Project)	MM 4.1-3; MM 4.13-1 through MM 4.13-4
Population and Housing (Project and Cumulative)	MM 4.15-2
Public Services (Project and Cumulative)	MM 4.9-11; MM 4.15-1 and MM 4.15-2; MM 4.17-1 through MM 4.17-3
Recreation (Project and Cumulative)	None required
Transportation and Traffic (Project)	MM 4.17-1 through MM 4.17-5
Tribal and Cultural Resources (Project and Cumulative)	MM 4.5-1 through MM 4.5-4
Utilities and Service Systems (Project)	MM 4.19-1 through MM 4.19-5
Wildfire (Project and Cumulative)	MM 4.9-11; MM 4.17-1 through MM 4.17-5

1.6.4 Significant and Unavoidable Cumulative Impacts

According to Section 15355 of the CEQA Guidelines, cumulative impacts "refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Individual effects that may contribute to a cumulative impact may result from a single project or a number of separate projects. Individually, the impacts

of a project may be relatively minor, but when considered along with impacts of other closely related or nearby projects, including newly proposed projects, the effects could be cumulatively considerable.

This Draft EIR considers the potential cumulative effects of the Project. Impacts for the following issue areas have been found to be cumulatively considerable:

- Air Quality
- Greenhouse Gases
- Noise
- Utilities and Service Systems (water supply)

Each of these significant cumulative impacts is discussed in the applicable sections of Chapter 4, *Environmental Settings, Impacts, and Mitigation Measures,* and are summarized below in **Table 1-4**.

Table 1-4: Summary of Significant and Unavoidable Impacts of the Project

Resources	Project Impacts	Cumulative Impacts
Air Quality	There would be no significant and unavoidable Project impacts. With the implementation of **MM 4.3-1** through **MM 4.3-5**, the impact would be less than significant.	The Project would have cumulatively significant and unavoidable impacts related to consistency with existing air quality plans as the County does not have jurisdiction and control over all potential projects in the San Joaquin Valley Air Basin and, thus, cannot assure that such projects would fully offset their criteria emissions pursuant to a Developer Mitigation Agreement. Additionally, although the Project would implement **Mitigation Measures MM 4.3-1** through **MM 4.3-10**, the Project, in combination with all potential projects in the San Joaquin Valley Air Basin, could result in significant levels of criteria pollutants due to the lack of methodology to assess the specific correlation between mass emissions generated and the effect on the public health and welfare. Therefore, it would be speculative to determine how the Project, in combination with all potential projects in the San Joaquin Valley Air Basin would affect the number of days the region is in nonattainment, since mass emissions are not correlated with concentration of emissions or how many additional individuals in the air basin would be affected by the health impacts mentioned. As such, cumulative impacts for criteria pollutants would be considered **cumulatively significant and unavoidable.**
Greenhouse Gases	There would be no significant and unavoidable Project impacts.	The Project would implement **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (See **Section 4.3**, *Air Quality*), **MM 4.6-1**, **MM 4.6-2** (see **Section 4.6**, *Energy*), **MM 4.8-1**, **MM 4.8-2** and **MM 4.17-3** (see **Section 4.17**, *Transportation and Traffic*) to help reduce GHG emissions. However, without clear scientific or other criteria for determining the significance of the Project's contribution to global climate change, it is not possible to

Resources	Project Impacts	Cumulative Impacts
		assess, with certainty, whether the Project's contribution would be cumulatively considerable within the meaning of *CEQA Guidelines* Sections 15065(a)(3) and 15130. Therefore, cumulative impacts associated with the generation of GHG emissions would be **significant and unavoidable**, regardless of implementation of the aforementioned mitigation measures, as GHG impacts are exclusively cumulative.
Noise	There would be no significant and unavoidable Project impacts.	The Project itself would result in a less than significant impact and Mitigation Measures MM 4.13-1 through MM 4.13-4 (Section 4.13, Noise, for full mitigation measures) would be implemented, requiring equipment laydown yards to be staged as far as possible from residences, construction equipment to be fitted with approved noise-reduction features, and construction vehicles to limit idling time and speeding on access roads. During operations, Project-level noise emissions would be further mitigated through the implementation of Mitigation Measure MM 4.1-3, as outlined in Section 4.1, Aesthetics, which requires installation of a vegetative barrier along the Airport Drive and Boughton Drive frontages, resulting in both a visual and noise buffer between the industrial operations and nearby residences and sensitive receptors. Project construction activities would generate worker trips per day, vendor trips, and haul truck trips that would result in substantial temporary increases in noise due to increased traffic. The existing baseline plus construction traffic noise levels along the analyzed roadway segments would not increase by a noise level of more than 5 A-weighted decibels, which is considered to be a readily perceivable increase. However, the Project would result in significant and unavoidable cumulative noise-related impacts due to the temporary increase in construction noise. Therefore, even with the implementation of Mitigation Measures MM 4.1-3, and MM 4.13-1 through MM 4.13-4, cumulative noise impacts would still be considered significant and unavoidable.
Utilities and Service Systems	There would be no significant and unavoidable Project impacts.	With implementation of the Project, sufficient groundwater supplies will continue to be available during future normal, dry, and multiple dry years in the County. Regardless, as the Kern County Subbasin is currently over drafted and the District's Groundwater Sustainability Plan has been deemed inadequate, along with the other Kern subbasin plans where the other similar known and unknown projects could occur, the cumulative impacts of any use of groundwater in the area are considered significant and unavoidable after all feasible and reasonable mitigation. Therefore, cumulative impacts related to water supply would be **significant and unavoidable,** despite implementation of **MM 4.19-3**, and **MM 4.19-4**.

1.6.5 Growth Inducement

The MBGP recognizes that certain forms of growth are beneficial, both economically and socially. CEQA Guidelines Section 15126.2(d) identifies a project as growth-inducing if it "would foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment."

The Project does not include the construction of housing; therefore, would not result in direct population growth as a result of additional housing. Implementation of the Project would create temporary and permanent employment positions. The Project would require a temporary workforce to construct the warehouse and distribution facility. The on-site construction workforce would consist of up to 503 full-time equivalent jobs; however, the average daily workforce would vary depending upon the stage of construction. During the operational phase, the facility would employ approximately 437 employees over the course of up-to three shifts, with additional indirect/induced economic impacts from the project supporting approximately 159 additional jobs. Construction staff that are not local would likely be housed in existing communities. It is expected that employees would already reside in the area and operation of the Project would not result in a substantial influx of people (such as a new residential development, school, or other use that would result in large volumes of people residing near or traveling to the Project site).

As described in Section 4.14, *Population and Housing*, the unemployment rate in the Project region was 8.9% in June 2024. This regional unemployment rate is still above the California unemployment rate (5.3%) and national average (4.3%). Thus, the temporary and permanent employees required by the Project could come from the surrounding areas without the need for relocation. The Project would not create additional infrastructure or road extensions that would indirectly induce population growth. The Project would promote development consistent with the economic and land use demands of the area, as defined by the goals and policies within the MBGP and would not induce substantial growth.

As described in Section 4.17, *Utilities and Service Systems*, the Project would connect to existing service laterals located along Boughton Drive and Airport Drive for electricity during construction, and water services during construction and operation. Once operational, a substation would provide power generation for the on-site building. Natural gas would not be required for Project operation. The Project would include its own on-site stormwater drainage consisting of inlets, underground piping, and surface and underground basins. The basins would be designed to accommodate a 100-year storm event and would detain runoff and release it at a rate no greater than the pre-development condition of the Project site. Therefore, the Project would not require connection to existing storm drains or wastewater laterals. Because no extension of infrastructure to unserved areas would be required, no removal of physical barriers to growth would occur. In total, the Project is not likely to induce any growth within Kern County.

1.6.6 Irreversible Impacts

Section 15126.2(c) of the CEQA Guidelines defines an irreversible impact as an impact that uses nonrenewable resources during the initial and continued phases of the Project. Irreversible impacts can also result from damage caused by environmental accidents associated with a project. Irretrievable commitments of resources should be evaluated to ensure that such consumption is justified.

During Project construction, build-out of the Project would commit nonrenewable resources. During Project operations, oil, gas, and other fossil fuels and nonrenewable resources would be consumed, primarily in the form of transportation fuel for Project employees and delivery trucks. The use of water during the construction phase is also required for activities such as dust suppression, soil compaction, and grading activities. Operations of the Project can expect to also require gas and other fossil fuels in the form of transportation fuel for employees, as well as water for operational activities such as landscape irrigation and employee restroom facilities. Therefore, an irreversible commitment of nonrenewable resources would occur as a result of long-term Project operations. However, assuming that those commitments occur in accordance with the adopted goals, policies, and implementation measures of the MBGP, as a matter of public policy, those commitments have been determined to be acceptable. The MBGP ensures that any irreversible environmental changes associated with those commitments will be minimized, to the extent feasible.

Additionally, the Project would be required to adhere to the latest adopted edition of the California Building Code, which includes standards to reduce energy demand, water consumption, wastewater generation, and solid waste generation that would collectively reduce the demand for resources during construction and operation. This would result in the emission and generation of less pollution and effluent and would further lessen the impact of corresponding environmental effects. Although the Project would result in an irretrievable commitment of nonrenewable resources, the commitment of these resources would not be inefficient, unnecessary, or wasteful.

1.7 Alternatives to the Project

Section 15126.6 of the CEQA Guidelines states that an EIR must address "a range of reasonable alternatives to the Project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the Project and evaluate the comparative merits of the alternatives." Based on the significant and unavoidable impacts of the project, the aforementioned objectives established for the project, and the feasibility of the alternatives considered, a range of alternatives is analyzed in the next subsection and discussed in detail in **Chapter 6**, *Alternatives*, of this Draft EIR.

1.7.1 Alternatives Considered and Rejected

Kern County considered several alternatives to reduce the project's significant and unavoidable impacts. Alternatives that are remote or speculative, or the effects of which cannot be reasonably predicted, also do not need to be considered (CEQA Guidelines Section 15126(f)(2)). Kern County considered several alternatives to reduce impacts to air quality (cumulative), biological resources (cumulative), greenhouse gases (cumulative) hydrology and water quality (cumulative groundwater supply), and utilities and service systems (cumulative water supply). Per CEQA, the Lead Agency may make an initial determination as to which alternatives are feasible and warrant further consideration, and which are infeasible.

The following alternatives were initially considered but were eliminated from further consideration in this EIR because they do not meet project objectives or were infeasible.

The Infill Alternative was considered and rejected, due to there being no suitable infill sites for the size of the land area or existing land use designation and zoning located in Kern County for the Project, and impacts would potentially be more significant.

The Transit-Oriented Alternative was considered and rejected, due to there being no suitable transit-oriented sites within Kern County for the Project.

1.7.2 Alternatives Selected for Analysis

Alternatives that would avoid or substantially lessen any of the significant effects of the project and feasibly attain most of the basic project objectives are evaluated, below. The alternatives are discussed with respect to their relationship to the Project's objectives. Kern County has considered the following two alternatives, which are also identified in **Table 1-3** and discussed individually as follows:

- Alternative 1 – "No Project" Alternative
- Alternative 2 – Reduced Size: One Parcel (APN: 492-101-13) – One Building (Building 1)
- Alternative 3 – Eastern Kern/Mojave Specific Plan Project Alternative Site

Alternative 1: "No Project" Alternative

The CEQA Guidelines require EIRs to include a No Project Alternative for the purpose of allowing decision-makers to compare the effects of approving the Project versus a No Project Alternative. Accordingly, Alternative 1, the No Project Alternative, assumes that the development of the proposed warehouse would not occur. The No Project Alternative would not require the PD or a ZV for construction and operation of a warehouse distribution facility and associated improvements. Under the No Project Alternative, the Project site would maintain the current zoning, land use classifications, and existing undisturbed land surrounded by industrial and commercial uses. No physical changes would be made to the Project site.

Alternative 2 – Reduced Footprint Alternative

Alternative 2, the Reduced Footprint Alternative, would develop the proposed alternative at the same Project site with a footprint reduced by approximately 30%. Under this alternative, only Building 1 would be constructed, with a site area of 35.17 acres featuring a 655,690 square foot warehouse with 10,000 square feet dedicated to office space. This approach would decrease the overall development footprint, as well as reduce the number of employee and truck trips, traffic congestion, and emissions compared to the Project, along with a proportionate amount of demand for water, energy, utilities, and other resources. However, it would still require the same entitlements as the Project.

Alternative 3 – Eastern Kern/Mojave Specific Plan Alternative Site

Alternative 3, the Eastern Kern/Mojave Specific Plan Project Alternative Site, proposes the same Project development and operation of a 923,130 square feet warehouse distribution facility and associated improvements on approximately 49.05 acres, but in a different area of Kern County, specifically eastern Kern County, within the adopted Mojave Specific Plan (Mojave Specific Plan 2003). The intention of this Project alternative is to find a Project site adjacent to major freeway access, non-agricultural land use, and reduce required travel distances for distribution trucks and thereby related impacts to aesthetics, air quality, biological resources, and greenhouse gas emissions associated with the Project. Alternative 3 would develop the same land area and all of the Project components.

The Mojave Specific Plan (2003) encompasses approximately 31,000 acres in eastern Kern County, including the unincorporated community of Mojave, and functions as the transportation and aviation hub of eastern Kern County. Impacts to water supply usage would be reduced to less than significant because the Mojave Specific Plan water basin is not subject to any adjudication or Groundwater Management Sustainability Act (GSMA). This alternative would be located in the Mojave Desert, rather than the San Joaquin Valley. Alternative 3 would also include improvements to off-site roadways, utilities, water treatment facilities, gas lateral extensions, storm drainage systems, and associated infrastructure, similar to the Project.

The Specific Plan area has direct access off State Route 58 (SR 58), which connects into the Riverside – San Bernadino and Ontario Metropolitan transportation corridors and connects to State Highway 14 (Antelope Valley Freeway) with direct access to Southern California Interstate 5 into the City of Los Angeles and San Diego The East Kern Air Pollution Control District is responsible for regional air quality of the area and is considered to be in attainment for emissions, while the SJVAPCD is in nonattainment for O_3 (8-hour) and $PM_{2.5}$ (federal) and O_3 (1-hour and 8-hour), PM_{10}, and $PM_{2.5}$ (State).. Approval of Alternative 3 would be required to comply with the Mojave Specific Plan and entitlements for the Project, which would be dependent on the site selected within the planning area. As a Specific Plan with an existing Final Environmental Impact Report, CEQA streamlining would be available for Alternative 3.

Table 1-5 and **Table 1-6** both summarize the full Alternatives discussion provided in **Chapter 6** of this Draft EIR.

Table 1-5: Summary of Development Alternatives

Alternative	Description	Basis for Selection and Summary of Analysis
The Project	The Project would include the development of a 923,130 square feet warehouse distribution facility and associated improvements on approximately 49.05 acres located in the central portion of unincorporated Kern County. The facility contains two single-story buildings: one building (Building 1) would total approximately 655,690 square feet and the second (Building 2) would total 267,440 square feet, with a total of 15,000 square feet for office space.	N/A
Alternative 1: No Project Alternative	No development would occur on the Project site. The Project site would remain unchanged.	• Required by CEQA • Avoids need for approval of ZV and PD Plan • Avoids all significant and unavoidable impacts • Less impact in all remaining environmental issue areas • Does not meet any of the Project objectives
Alternative 2: Reduced Footprint	Alternative 2, the Reduced Footprint Alternative, would develop the proposed alternative at the same Project site with a footprint reduced by approximately 30%. Under this alternative, only Building 1 would be constructed, with a site area of 35.17 acres featuring a 655,690 square foot warehouse with 10,000 square feet dedicated to office space.	• Requires the same PD Plan and ZV • Reduces impacts to aesthetics, air quality, cultural resources, energy, geology and soils, noise, transportation and traffic, and tribal cultural resources due to the reduced footprint. • Reduces environmental impacts associated with operational traffic, and associated air, noise and GHG emissions by approximately 30% • Meets Project objectives to lesser extent than the Project
Alternative 3: Eastern Kern/Mojave Specific Plan Project Alternative Site	Alternative 3, the Eastern Kern/Mojave Specific Plan Project Alternative Site, proposes the same project development and operation of a 923,130 square feet warehouse distribution facility and associated improvements on approximately 49.05 acres, but in a different area of Kern County, specifically eastern Kern County in the adopted Mojave Specific Plan (Mojave Specific Plan 2003).	• Greater impacts to Biological Resources • Similar impacts in all remaining environmental issue areas • Meets all Project objectives

Table 1-6: Summary Comparison of Alternative Impacts

Issue Area	Project Summary of Impacts	Alternative 1 No Project	Alternative 2 Reduced Footprint Alternative	Alternative 3 Alternative Site
Aesthetics and Visual Resource	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Agricultural and Forest Resources	No Impact	Similar (NI)	Similar (NI)	Similar (NI)
Air Quality	Significant and unavoidable (cumulative)	Less (NI)	Less (SU)	Similar (SU)
Biological Resources	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Greater (SU)
Cultural Resources	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Energy	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Geology and Soils	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Greenhouse Gas Emissions	Significant and unavoidable (cumulative)	Less (NI)	Similar (SU)	Less (SU)
Hazards and Hazardous Materials	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Hydrology and Water Quality	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Land Use and Planning	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Mineral Resources	Less than significant	Less (NI)	Similar (LTS)	Greater (SU)
Noise	Significant and unavoidable (cumulative)	Less (NI)	Less (SU)	Similar (SU)
Population and Housing	Less than significant	Less (NI)	Similar (NI)	Similar (LTS)
Public Services	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Recreation	Less than significant	Less (NI)	Similar (LTS)	Similar (LTS)
Transportation and Traffic	Less than Significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)

Issue Area	Project Summary of Impacts	Alternative 1 No Project	Alternative 2 Reduced Footprint Alternative	Alternative 3 Alternative Site
Tribal Cultural Resources	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Utilities and Service Systems	Significant and unavoidable (cumulative – water supply)	Less (NI)	Similar (SU)	Similar (LTS)
Wildfire	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Meet Project Objectives?	All	None	Most	All
Reduce Significant and Unavoidable Impacts	N/A	All	Partially	Some

NI = No Impact
LTS = Less Than Significant
SU = Significant and Unavoidable

1.7.3 Environmentally Superior Alternative

As presented in the comparative analysis above, and as shown in **Table 1-6** there are a number of factors in selecting the environmentally superior alternative. An EIR must identify the environmentally superior alternative to the Project. Alternative 1, the No Project Alternative, would be environmentally superior to the Project on the basis of its minimization or avoidance of physical environmental impacts. However, CEQA Guidelines Section 15126.6(e)(2) states:

> *The "no project" analysis shall discuss the existing conditions at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services. If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives.*

Because the No Project Alternative cannot be the Environmentally Superior Alternative under CEQA, the Environmentally Superior Alternative is considered to be Alternative 3: Alternative Site. When compared to the Project, Alternative 3 would result in similar impacts across all environmental resources, excluding *Biological Resources* and *Greenhouse Gas Emissions*, as Alternative 3 would generate a lessened impact due to the Mojave air basin's emissions attainment status and due to the widely undeveloped nature of East Kern lending itself to greater impacts on potential habitat for sensitive desert species. However, the significant and unavoidable impacts on a cumulative level for *Utilities and Service Systems* that would result from the Project would be reduced to less than significant levels under Alternative 3 since the Mojave Specific Plan is not within a groundwater basin that is subject to any adjudication or GSMA, nor considered over drafted.

It should be noted that the project proponent lacks immediate control and access to such an alternative site location and although all project objectives could be met, as discussed above, such project objectives could not be met within the same time frame and/or with the same efficiency as the current proposal forecasts. The project proponent would be required to identify and secure land use authority over such an alternative site location, whether by purchasing or leasing the land, and subsequently must apply for land use entitlements and conduct environmental review.

1.8 Areas of Known Controversy

Areas of controversy were identified through written agency and public comments received during the scoping period. Public comments received during the scoping period are summarized in Chapter 2, *Introduction*, and provided in Appendix A. In summary, the following issues were identified during scoping and are addressed in the appropriate sections of Chapter 4, *Environmental Setting, Impacts, and Mitigation Measures*:

- Air quality concerns for criteria pollutants and relation to sensitive receptors

- Construction and operational GHG emissions
- Temporary noise increases from construction
- Water supply availability

1.9 Issues to Be Resolved

Section 15123(b) (3) of the CEQA Guidelines requires that an EIR contain issues to be resolved, which include the choices among alternatives and whether or how to mitigate significant impacts. The major issues to be resolved regarding a project include decisions by the Lead Agency:

- Determine whether the Draft EIR adequately describes the environmental impacts of a project
- Select a preferred choice among alternatives
- Determine whether the recommended mitigation measures should be adopted or modified
- Determine whether additional mitigation measures need to be applied to a project

1.10 Summary of Environmental Impacts and Mitigation

Section 15123 of the *CEQA Guidelines* requires that an EIR contain a brief summary of the proposed actions and its consequences. **Table 1-7** below, summarizes the environmental impacts of the project, mitigation measures, and unavoidable significant impacts identified and analyzed in Chapter 4, *Environmental Setting, Impacts, and Mitigation Measures*, of this Draft EIR.

Table 1-7: Draft EIR Impacts, Mitigation Measures, and Level of Impacts After Mitigation

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
4.1 Aesthetics and Visual Resources			
Impact 4.1-1: The project would have a substantial adverse effect on a scenic vista.	No impact	No mitigation would be required.	No impact
Impact 4.1-2: The project would substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State Scenic Highway.	No impact	No mitigation would be required.	No impact
Impact 4.1-3: The project would, in nonurbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings. (Public views are those that are experienced from publicly accessible vantage points.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality.	Potentially significant	**MM 4.1-1:** Prior to the issuance of building permits for the proposed project, the project proponent/operator shall submit a proposed color scheme and treatment plan, for review and approval by the Kern County Planning and Natural Resources Department, that will ensure all project facilities blend in with the colors found in the surrounding landscape. All color treatments shall result in matte or nonglossy finishes. **MM 4.1-2:** Prior to the issuance of building permits, site plans submitted for warehouse buildings located within 1,000 feet of the Boughton Drive and Airport Drive corridors shall include the following aesthetic features: a. Rooftop screening features, such as a parapet or screening material, to create a visual screen for rooftop mechanical equipment. b. Reflective metal shall not be used as exterior architectural elements on buildings immediately adjacent to Boughton Drive and Airport Drive. c. Entry gates to the loading truck court must be positioned to allow a minimum of 50 feet of available stacking depth inside the property line. The stacking depth would increase by 70 feet for every 20 loading bays and beyond 50 loading bays, to the extent feasible. d. Anti-idling signs must be installed at truck loading sites, the entrance to the development, and at all heavy-duty truck exit driveways directing drivers to the proper truck route.	Less than significant impact

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		MM 4.1-3: Prior to the issuance of building permits for any facilities on the project site, theproponent/operator applicant shall submit to the Kern County Planning and Natural Resources Department for approval a landscape plan that complies with the Kern County Zoning Ordinance requirements in Chapter 19.86 - Landscaping. The plan shall include: a. Preparation by a licensed Landscape Architect; b. California native, drought-tolerant plants; c. An irrigation plan as required under the Kern County Zoning Ordinance 19.86.070; d. A vegetation barrier shall be installed along the Boughton Drive and Airport Drive frontages of the project site. The vegetation barrier shall consist of multiple rows of trees and shrubs, a 10-foot-high berm, a decorative wall, or a combination thereof. Final design shall be submitted for review and approval by the Director of the Planning and Natural Resources Department. The vegetation barrier shall: 1. Be a minimum of 15 feet high (at full maturity) or a minimum of 3 feet above the decorative wall. The wall shall be between 6 and 8 feet high. 2. Be a minimum 30-foot-wide perimeter buffer along any visible boundary from the Boughton Drive and Airport Drive; 3. Achieve porosity between .5 to .9 at full maturity and shall maintain porosity during all seasons. 4. Consist of multiple types of species to prevent plant mono-cultures. Use of coniferous trees, and/or trees comprised of waxy and/or hairy leaf surfaces with leaf and branch structure that provide increased surface areas is encouraged. Species composition shall include, but not be limited to, the following: A. Consist of evergreen, drought tolerant species of low biogenic emissions (e.g. low pollen, etc.), a minimum of 36-inch box size at time of installation	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		and spaced no greater than 40 feet apart. B. One (1) tree having a minimum planting height of six (6) feet for every 40 lineal feet of buffer; C. Palm trees, deciduous trees, and monocarpic, and annual plants shall not be allowed to satisfy this requirement. D. Evergreen shrubs which reach a minimum height of four (4) to six (6) feet. E. Live ground cover consisting of low-height plants, or shrubs, or grass shall be planted in the portion of the landscaped area not occupied by trees or evergreen shrubs. F. Bare gravel, rock, bark or other similar materials may be used, but are not a substitute for ground cover plantings, and shall be limited to no more than 25 percent of the required landscape area. G. Consist of species that are native, non-invasive and non-poisonous 1. Be maintained and consistent throughout all seasons and climatic conditions for the life of the project. Vegetation maintenance for the vegetation barrier shall include tree and shrub replacement in the event of die-off, disease or damage due to accidents 2. Maximum height shall be maintained to comply with the H (Airport Approach Height) District, Section 19.76.080 or within the specified maximum height limit for an approved Zone Variance that is active for this project; 3. Designed to preserve safe lines-of-sight and viewshed standards for drivers on the road. 4. Be installed prior to final occupancy. 5. After year 1 of planting, the Project proponent shall submit documentation to the Kern County Planning and Natural Resources Department indicating successful species survival and rate of porosity growth. This shall be	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		achieved through photo documentation and/or reporting of maintenance logs and growth rates to be submitted each spring, preferably after shrubs have begun to leaf out, but, if necessary, could be conducted any time during the summer. Documentation shall be submitted each year for the first five (5) years or until the vegetation reaches maturity, whichever occurs first, in order for Kern County Planning and Natural Resources Department to confirm all growth has successfully reached maturity level. e. Should perimeter fencing be proposed, fencing materials shall be constructed of any materials commonly used in the construction of fences and walls such as wood, stone, rock, tubular steel, wrought iron, or brick, or other durable materials. Masonry block walls shall be decorative and not bare masonry blocks. Decorative materials can include a façade, colored masonry blocks, or other materials. Fencing proposed around sumps shall be chain-link with view obscuring slats.	
Impact 4.1-4: The project would create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area.	Potentially significant impact	**MM 4.1-4:** Prior to issuance of building permits, the project proponent shall demonstrate to Kern County Planning and Natural Resources Staff, through the submittal of a lighting plan, that the project site will continuously comply with the applicable provisions of the Outdoor Lighting - Dark Skies Ordinance (Chapter 19.81 of the Kern County Zoning Ordinance), and shall be designed to provide the minimum illumination needed to achieve safety and security objectives. All lighting shall be directed downward and shielded to focus illumination on the desired areas only and avoid light trespass onto adjacent properties and roadways. Lenses and bulbs shall not extend below the shields.	Less than significant
Impact 4.1: Cumulative Impacts	Potentially significant impact	Implementation of **MM 4.1-1** through **MM 4.1-4** is required.	Less than significant
4.2 Agriculture and Forestry Resources			
Impact 4.2-1: The project would Convert	No impact	No mitigation would be required.	No impact

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use.			
Impact 4.2-2: The project would conflict with existing zoning for agricultural use or Williamson Act Contract.	No impact	No mitigation would be required.	No impact
Impact 4.2-3: The project would conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)) or timberland (as defined in Public Resources Code Section 4526) or timberland zoned Timberland Production (as defined by Government Code Section 51104(g)).	No impact	No mitigation would be required.	No impact
Impact 4.2-4: The project would result in the loss of forestland or conversion of forest land to non-forest use.	No impact	No mitigation would be required.	No impact
Impact 4.2-5: The project would involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forest land to non-forest use.	No impact	No mitigation would be required.	No impact
Impact 4.2-6: The project would result in the cancellation of an open space contract made pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Contract for any parcel of	No impact	No mitigation would be required.	No impact

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
100 or more acres (Section 15206(b)(3)) Public Resources Code.			
Impact 4.2: Cumulative Impacts	No impact	No mitigation would be required.	No impact
4.3 Air Quality			
Impact 4.3-1: The project would conflict with or obstruct implementation of the applicable air quality plan.	Potentially significant impact	**MM 4.3-1:** The project shall continuously comply with applicable rules and regulations set forth by the San Joaquin Valley Air Pollution Control District. **MM 4.3-2:** Prior to issuance of grading permits, the project proponent shall provide to the Kern County Planning and Natural Resources Department a site-specific Dust Control Plan approved by the San Joaquin Valley Air Pollution Control District (SJVAPCD). The Dust Control Plan shall include name(s), address(es), and phone number(s) of person(s) responsible for the preparation, submission, and implementation of the plan; a description and location of operation(s); and a listing of all fugitive dust emission sources. The site-specific Dust Control Plan shall take into consideration grading and construction schedule, seasonal winds, site-specific wind patterns, and soil conditions to ensure adequate measures are implemented to manage fugitive dust. The following shall be included where applicable and feasible and is not to be considered all-inclusive; and any other measures to reduce fugitive dust emissions not listed shall be encouraged: a. Land Preparation, Excavation and/or Demolition. The following dust control measures shall be implemented: 1. Identify a comprehensive grading schedule for the entire project site. When feasible, grading activities shall be phased and minimized to those areas necessary for project access and installation of project features. 2. All onsite unpaved roads and offsite unpaved access roads shall be stabilized using water or chemical soil stabilizers that can be determined to be as efficient as or more efficient for fugitive dust control than California Air	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Resources Board approved soil stabilizers, and that shall not increase any other environmental impacts including loss of vegetation. 3. All soil excavated or graded shall be sufficiently watered to prevent excessive dust. Watering shall occur as needed with complete coverage of disturbed soil areas. Watering shall take place a minimum of twice daily on unpaved/untreated roads and on disturbed soil areas with active operations. 4. All clearing, grading, earth moving, and excavation activities shall cease during periods of winds greater than 20 miles per hour (averaged over one hour), if disturbed material is easily windblown, or when dust plumes of 20 percent or greater opacity impact public roads, occupied structures, or neighboring property. 5. Stockpiles of dirt or other fine loose material shall be stabilized by watering or other appropriate method to prevent windblown fugitive dust. 6. Where acceptable to the Kern County Fire Department, weed control shall be accomplished by mowing instead of disking, thereby, leaving the ground undisturbed and with a mulch covering. b. Site Construction. After clearing, grading, earth moving and/or excavating is completed within any portion of the project sites, the following dust control practices shall be implemented: 1. Once initial leveling has ceased, all temporality open and inactive soil areas within the construction site shall be (1) seeded and watered until plant growth is evident, (2) treated with a dust palliative, or (3) watered twice daily until soil has sufficiently crusted to prevent fugitive dust emissions. 2. Dependent on specific site conditions (season and wind conditions), revegetation shall occur in those areas so planned as soon as practical after installation of the solar	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		panels. A native seed mix of grass and flowers shall also be added to the spread topsoil to enhance regrowth. 3. 3. All active disturbed soil areas shall be sufficiently watered at least twice daily or have dust palliatives applied to prevent excessive dust c. Vehicular Activities. During all phases of construction, the following vehicular control measures shall be implemented: 1. On-site vehicle speed shall be limited to 15 miles per hour on unpaved roads. 2. All areas with vehicle traffic shall be paved, treated with dust palliatives or watered a minimum of twice daily. 3. Streets adjacent to the project sites shall be kept clean, and project-related accumulated silt shall be removed. 4. Access to the project sites shall be by means of an apron into the project sites from adjoining surfaced roadways. The aprons shall be surfaced or treated with dust palliatives. If operating on soils that cling to the wheels of vehicles, a grizzly, wheel washer, or other such device shall be used on the road exiting the project sites, immediately prior to the pavement, in order to remove most of the soil material from vehicle tires. 5. Track-out debris onto public paved roads shall not extend 50 feet or more from an active operation and track-out shall be removed or isolated such as behind a locked gate at the conclusion of each workday, except on agricultural fields where speeds are limited to 15 mph. 6. All hauling materials should be moist while being loaded into dump trucks. 7. Drop heights when loaders dump soil into trucks shall not exceed 5 feet above the truck. 8. Soil loads should be kept below 6 inches or the freeboard of the truck. 9. All haul trucks hauling fine material (soil, sand, other	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		loose material) off-site on public roads shall be either sufficiently watered or securely covered to prevent excessive dust. 10. Gate seals should be tight on dump trucks. **MM 4.3-3:** The project proponent and/or its contractors shall continuously implement the following measures during construction and operation of the project to control emissions from the on-site equipment: a. All equipment shall be maintained in accordance with the manufacturer's specifications. b. All equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than five (5) minutes. c. Construction equipment shall not operate longer than eight (8) cumulative hours per day without prior written authorization provided by the Kern County Planning and Natural Resources Department. d. All construction vehicles shall be equipped with proper emissions control equipment and kept in good and proper running order to substantially reduce NOx emissions. e. On-road and off-road diesel equipment shall use diesel particulate filters (or the equivalent) if permitted under manufacturer's guidelines. f. All on-site off-road equipment and on-road vehicles shall meet the recent California Air Resources Board engine emission standards or alternatively fueled equipment, such as compressed natural gas, liquified natural gas, or electric, as appropriate. g. Tier 4 engines shall be used on all equipment when available. **MM 4.3-4:** To reduce demand for gas-powered landscape maintenance equipment, all required landscaping along major and arterial roadways will be designedwith native drought-resistant species (plants, trees, and bushes). **MM 4.3-5:** Prior to the issuance of grading permits, the Owner/Operator shall enter into a Developer Mitigation Agreement (DMA) (synonymous with a Voluntary Emissions Reduction	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Agreement) with the San Joaquin Valley Air Pollution Control District. The DMA is to fully mitigate construction and operations criteria air emissions of project implementation for project vehicle and other mobile source emissions. The Owner/Operator shall pay fees to fully mitigate project emissions of NOx (oxides of nitrogen), ROG (reactive organic gases), PM10 (particulate matter of 10 microns or less in diameter), and PM 2.5 (particulate matter of 2.5 microns or less in diameter) (collectively referred to as "designated criteria emissions") to avoid any net increase in these pollutants. The air quality mitigation fee shall be paid prior to the approval of any construction or grading approval or payment plan as designated by the San Joaquin Valley Air Pollution Control District.	
Impact 4.3-2: The project would result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard. Specifically, implementation of the project would exceed any of the following adopted thresholds: a. San Joaquin Valley Unified Air Pollution Control District Operational and Area Sources: • 10 tons per year for ROG • 10 tons per year for NO_X • 15 tons per year for PM10. b. Stationary Sources as Determined by District Rules • Severe Nonattainment: 25 tons per year	Potentially Significant	Implementation of **Mitigation Measures 4.1-3** (See **Section 4.1**, *Aesthetics*), and **MM 4.3-1** through **MM 4.3-5** would be required.	Significant and unavoidable

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
• Extreme Nonattainment: 10 tons per year			
Impact 4.3-3: The project would expose sensitive receptors to substantial pollutant concentrations.	Potentially significant impact	Implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-5** would be required. **MM 4.3-6:** To minimize personnel and public exposure to potential Valley Fever–containing dust on and off site, the following control measures shall be implemented during project construction: a. Equipment, vehicles, and other items shall be thoroughly cleaned of dust before they are moved offsite to other work locations. b. Wherever possible, grading and trenching work shall be phased so that earth-moving equipment is working well ahead or downwind of workers on the ground. c. The area immediately behind grading or trenching equipment shall be sprayed with water before ground workers move into the area. d. In the event that a water truck runs out of water before dust is sufficiently dampened, ground workers exposed to dust shall leave the area until a truck can resume water spraying. e. To the greatest extent feasible, heavy-duty earth-moving vehicles shall be closed-cab and equipped with a HEPA-filtered air system. f. Workers shall receive training in procedures to minimize activities that may result in the release of airborne *Coccidioides immitis* (CI) spores and recognize the symptoms of Valley Fever and shall be instructed to promptly report suspected symptoms of work-related Valley Fever to a supervisor. Evidence of training shall be provided to the Kern County Planning and Natural Resources Department within 5 days of the training session. g. A Valley Fever informational handout shall be provided to all onsite construction personnel and surrounding residences within 1000 feet of the project site. The handout shall, at a minimum, provide information regarding symptoms, health effects, preventative measures, and treatment of Valley Fever. No less than 30 days prior to any work commencing, this handout shall be	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		mailed to all existing residences within 1000 feet of the project boundaries. Additional information and handouts can be obtained by contacting the Kern County Public Health Services Department. h. Onsite personnel shall be trained on the proper use of personal protective equipment, including respiratory equipment. National Institute for Occupational Safety and Health-approved respirators shall be provided to onsite personnel, upon request. When exposure to dust is unavoidable, affected workers shall be provided appropriate NIOSH-approved respiratory protection. If respiratory protection is deemed necessary, employers must develop and implement a respiratory protection program in accordance with the California Occupational Safety and Health Administration's Respiratory Protection standard (8 CCR 5144). **MM 4.3-7:** Prior to the issuance of grading permits, a one-time fee shall be paid to the Kern County Public Health Services Department in the amount of $3,200 for Valley Fever public awareness programs. **MM 4.3-8:** At the time of project implementation, a COVID-19 Health and Safety Plan shall be prepared in accordance with the Kern County Public Health Services Department and Kern County Health Officer mandates. A copy of the COVID-19 Health and Safety Plan shall be submitted to the Kern County Planning Department to be kept on file. **MM 4.3-9:** Prior to commencement of any on-site construction activities (i.e., fence construction, mobilization of construction equipment, initial grading), the project applicant shall provide written notice to the public through mailing a notice to all parcels within 1,000 feet of the project site, as well as the resident manager of the California Aeronautical University Student Housing at the western terminus of Boughton Drive, no sooner than 15 days prior to construction activities. The notices shall include the construction schedule, a telephone number and email address where complaints and questions can be registered. Additionally, a minimum of one sign, legible at a distance of 50 feet, shall also be posted at the construction sites or adjacent to the nearest public access to the main construction entrances throughout	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		construction activities which include the construction schedule (updated as needed) and a telephone number where complaints can be registered. Documentation that the public notice has been sent and the sign has been posted shall be provided to the Kern County Planning and Natural Resources Department. **MM 4.3-10:** Prior to the issuance of any grading or building permit, the project applicant shall establish a "construction coordinator" and submit written documentation which includes their phone number, email address and mailing address. The construction coordinator shall be responsible for the following: a. Responding to any local complaints about construction activities. The construction coordinator shall determine the cause of the construction complaint and shall be required to implement reasonable measures such that the complaint is resolved. b. Ensuring all appropriate construction notices have been made available to the public and that all appropriate construction signs have been installed. c. Maintaining an ongoing up-to-date log of all construction-related complaints (i.e., blowing dust, inability to access parcels, etc.) during project construction activities. The log shall include the nature of the complaint and the measures that were undertaken to address the concerns. Upon request, the construction coordinator shall provide the log to the Planning and Natural Resources Department no later than three business days from request.	
Impact 4.3-4: The project would result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	Less than significant impact	No mitigation would be required.	Less than significant
Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measures MM 4.3-1 through MM 4.3-10** would be required.	Significant and unavoidable (cumulative impacts)

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
4.4 Biological Resources			
Impact 4.4-1: The project would have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or a special-status species in local or regional plans, policies, or regulations or by California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	Potentially significant impact	**MM 4.4-1:** Prior to the issuance of grading permits, the project operator shall retain a Lead Biologist(s) who meets the qualifications of an Authorized Biologist as defined by California Department of Fish and Wildlife (CDFW) Service to oversee compliance with protection measures for all listed and other special-status species that may be affected by the construction and operation of the project. The resume and contact information for the Lead Biologist(s) shall be provided in writing to the Planning and Natural Resources Department. The following measures pertain to the Lead Biologist(s): a. The Lead Biologist(s), or their designee, shall be on the project site during all construction activities which include, but are not limited to, installation of perimeter fencing, clearing of vegetation, grading activities, and facility construction. b. The Lead Biologist(s) or their designee shall have the right to halt all activities that are in violation of the special-status species protection measures, as well as any regulatory permits from the U.S. Fish and Wildlife Service and/or the California Department of Fish and Wildlife, if applicable. Work shall proceed only after hazards to special-status species are removed and the species is no longer at risk. **MM 4.4-2**: Prior to the issuance of grading permits, the Lead Biologist shall develop a Worker Environmental Awareness Training Program containing life history and identification information of special-status wildlife and plant species with potential to occur on site. The Worker Environmental Awareness Training Program shall review responsibilities for all on-site personnel including trash control, checking under and around vehicles and heavy equipment before starting, scanning for wildlife resources, contacting the Lead Biologist in the unanticipated instance of encountering special status wildlife species, and prohibition of pets and firearms. All on-site personnel shall be required to attend a worker environmental training. A sticker shall be placed on hard hats, indicating that the worker has completed the	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Worker Environmental Awareness Training. Copies of all prepared materials including, but not limited to, PowerPoint presentations, videos, information handouts and signed acknowledgement from each worker who has attended the required training shall be provided to the Planning and Natural Resources Department. **MM 4.4-3:** During construction of the project site, the project proponent and/or contractor(s) shall implement the following general avoidance and protective measures: a. Immediately prior to conducting vegetation clearing or similar activities, the Lead Biologist or their designee shall perform a pre-construction visual survey of the area to ensure that no special-status species are present. Daily reports of these inspections shall be retained by the Lead Biologist and provided to the Kern County Planning and Natural Resources Department, U.S. Fish and Wildlife Service, or California Department Fish and Wildlife upon request. b. Within the vicinity of any construction activities, sensitive biological resources (i.e., special-status species, jurisdictional drainages, nesting birds, etc.) shall be delineated with stakes and/or flagging. c. All construction activities shall be confined within the project construction area, which may include temporary access roads, haul roads, and staging areas specifically designated and marked for these purposes. At no time shall equipment or personnel be allowed to adversely affect areas outside the project site. d. Any spoils shall be stockpiled in disturbed areas that lack native vegetation to the maximum extent practicable. Spoils that have been stockpiled and inactive for more than 24 hours shall be inspected by a qualified biologist for signs of special-status wildlife before moving or disturbing. e. To prevent inadvertent entrapment of San Joaquin kit foxes, American badgers, or other animals during construction, all excavated steep-walled holes or trenches more than two (2) feet deep shall be covered with plywood or similar materials at the close of each working day. If holes or trenches cannot be covered,	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		one or more escape ramps constructed of earthen fill or wooden planks, no less than 12 inches wide and secured at the top, shall be placed a minimum of every 100 feet within the open trench. Covered and non-covered holes or trenches shall be thoroughly inspected for trapped animals by a qualified biologist at the beginning and end of each working day. Immediately before such holes or trenches are filled, they shall again be thoroughly inspected by trained Staff approved by the Lead Biologist. If any trapped animals are observed, escape ramps or structures shall be installed immediately to allow for their escape. If a listed species is trapped, the Lead Biologist shall immediately confer with the U.S. Fish and Wildlife Service and/or California Department of Fish and Wildlife. f. All construction pipes, culverts, or similar structures with a diameter of four (4) inches or greater that are stored at the site for more than 24 hours and without endcaps shall be thoroughly inspected by a qualified biologist prior to being moved or capped. If a listed wildlife species is discovered inside a pipe, that section of pipe shall not be moved until a qualified biologist has been consulted and the animal has either moved from the structure on its own accord or until the animal has been captured and relocated in conformance with appropriate wildlife agency guidelines. g. No construction vehicle or equipment parked on the project site shall be moved prior to inspecting the ground beneath the vehicle or equipment for the presence of listed wildlife species. If present, the animal shall be left to move on its own. h. A speed limit of 15 miles per hour shall be enforced within the limits of the project site. If night work occurs on the project site, the speed limit will be 10 miles per hour. i. Fueling of construction equipment shall take place within existing roads or disturbed areas. No refueling within or adjacent to drainages (within 150 feet) shall be permitted. Contractor equipment shall be checked for leaks prior to operation and repaired as necessary. j. Trash and food items shall be contained in closed containers to	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		reduce the attractiveness to opportunistic predators such as common ravens, coyotes, and feral dogs. k. Workers shall be prohibited from bringing pets and firearms to the project site and from feeding wildlife. l. No pets shall be allowed in project areas, except for trained canine animals related to security and operation of the facility. m. Intentional killing or collection of any listed plant or wildlife species shall be prohibited. n. Herbicides that may be used as vegetation control measures in project areas shall be applied in accordance with submeasures below. All uses of such herbicidal compounds shall observe label and other restrictions mandated by the U.S Protection Agency, California Department of Food and Agriculture, and state/federal legislation as well as additional project related restrictions deemed necessary by the U.S. Fish and Wildlife Service or California Department of Fish and Wildlife. 1. The construction contractor or project personnel shall use herbicides that are approved by the California Department of Fish and Wildlife (CDFW) and United States Fish and Wildlife Service (USFWS) for use in California and are appropriate for application adjacent to natural vegetation areas (i.e., nonagricultural use). Personnel applying herbicides shall have all appropriate State and local herbicide applicator licenses and comply with all State and local regulations regarding herbicide use. 2. Herbicides shall be mixed and applied in conformance with the manufacturer's directions. 3. The herbicide applicator shall be equipped with splash protection clothing and gear, chemical resistant gloves, chemical spill/splash wash supplies, and material safety data sheets for all hazardous materials to be used. To minimize harm to wildlife, vegetation, and water bodies, herbicides shall not be applied directly to wildlife. 4. Products identified as non-toxic to birds and small	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		mammals shall be used if nests or dens are observed; and herbicides shall not be applied if it is raining at the site, rain is imminent, or the target area has puddles or standing water. 5. Herbicides shall not be applied when wind velocity exceeds 10 miles per hour. If spray is observed to be drifting to a non-target location, spraying shall be discontinued until conditions causing the drift have abated. 6. A written record of all herbicide applications on the site, including dates and amounts, shall be furnished annually to the Kern County Planning and Natural Resources Department. **MM 4.4-4**: No more than (30) days prior to the issuance of any grading permits or the start of ground disturbance, a qualified biologist knowledgeable in the identification of all special-status wildlife species shall conduct a pre-construction survey of areas proposed for disturbance within the project site and 500-foot buffer (where legally accessible) to determine if any special-status species are present. If, as a result of this pre-construction survey it is determined that special-status wildlife species are present, the project proponent shall confer with the U.S. Fish and Wildlife Service or California Department of Fish and Wildlife, as required by applicable law, for proper avoidance measures or the need for take authorization through the acquisition of an incidental take permit, pursuant to Fish and Game Code section 2081 subdivision (d). **MM 4.4-5:** No more than thirty (30) days prior to the start of ground disturbance activities or issuance of any grading permits, a qualified biologist knowledgeable on the identification of rare plant species shall conduct a pre-construction plant survey of areas of proposed disturbance within the project site and 100-foot buffer (where legally accessible) to determine if any special-status plant species are present. If special-status plants are identified on-site, their locations shall be mapped and the project proponent shall confer with CDFW or USFWS	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		as required by applicable law to facilitate salvage or seed collection. **MM 4.4-6:** If construction activities are conducted during the typical nesting bird season (February 15 through September 15), pre-construction surveys shall be conducted by a qualified biologist prior to any site preparation and/or construction activity to identify potential nesting bird activity. The survey area shall include a 500-foot buffer surrounding the property. Swainson's hawk protocol-level surveys shall be consistent with the survey methods developed by the Swainson's Hawk Technical Advisory Committee (SWHA TAC 2000); If no active nests are found within the survey area, no further mitigation is required. If nesting activity is identified during the pre-construction survey process, the following measures will be implemented: a. If active nest sites of bird species protected under the Migratory Bird Treaty Act and/or California Fish and Game Code are observed within the project site, then the project will be modified and/or delayed as necessary to avoid direct take of the identified nests, eggs, and/or young; b. If active nest sites of raptors and/or bird species of special concern are observed within the vicinity of the project site, then the appropriate buffer around the nest site (typically 250 feet for passerines and 500 feet for raptors) will be established. Construction activities in the buffer zone will be prohibited until the young have fledged the nest and achieved independence; and, c. Active nests shall be documented by a qualified biologist, and a letter report shall be submitted to the Kern County Planning and Natural Resources Department documenting project compliance with the Migratory Bird Treaty Act and California Fish and Game Code. **MM 4.4-7:** Pre-construction protocol-level surveys by a qualified biologist for nesting birds shall be required if construction activities are scheduled to occur during the breeding season for raptors and other migratory birds (February 1– August 31), to reduce potential impacts to nesting birds and raptors. The survey shall be conducted within 30 days of ground disturbance activities. a. If any nesting birds/raptors are observed, a qualified biologist shall	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		determine buffer distances and/or the timing of project activities so that the proposed project does not cause nest abandonment or destruction of eggs or young. This measure shall be implemented so that the proposed project remains in compliance with the Migratory Bird Treaty Act and applicable State regulations. **MM 4.4-8:** Prior to any vegetation removal during site preparation, the areas required for construction shall be surveyed for actively nesting birds. If any wildlife is encountered during the course of construction, the wildlife shall be allowed to leave the construction area unharmed. Should any active bird nests be identified, the vegetation shall not be removed in areas that contain actively nesting birds. A biological monitor shall survey the areas of vegetation slated for removal, a report shall be submitted to the Kern County Planning and Natural Resources Department for review prior to site preparation. **MM 4.4-9:** Preconstruction surveys shall be conducted by a qualified biologist to locate active breeding or wintering burrowing owl burrows no fewer than 14 days prior to commencement of ground-disturbing activities. Surveys need not be conducted for all areas of suitable habitat at one time; they may be phased so that surveys occur within 14 days prior to that portion of the project site disturbed. The survey methodology shall be consistent with the methods outlined in the 2012 California Department of Fish and Wildlife (CDFW) Staff Report on Burrowing Owl Mitigation and shall consist of walking parallel transects 7 to 20 meters apart, adjusting for vegetation height and density as needed, and noting any potential burrows with fresh burrowing owl sign or presence of burrowing owls. As each burrow is investigated, surveying biologists shall also look for signs of American badger and San Joaquin kit fox. Copies of the survey results shall be submitted to CDFW and the Kern County Planning and Natural Resources Department. If burrowing owls are detected onsite, the avoidance buffers outlined below should be established. These buffers shall be implemented prior to and during any ground-disturbing activities. Specifically, CDFW's Staff Report recommends that impacts to occupied burrows be avoided	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation

in accordance with the following table unless a qualified biologist, approved by CDFW, verifies through non-invasive methods that either: 1) the birds have not begun egg laying and incubation; or 2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival. Visible markers shall be placed near the identified burrow(s) to ensure that machinery does not collapse the burrow(s).

Location	Time of Year	Level of Disturbance		
		Low	Med	High
Nesting sites	April 1 – Aug 15	200 m*	500 m	500 m
Nesting sites	Aug 16 – Oct 15	200 m*	200 m	500 m
Nesting sites	Oct 16 – Mar 31	50 m	100 m	500 m

*meters (m)

If burrow avoidance is infeasible during the non-breeding season or during the breeding season (February 1 through August 31) where resident owls have not yet begun egg laying or incubation, or where the juveniles are foraging independently and capable of independent survival, a qualified biologist shall implement a passive relocation program in accordance with Appendix E1 (i.e., Example Components for Burrowing Owl Artificial Burrow and Exclusion Plans) of the 2012 CDFW Staff Report on Burrowing Owl Mitigation.

If passive relocation is required, a qualified biologist shall prepare a Burrowing Owl Exclusion and Mitigation Plan and a Mitigation Land Management Plan in, accordance with the 2012 CDFW Staff Report on Burrowing Owl Mitigation, for review by CDFW prior to passive relocation activities. If applicable, the Mitigation Land Management Plan shall include a requirement for the permanent conservation of offsite Burrowing Owl Passive Relocation Compensatory Mitigation. At a minimum, the following recommendations shall be implemented:

a. Temporarily disturbed habitat shall be restored, if feasible, to pre-project conditions including decompacting soil and revegetating.
b. Permanent impacts to nesting, occupied and satellite burrows

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		and/or burrowing owl habitat shall be mitigated such that the habitat acreage, number of burrows and burrowing owl impacted are replaced based on a site-specific analysis and shall include permanent conservation of similar vegetation communities (grassland, scrublands, desert, urban, and agriculture) to provide for burrowing owl nesting, foraging, wintering, and dispersal (i.e., during breeding and non-breeding seasons) comparable to or better than that of the impact area, and with sufficiently large acreage, and presence of fossorial mammals. c. Permanently protect mitigation land through a conservation easement, deed restriction, or similar mechanism deeded to a nonprofit conservation organization or public agency with a conservation mission. If the project is located within the service area of a CDFW-approved burrowing owl conservation bank, the project operator may purchase available burrowing owl conservation bank credits. Land identified to mitigate for passive relocation of burrowing owl may be combined with other offsite mitigation requirements of the proposed project if the compensatory habitat is deemed suitable to support the species. **MM 4.4-10:** Prior to and during construction activities: a. If any San Joaquin kit fox dens are found during pre-construction surveys, the status of the dens shall be evaluated no more than 14 days prior to project ground disturbance. Provided that no evidence of kit fox occupation is observed, potential dens shall be marked and a 50-foot avoidance buffer delineated using stakes and flagging or other similar material to prevent inadvertent damage to the potential den. If a potential den cannot be avoided, it may be hand-excavated following United States Fish and Wildlife Service standardized recommendations for protection of the San Joaquin kit fox prior to or during ground disturbance by the lead biologist. If kit fox activity is observed at a den, the den status shall change to "known" per United States Fish and Wildlife Service guidelines (1999), and the buffer distance shall be increased to 100 feet. Absolutely no excavation of San Joaquin kit fox known or pupping dens shall occur without prior authorization from the United States	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Fish and Wildlife Service and California Department of Fish and Wildlife. b. To enable kit foxes and other wildlife (e.g., American badger) to pass through the project site during construction, the perimeter security fence shall leave a 5-inch opening between the fence mesh and the ground or the fence shall be raised 5 inches above the ground. The bottom of the fence fabric shall be knuckled (wrapped back to form a smooth edge) to protect wildlife that passes under the fence. c. All pipes, culverts, or similar structures with a diameter of four inches or more that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the United States Fish and Wildlife Service has been consulted. If necessary, under the direct supervision of the biologist, the pipe may be moved once to remove it from the path of construction activity until the fox has escaped. d. To prevent inadvertent entrapment of San Joaquin kit foxes, badgers, or other animals during construction, all excavated, steep-walled holes or trenches more than two feet deep shall be covered with plywood or similar materials at the close of each working day, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals. If trapped animals are observed, escape ramps or structures shall be installed immediately to allow escape. If listed species are trapped, the United States Fish and Wildlife Service and California Department of Fish and Wildlife shall be contacted. e. All vertical tubes used in project construction, such as chain link fencing poles shall be temporarily or permanently capped at the time they are installed to avoid the entrapment and death of special-status birds.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		MM 4.4-11: A qualified biologist shall conduct a survey for Crotch's bumble bee and their requisite habitat using the California Department of Fish and Wildlife -approved protocol during the blooming period immediately prior to project construction to detect bumble bees and potential nesting sites. The survey shall be conducted within a survey area that includes a 50-foot buffer around the Project footprint and results submitted to California Department of Fish and Wildlife at least seven (7) days prior to commencing any project activities. If Crotch's bumble bee is identified during surveys or at any time during Project construction, the project proponent shall confer with California Department of Fish and Wildlife to determine if take can be avoided. If avoidance of Crotch's bumble bee nest(s) is not feasible, take authorization prior to ground disturbing activities is warranted. Ake authorization would occur through issuance of an Incidental Take Permit by California Department of Fish and Wildlife, pursuant to Fish and Game Code section 2081(b). Alternatively, in the absence of surveys, the project proponent may assume presence and apply for and acquire an Incidental Take Permit for Crotch's bumble bee prior to initiating project activities. **MM 4.4-12:** If nighttime lighting for construction activities and operations is required and is within 50 feet of the outside edge of areas containing habitat for special-status wildlife, as determined by the qualified biologist, lighting shall be directed away from those areas that contain habitat for special-status wildlife.	
Impact 4.4-2: The project could have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	No impact	No mitigation would be required.	No impact
Impact 4.4-3: The project would have a substantial adverse effect on federally protected wetlands (including, but not	No impact	No mitigation would be required.	No impact

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.			
Impact 4.4-4: The project would interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.	Potentially significant impact	Implementation of **Mitigation Measures MM 4.4-3, MM 4.4-6, MM 4.4-7** and **MM 4.4-8**.	Less than significant
Impact 4.4-5: The project would conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	Less than significant impact	Implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12**, and **MM 4.9-1** (see Section 4.9, *Hazards and Hazardous Materials*).	Less than significant
Impact 4.4-6: The project would conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan or other approved local, regional, or State Habitat Conservation Plan.	No impact	No mitigation would be required.	No impact
Impact 4.4: Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12,** and **MM 4.9-1** (see Section 4.9, *Hazards and Hazardous Materials*).	Less than significant
4.5 Cultural Resources			
Impact 4.5-1: The project would cause a substantial adverse change in the significance of a historical resource, as defined in *CEQA Guidelines* Section 15064.5.	Potentially significant impact	**MM 4.5-1:** Prior to initial ground disturbance, or the issuance of grading permits, the project applicant shall retain a qualified Lead Archaeologist to carry out all mitigation measures related to archaeological resources. The contact information for this Lead Archaeologist shall be provided to the Kern County Planning and Natural Resources Department prior to	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		the commencement of any construction activities on-site. Further, the Lead Archaeologist shall be responsible for ensuring the following employee training provisions are implemented during implementation of the project: a. Prior to commencement of any ground disturbing activities, the Lead Archaeologist shall prepare Cultural Resources Sensitivity Training materials, including a Cultural Resources Sensitivity Training Guide, to be used in an orientation program given to all personnel working on the project. The training guide may be presented in video form. A copy of the proposed training materials, including the Cultural Resources Sensitivity Training Guide, shall be provided to the Planning and Natural Resources Department prior to the issuance of any grading or building permit. b. The project proponent/operator shall ensure all new employees or onsite workers who have not participated in earlier Cultural Resources Sensitivity Trainings shall meet provisions specified above. c. The training shall include an overview of potential cultural resources that could be encountered during ground disturbing activities to facilitate worker recognition, avoidance, and subsequent immediate notification to the Lead Archaeologist for further evaluation and action, as appropriate; and penalties for unauthorized artifact collecting or intentional disturbance of archaeological resources. d. A copy of the Cultural Resources Sensitivity Training Guide/Materials shall be kept on-site and available for all personnel to review and be familiar with as necessary. It is the responsibility of the Lead Archaeologist to ensure all employees receive appropriate training before commencing work on-site. **MM 4.5-2:** The project proponent shall comply with the following in the event of inadvertent discovery of resources occur during implementation of the project: Prior to the issuance of grading permits, the project proponent shall ensure the following measures are implemented for resources, which are discretionarily considered historical resources for the purposes of this project:	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		a. The construction zone shall be narrowed or otherwise altered to avoid resources. All avoidance areas delineated on the site plan shall be coordinated through the lead archeologist and submitted to the Kern County Planning and Natural Resources Department for approval. b. In coordination with the qualified archaeologist avoidance shall be ensured by the delineation of environmentally sensitive areas. Protective fencing shall not identify the protected area as a cultural resource area in order to discourage unauthorized disturbance or collection of artifacts. c. A qualified Archaeologist and Native American Monitor, shall monitor all project-related ground disturbing activities within 150 feet of the environmentally sensitive areas, in order to ensure avoidance. The Native American monitor shall be selected from a list of Native American contacts with traditional ties to the project area, provided by the Native American Heritage Commission and/or consultation with Native American tribal groups who may have interest in the project area. The archaeological monitor shall work under the supervision of the qualified archaeologist. d. If avoidance is demonstrated to be infeasible, the resource shall be collected and curated at an appropriate curatorial facility. Or if avoidance is demonstrated to be infeasible, a detailed Cultural Resources Treatment Plan shall be prepared and implemented by a qualified archaeologist. The Cultural Resources Treatment Plan shall include a research design and a scope of work for data recovery of the portion(s) to be impacted by the project. Treatment may consist of (but would not be limited to): 1. a sufficient avoidance buffer to protect the resource until data recovery and/or removal is completed; 2. sample excavation; 3. surface artifact collection; 4. site documentation; and, 5. historical research, with the aim to target the recovery of important scientific data contained in the portion of the	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		significant resource to be impacted by the project. 6. The Cultural Resources Treatment Plan shall also include provisions for analysis of data in a regional context, reporting of results within a timely manner, and curation of artifacts and data at an approved facility. The reports documenting the implementation of the Cultural Resources Treatment Plan shall be submitted to and approved by the Kern County Planning and Natural Resources Director and shall also be submitted to the Southern San Joaquin Valley Information Center at California State University, Bakersfield.	
Impact 4.5-2: The project would cause a substantial adverse change in the significance of an archaeological resource pursuant to *CEQA Guidelines* Section 15064.5.	Potentially significant impact	Implementation of **Mitigation Measures MM 4.5-1** through **MM 4.5-2**.	Less than significant
Impact 4.5-3: The project would disturb any human remains, including those interred outside of dedicated cemeteries.	Potentially significant impact	**MM 4.5-3:** If human remains are uncovered during project construction, the project proponent shall immediately halt work within 100 feet of the find, contact the Kern County Coroner to evaluate the remains, and follow the procedures and protocols set forth in Section 15064.5 (e) of the California Environmental Quality Act Guidelines. If the County Coroner determines that the remains are Native American, the coroner shall contact the Native American Heritage Commission, in accordance with Health and Safety Code Section 7050.5, subdivision (c), and Public Resources Code 5097.98 (as amended by Assembly Bill 2641). The Native American Heritage Commission shall designate a Most Likely Descendent for the remains per Public Resources Code 5097.98. Per Public Resources Code 5097.98, and in accordance with generally accepted cultural or archeological standards or practices, the landowner shall ensure that the immediate vicinity of the Native American human is not damaged or disturbed by further development activity until the landowner has conferred with the most likely descendent regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. If the remains are	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		determined to be neither of forensic value to the Coroner, nor of Native American origin, provisions of the California Health and Safety Code (7100 et. seq.) directing identification of the next-of-kin will apply.	
Impact 4.5: Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measures MM 4.5-1** through **MM 4.5-3**.	Less than significant
4.6 Energy			
Impact 4.6-1: The project would result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.	Less than significant impact	Implement Mitigation Measure MM 4.3-3 (see Section 4.3, *Air Quality*). **MM 4.6-1:** Prior to the issuance building permits, the project proponent shall provide a report and summary of all energy efficient building design standards incorporated into the project design and operations to reduce the level of energy consumption of the project. The following measures shall be included in the project design, as applicable. Explanations for feasibility and implementation shall be included in the report: a. Within one year of the first day of project operations, solar photovoltaics mounted on proposed structure's roofs to provide a portion of the future electrical demand and offset emissions from fossil fuel fired power plants. b. Incorporate green building measures that contribute to reducing energy use by at least 10 percent and up to 25 percent less than Title 24 requirements; c. Provide solar water heating for non-industrial water heating; d. If needed, in addition to roof mounted solar, provide ground mounted solar photovoltaics arrays to provide a portion of the estimated electrical demand for the proposed project; e. Commercial buildings shall be designed to meet LEED® certification standards; f. Roofs on all buildings shall be of a light color to reduce heat generation; g. Portions of parking lots (drive aisles) may be paved with concrete versus asphalt, based on structural determinations, to reduce initial	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		solar reflectance; h. Within two years of the first day of project operations, up to 20% of employee parking stalls shall be covered. If feasible for electrical demand, the parking stall roofs shall contain solar photovoltaics i. LED lighting fixtures shall be used on all indoor and exterior site lighting; j. LED lighting fixtures shall be used on all public streets and site lighting; k. Electric forklifts and other material handling vehicles to reduce usage of fossil fuels shall be implemented, based on feasibility of operations. l. Consult with Kern County Public Works and Golden Empire Transit (GET) on feasible design circulation features for transit related public street improvements adjacent to the project for implementation of MM 4.17-3 Transportation Demand Management Program m. Provide bicycle friendly features, such as onsite bike lanes, bike racks, and bike lockers, to reduce vehicle miles traveled and to encourage non-vehicular transportation; n. Where feasible design operations to incorporate the usage of high efficiency electric motors for industrial uses. **MM 4.6-2**: Prior to the issuance of building permits, the project proponent shall provide evidence that the project is designed to include the green building measures specified as mandatory in the application checklists contained in the current California Green Building Standards. In addition to the number of electric vehicle capable spaces provided with electric vehicle supply equipment required by the current California Green Building Standards, the project shall provide an additional two percent of electric vehicle-capable spaces with electric vehicle supply equipment.	
Impact 4.6-2: The project would conflict with or obstruct a State or local plan for renewable energy or energy efficiency.	Less than significant impact	No mitigation would be required.	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact 4.6: Cumulative Impacts	Less than significant impact	Implement **Mitigation Measures MM 4.3-3** (see Section 4.3, *Air Quality*), **MM 4.6-1, MM 4.6-2, MM 4.8-1** and **MM 4.8-2** (see Section 4.8, *Greenhouse Gas Emissions*).	Less than significant
4.7 Geology and Soils			
Impact 4.7-1: The project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo earthquake fault zoning map issued by the State Geologist for the area or based on other substantial evidence of a known fault.	Less than significant impact	No mitigation would be required.	Less than significant
Impact 4.7-2: The project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: strong seismic ground shaking.	Potentially significant impact	**MM 4.7-1**: The project proponent shall limit grading to the minimum area necessary for construction. Prior to the initiation of construction, the project proponent shall retain a California registered professional engineer to approve the final grading earthwork and foundation plans prior to construction. **MM 4.7-2:** Prior to the issuance of grading permits for the project, the Project proponent shall conduct a full geotechnical study to evaluate soil conditions on the Project site and submit it to the Kern County Public Works Departmentfor review and approval. The geotechnical study must be signed and stamped by a California-registered professional engineer and must, at minimum, identify the following: a. Maximum considered earthquake and associated ground acceleration; b. Potential for seismically induced liquefaction, landslides, differential settlement, andmudflows; c. Stability of any existing or proposed cut-and-fill slopes;collapsible or expansive soils; d. Foundation material type;	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		e. Recommendations for placement and design of facilities, foundations, and remediation of unstable ground. f. The project proponent shall determine the final siting of project facilities based on the results of the geotechnical study and implement recommended measures to minimize geologic hazards. The project proponent shall not locate project facilities on or immediately adjacent to a fault trace. All structures shall be offset at least 100-feet fromany mapped fault trace. Alternatively, a detailed fault trenching investigation may be performed to accurately locate the fault trace(s) to avoid sighting improvements on or close to these fault structures and to evaluate the risk of fault rupture. After locating thefault, accurate setback distances can be proposed. g. The Kern County Public Works Department shall evaluate any final facility siting designdeveloped prior to the issuance of any building permits to verify that geological constraints have been avoided. **MM 4.7-3:** Prior to the issuance of grading permits, the project proponent shall retain a California registered engineer to design the project facilities to withstand probable seismically induced ground shaking at the site. All grading and construction on-site shall adhere to the specifications, procedures, and siteconditions contained in the final design plans, which shall be fully compliant with the seismic recommendations of the California-registered professional engineer. The procedures and site conditions shall encompass site preparation, foundation specifications, and protection measures for buried metal. The final structural design shall be subject to approval and follow-up inspection by the Kern County Building Inspection Department. Final design requirements shall be provided to the on-site construction supervisor and the Kern County Building Inspector to ensure compliance. **MM 4.7-4:** Building locations shall be stabilized against the occurrence of liquefaction by dynamic compaction, or other accepted soil stabilization method approved by the County Building official.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		MM 4.7-5: Prior to the issuance of grading permits, a geotechnical evaluation, consisting of field exploration (drilling and soil sampling), laboratory testing of soil samples, and engineering analysis, shall be prepared to determine soil properties related, but not limited, to ground-motion acceleration parameters, the amplification properties of the subsurface units at the specific site, the potential for hydrocompaction to affect the proposed facilities, and the potential for collapsible, subsiding, or expansive soils to affect the proposed facilities. These studies shall be used to determine the appropriate engineering for foundations and support structures as well as building requirements to minimize geotechnical hazard impacts. Copies of all analyses shall be submitted to the Kern County Public Works Department for review and approval. An approved copy of the evaluation shall be submitted to the Kern County Planning and Natural Resources Department. **MM 4.7-6:** The project proponent shall use existing roads to the greatest extent feasible to minimize erosion. Prior to approval of the grading permit, final plans shall be reviewed and approved by the Kern County Public Works Department to confirm existing roads were used to the greatest extent feasible. **MM 4.7-7:** The project proponent shall limit grading to the minimum area necessary for construction and operation of the project. Final grading plans shall include best management practices (BMPs) to limit on-site and off-site erosion, a water plan to treat disturbed areas during construction and reduce dust, and a plan for the disposal of drainage waters originating on-site and from adjacent rights-of-ways (if required). The plans shall be submitted to the Kern County Public Works Department for review and approval.	
Impact 4.7-3: The project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: seismic-related ground failure including liquefaction.	Less than significant impact	No mitigation would be required.	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact 4.7-4: The project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: landslides.	No impact	No mitigation would be required.	No impact
Impact 4.7-5: The project would result in substantial soil erosion or the loss of topsoil.	Potentially significant impact	**Implement Mitigation Measure MM 4.10-1 (See Section 4.10, *Hydrology and Water Quality*), MM 4.7-7, and:** **MM 4.7-8:** The project proponent shall prepare a Soil Erosion and Sedimentation Control Plan to mitigate potential loss of soil and erosion. The plan shall be prepared by a California registered civil engineer or other professional approved to prepare said Plan and submitted for review and approval by the Kern County Public Works Department prior to issuance of grading permits. The Soil Erosion and Sedimentation Control Plan shall include, but is not limited to, the following: a. Best Management Practices to minimize soil erosion consistent with Kern County grading requirements and the California Regional Water Quality Control Board requirements pertaining to the preparation and approval of a Stormwater Pollution Prevention Plan (Best Management Practices recommended by the Kern County Public Works Department shall be reviewed for applicability); b. Sediment collection facilities as may be required by the Kern County Public Works Department; c. A timetable for full implementation, estimated costs, and a surety bond or other security as approved by the County; and d. Other measures required by the County during permitting, including long-term monitoring (post-construction) of erosion control measures until site stabilization is achieved. e. Provisions to comply with local and state codes relating to drainage and runoff, including use of pervious pavements, and/or other methods to the extent feasible, to increase stormwater infiltration and reduce runoff onto agricultural lands.	Less than significant
Impact 4.7-6: The project would be	Less than	No mitigation would be required.	Less than

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.	significant impact		significant
Impact 4.7-7: The project would be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.	Potentially significant impact	Implementation of **Mitigation Measure MM 4.7-2** would be required.	Less than significant
Impact 4.7-8: The project would have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.	No impact	No mitigation would be required.	No impact
Impact 4.7-9: The project would directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	Potentially significant impact	**MM 4.7-9:** Prior to the issuance of grading permits, the project proponent shall retain a qualified Paleontologist, defined as a Paleontologist meeting the Society for Vertebrate Paleontology's Professional Standards (Society for Vertebrate Paleontology 2010), to carry out all mitigation measures related to paleontological resources. The qualified Paleontologist and the Lead Archaeologist may be the same individual: a. Prior to the start of any ground-disturbing activities, the qualified paleontologist shall prepare a Paleontological Resources Awareness Training program for all construction personnel working on the proposed project. A Paleontological Resources Awareness Training Guide approved by the qualified paleontologist shall be provided to all personnel. A copy of the Paleontological Resources Awareness Training Guide shall be submitted to the Kern County Planning and Natural Resources Department. The training guide may be presented in video form.	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		b. Paleontological Resources Awareness Training may be conducted in conjunction with the archaeological resources training. c. The training shall include an overview of potential paleontological resources that could be encountered during ground-disturbing activities to facilitate worker recognition, avoidance, and subsequent immediate notification to the qualified Paleontologist for further evaluation and action, as appropriate; and penalties for unauthorized fossil collecting or intentional disturbance of paleontological resources. d. The project applicant shall ensure all new on-site construction personnel who have not participated in earlier Paleontological Resources Awareness Trainings shall meet the provisions specified above. e. The Paleontological Resources Awareness Training Guides shall be kept available for all personnel to review and be familiar with as necessary. **MM 4.7-10:** During construction the qualified Paleontologist or designated monitor shall monitor all ground-disturbing activity (with the exception of vibratory or hydraulic installation of tracking or mounting structures and foundations or supports) that occurs at a depth of 5 feet or deeper below ground surface: a. The duration and timing of monitoring shall be determined by the qualified Paleontologist in consultation with the Kern County Planning and Natural Resources Department and shall be based on a review of geologic maps and grading plans. 1. During the course of monitoring, if the paleontologist can demonstrate based on observations of subsurface conditions that the level of monitoring should be reduced, the Paleontologist, in consultation with the Kern County Planning and Natural Resources Department, may adjust the level of monitoring to circumstances, as warranted. b. Paleontological monitoring shall include inspection of exposed rock units during active excavations within sensitive geologic sediments. The qualified Paleontologist shall have authority to temporarily divert excavation operations away from exposed	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		fossils to collect associated data and recover the fossil specimens if deemed necessary. c. Following the completion of monitoring, the paleontologist shall prepare a report documenting the absence or discovery of fossil resources on-site. If fossils are found, the report shall summarize the results of the inspection program, identify those fossils encountered, recovery and curation efforts, and the methods used in these efforts, as well as describe the fossils collected and their significance. A copy of the report shall be provided to the Kern County Planning and Natural Resources Department and to an appropriate repository such as the Natural History Museum of Los Angeles County. **MM 4.7-11:** If a paleontological resource is found, the project contractor shall cease ground-disturbing activities within 50 feet of the find. The qualified Paleontologist shall evaluate the significance of the resources and recommend appropriate treatment measures. At each fossil locality, field data forms shall be used to record pertinent geologic data, stratigraphic sections shall be measured, and appropriate sediment samples shall be collected and submitted for analysis. Any fossils encountered and recovered shall be cataloged and donated to a public, non-profit institution with a research interest in the materials. Accompanying notes, maps, and photographs shall also be filed at the repository.	
Impact 4.7: Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measures MM 4.7-1** through **MM 4.7-11, and MM 4.10-1** (see Section 4.10, *Hydrology and Water Quality*) would be required.	Less than significant
4.8 Greenhouse Gas Emissions			
Impact 4.8-1: The project would generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	Potentially significant impact	Implement **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (see **Section 4.3**, *Air Quality)* **MM 4.6-1** and **MM 4.6-2** (see Section 4.6, *Energy*) and **MM 4.17-2** (see **Section 4.17,** *Transportation and Traffic,*) and	Less than Significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		MM 4.8-1 a. Prior to issuance of occupancy permits, the project developer shall disclose to all tenants/business entities that only electric-powered off-road equipment (e.g. forklifts, material handling equipment, etc.) shall be utilized for all indoor activities for daily warehouse and business operations and a copy of disclosure documents shall be submitted to the Planning and Natural Resources Department to be kept on file. b. Prior to issuance of grading permits, the project construction's General Contractor shall target a construction waste diversion rate of 80 percent. A monthly construction report shall be provided to the County documenting total waste generated, types of waste streams, and total waste recycled. c. During operation and to the extent feasible for safe warehouse operations, automatic light switches shall be incorporated into the project. d. During operation, any equipment containing greater than five pounds of refrigerant, procured or installed, shall be tagged so that project applicant and tenant can identify and verify all installed equipment. **MM-4.8-2**: If tenant/business will utilize cold storage in the project, the project developer shall provide a disclosure to that user that requires all Transport Refrigeration Units (TRUs) entering the project site to be plug-in capable. The building systems shall be upgraded to provide electrical hookups as part of the tenant improvements for any tenant that requires cold storage. The electrical hookups shall be provided at loading bays for truckers to plug in any onboard auxiliary equipment and power refrigeration units while their truck is stopped. A copy of this required disclosure shall be provided to the Planning and Natural Resources Department prior to the issuance of occupancy permit for this specific user.	
Impact 4.8-2: The project would conflict with any applicable plan, policy, or regulation adopted for the purpose of	Potentially significant impact	Implement Mitigation Measures **MM 4.3-3** and **MM 4.3-5** (see **Section 4.3**, *Air Quality),* **MM 4.6-1** and **MM 4.6-2** (see Section 4.6, *Energy*) **MM 4.8-1, MM 4.8-2** and **MM 4.17-3** (see **Section 4.17,**	Less than Significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
reducing the emissions of greenhouse gas.		*Transportation and Traffic*).	
Impact 4.8: Cumulative Impacts	Potentially significant impact	Implement Mitigation Measures **MM 4.3-3** and **MM 4.3-5** (See Section 4.3, *Air Quality*), **MM 4.6-1, MM 4.6-**2 (see Section 4.6, *Energy*), **MM 4.8-1** and **MM 4.8-2,** and **MM 4.17-3** (see Section 4.17, *Transportation and Traffic*).	Significant and unavoidable impact
4.9 Hazards and Hazardous Materials			
Impact 4.9-1: The project would create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	Potentially significant impact	**MM 4.9-1:** Prior to the issuance of grading or building permits related to facilities requiring a Spill Prevention Control and Countermeasures Response Plan, the project proponent shall prepare and submit a Spill Prevention Control and Countermeasures Response Plan to the Kern County Public Health Services Department. Environmental Health Division, and the California Department of Water Resources, for review and approval by those agencies. The project proponent shall ensure the project is implemented in compliance with the approved Spill Prevention Control and Countermeasures Response Plan. **MM 4.9-2:** Prior to the issuance of building permits, the project proponent shall ensure any hazardous materials be stored properly and Material Safety Data Sheets shall be on site. Hazardous waste shall be managed properly. Training shall be provided to all personnel involved in handling of any hazardous materials or waste. **MM 4.9-3:** The project proponent shall consult with the Kern County Public Health Services Department – Environmental Health Division – Hazardous Materials Program. If required, the project proponent shall submit a Hazardous Materials Business Plan to the Kern County Environmental Health Division Hazardous Materials program and with the California Environmental Reporting System (CERS) for hazardous materials/wastes stored on site. This Business Plan, as applicable, shall be submitted within 30 days of operation.	Less than significant
Impact 4.9-2: The project would create a significant hazard to the public or the environment through reasonably	Potentially significant impact	Implementation of **Mitigation Measures MM 4.9-1** through **MM 4.9-3**, as provided above, **MM 4.4-3** (see **Section 4.3,** *Biological Resources*, for full mitigation measure text) and **MM 4.7-8** would be	Less than significant impact

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
foreseeable upset and accident conditions involving the release of hazardous materials into the environment.		required (see **Section 4.7**, *Geology and Soils*, for full mitigation measure text). **MM 4.9-4**: The Project proponentshall continuously comply with the following: If suspect materials or wastes of unknown origin are discovered during construction onthe project site, which is thought to include hazardous waste materials the following shall occur: a All work shall immediately stop in the vicinity of the suspected contaminant; b. Project Construction Manager shall be notified; c. Area(s) shall be secured as directed by the Project Construction Manager; d. Notification shall be made to the Kern County Environmental Health Services Division/Hazardous Materials Section for consultation, assessment, and appropriateactions; and, e. Copies of all notifications and correspondence shall be submitted to the Kern CountyPlanning and Natural Resources Department **MM 4.9-5**: The following note shall appear onall final maps and grading plans: *If during grading or construction, any plugged and abandoned or unrecorded wells are uncovered or damaged, the California Department of Geologic Energy Management Division will be contacted to inspect and approve any remediation required.* **MM 4.9-6**: Prior to grading or excavating the Underground Service Alert One-call center shall be contacted. The proposed excavation area shall be delineated with white marking paint or with other suitable markers such as flags or stakes at least two days prior to commencing any excavation work. A “Dig Alert” ticket number would be issued at the time Underground Service Alert is contacted. Excavating is not permitted without this ticket number and isvalid for twenty-eight days. Underground Service Alert would notify its member utilities having underground facilities in the area. Underground Service Alert does not notify nonmember utilities or energy companies, or Caltrans.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		MM 4.9-7: Prior to the issuance of both grading and building permits, the project proponent shall prepare notification requirements should the rupturing of a pipeline occur during excavation and construction activities, the Kern County Fire Department and Pacific Gas and Electric Company (PG&E should be contacted immediately. Natural gas transmission pipeline rupture most often indicates an emergency situation and 9-1-1 should be dialed. If an emergency is not indicated, the Kern County Fire Department Meadows Field Station 62, located at 1652 Sunnyside Court, should be contacted at (661) 393-9311. Or at the non- Emergency telephone number (661) 324-6551. The project proponent shall follow all safety and cleanup regulations. **MM 4.9-8**: Prior to the issuance of grading permits, on-site water wells not to be used for irrigation or industrial purposes shall be destroyed in accordance with California Well Standards as governed by the California Department of Water Resources and permit requirements of the Kern County Environmental Health Services Division. **MM 4.9-9**: Prior to the issuance building permits, the project proponent shall prepare notification requirements should asbestos containing materials be identified during construction. The San Joaquin Valley Air Pollution Control District shall be contacted for removal and disposal procedures. These procedures shall be followed in order to eliminate asbestos exposure to construction workers and surrounding workers and residents.	
Impact 4.9-3: The project would emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 miles of an existing or proposed school.	No impact	No mitigation would be required.	No impact
Impact 4.9-4: The project would be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a	No impact	No mitigation would be required.	No impact

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
significant hazard to the public or the environment.			
Impact 4.9-5: The project would result in a safety hazard or excessive noise for people residing or working in the project area, for a project located within the adopted Kern County Airport Land Use Plan.	Potentially significant	**MM 4.9-10**: Prior to issuance of building permits for portions of the project that meet the Federal Aviation Administration's noticing requirements, the project proponent/operator shall comply with the following: a. Submit Form 7460-1 (Notification of Proposed Construction or Alteration) to the Federal Aviation Administration, in the form and manner prescribed in Code of Federal Regulation 77.17. b. Obtain a Federal Aviation Administration issued "Determination of No Hazard to Air Navigation" or make the Federal Aviation Administration's recommended changes to the project. c. Provide documentation to the Kern County Planning and Natural Resources Department demonstrating the project would comply with the Kern County Zoning Ordinance Figure 19.08.160 that all project components in the flight area would create no significant military mission impact and a copy of the site plan has been provided to the appropriate military authority responsible for operations in the flight area. Provide documentation to the Kern County Planning and Natural Resources Department demonstrating that a copy of the final site plan has been provided to the operators of Meadows Field Airport.	Less than significant
Impact 4.9-6: The project would impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.	Less than significant impact	Implementation of **Mitigation Measure MM 4.17-4** and **MM 4.17-5** (see **Section 4.17**, *Transportation*) and **MM 4.9-11:** Prior to the issuance of grading permits, the project proponent shall develop and implement a Fire Safety Plan for use during construction and operation. The project proponent shall submit the plan, along with maps of the project site and access roads, to the Kern County Fire Department for review and approval. The Fire Safety Plan shall contain notification procedures and emergency fire precautions, including, but not limited to, the following: a. All internal combustion engines, both stationary and mobile, shall	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		be equipped with spark arresters. Spark arresters shall be in good working order. b. Light trucks and cars with factory-installed (type) mufflers shall be used only on roads where the roadway is cleared of vegetation. These vehicle types shall maintain their factory-installed (type) mufflers in good condition. c. Fire rules shall be posted on the project bulletin board at the contractor's field office and in areas visible to employees. d. Equipment parking areas and small stationary engine sites shall be cleared of all extraneous flammable materials. e. Personnel shall be trained in the practices of the fire safety plan relevant to their duties. Construction and maintenance personnel shall be trained and equipped to extinguish small fires to prevent them from growing into more serious threats. f. The project proponent shall make an effort to restrict the use of chainsaws, chippers, vegetation masticators, grinders, drill rigs, tractors, torches, and explosives to periods outside of the official fire season. When the above tools are used, water tanks equipped with hoses, fire rakes, and axes shall be easily accessible to personnel.	
Impact 4.9-7: The project would expose people or structures either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.	Potentially significant impact	Implementation of **Mitigation Measures MM 4.9-11** and **MM 4.15-1** (see **Section 4.15,** *Public Services*) would be required.	Less than significant
Impact 4.9-8: The project would generate vectors (flies, mosquitoes, rodents, etc.) or have a component that includes agricultural waste. Specifically, the project would not exceed the following qualitative threshold: the presence of domestic flies, mosquitoes, cockroaches, rodents, and/or any other vectors associated with the project is significant when the applicable enforcement agency determines that any of	Potentially Significant Impact	**MM 4.9-12:** Prior to issuance of building permits, a long-term trash abatement program shall be established for construction, operations and maintenance. Trash and food items shall be contained in closed containers and removed weekly. a. Trash and food items shall be contained in closed containers to be locked at the end of the day and removed at least once per week to reduce the attractiveness to opportunistic predators such as common ravens, coyotes, and feral dogs. **MM 4.9-13:** Prior to the issuance of building permits, the project	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
the vectors: i. Occur as immature stages and adults in numbers considerably in excess of those found in the surrounding environment; and ii. Are associated with design, layout, and management of project operations; and iii. Disseminate widely from the property; and iv. Cause detrimental effects on the public health or well-being of the majority of the surrounding population.		proponent shall prepare a Vector Control Plan and submit it to the Kern County Environmental Health Services Department and Kern Mosquito Abatement District for review and approval. The Plan shall include best management practices such as: good housekeeping measures to minimize harborage for vectors. Further controls may include the use of traps or other abatement controls, and/or the use of a licensed pest management service if needed.	
Impact 4.9: Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measures MM 4.4-3** (see **Section 4.3,** *Biological Resources*), **MM 4.7-8** (see **Section 4.7,** *Geology and Soils***)**, **MM 4.9-1** through **MM 4.9-13**, **MM 4.15-1** (see **Section 4.15**, *Public Services*) and **MM 4.17-1 through MM 4.17-5 (see Section 4.17,** *Transportation and Traffic* for full mitigation measure text).	Less than significant
4.10 Hydrology and Water Quality			
Impact 4.10-1: The project would violate any water quality standards or waste discharge requirements, or otherwise degrade surface or groundwater water quality.	Potentially significant impact	Implementation of Mitigation **Measures MM 4.7-8 and MM 4.9-3** would be required (see **Sections 4.7**, *Geology and Soils*, and **4.9**, *Hazards and Hazardous Materials*, for full mitigation measure text), and: **MM 4.10-1:** Prior to issuance of a grading permit, the project proponent/operator shall submit a Stormwater Pollution Prevention Plan for review and approval by the Kern County Planning and Natural Resources Department and/or Kern County Public Works Department. The Stormwater Pollution Prevention Plan shall be designed to minimize runoff and shall specify best management practices to prevent all construction pollutants from contacting stormwater, with the intent of keeping sediment or any other pollutants from moving offsite and into receiving waters. The requirements of the Stormwater Pollution Prevention Plan shall be incorporated into design specifications and	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		construction contracts. Recommended best management practices to be incorporated in the Stormwater Pollution Prevention Plan shall include the following: a. Minimization of vegetation removal; b. Implementing sediment controls, including silt fences as necessary; c. Installation of a stabilized construction entrance/exit and stabilization of disturbed areas; d. Properly containing and disposing of hazardous materials used for construction onsite; e. Properly covering stockpiled soils to prevent wind erosion; f. Proper protections and containment for fueling and maintenance of equipment and vehicles; g. Appropriate disposal of demolition debris, concrete and soil, and aggressively controlling litter. h. Cleanup of silt and mud on adjacent street due to construction activity; i. Checking all lined and unlined ditches after each rainfall; j. Restore all erosion control devices to working order to the satisfaction of the Kern County Planning and Natural Resources Department and/or Kern County Public Works Department after each rainfall run-off; k. Install additional erosion control measures as may be required due to uncompleted grading operations or unforeseen circumstances which may arise. **MM 4.10-2:** Prior to the issuance of a grading permit, the project proponent/operator shall complete a final drainage plan designed to evaluate and minimize potential increases in runoff from the project site. The study shall include, but is not limited to the following: a. A numerical stormwater model for the project site that evaluates existing and proposed (with project) drainage conditions during storm events ranging up to the 100-year event. b. The drainage plan shall consider potential for erosion and sedimentation in light of modeled changes in stormwater flow across the project area that would result from project implementation.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		c. Engineering recommendations to be incorporated into the project design and applied within the site boundary. Engineering recommendations will include measures to offset increases in stormwater runoff that would result from the project, as well as implementation of design measures to minimize or manage flow concentration and changes in flow depth or velocity so as to minimize erosion, sedimentation, and flooding onsite or offsite. d. The drainage plan shall be prepared in accordance with the Kern County Grading Code and Kern County Development Standards, and approved by the Kern County Public Works Department prior to the issuance of grading permits.	
Impact 4.10-2: The project would substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.	Less than significant impact	Implementation of **Mitigation Measure MM 4.19-3** and **MM 4.19-4** (see **Section 4.19,** *Utilities and Service Systems*) would be required.	Less than significant
Impact 4.10-3: The project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on-site or off-site.	Potentially significant impact	Implementation of **Mitigation Measures MM 4.7-8** (see **Section 4.7**, *Geology and Soils*, for full mitigation measure text) and **MM 4.10-1 and MM 4.10-2** would be required**.**	Less than significant
Impact 4.10-4: The project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which	Less than significant impact	Implementation of **Mitigation Measure MM 4.10-2** would be required.	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
would substantially increase the rate of amount of surface runoff in a manner which would result in flooding on-site or off-site.			
Impact 4.10-5: The project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.	Less than significant impact	Implementation of **Mitigation Measure MM 4.10-2** would be required.	Less than significant
Impact 4.10-6: The project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would impede or redirect flood flows.	Less than significant impact	No mitigation would be required	Less than significant
Impact 4.10-7: The project would result in a flood hazard, tsunami, or seiche zone, that would risk release of pollutants due to project inundation.	No Impact	No mitigation would be required.	No Impact
Impact 4.10-8: The project would conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	Less than significant impact	No mitigation would be required.	Less than significant
Impact 4.10: Cumulative Impacts	Potentially significant impact	Implementation of M**itigation Measures MM 4.7-8** (see **Section 4.7,** *Geology and Soils*) and **MM 4.9-3** (see **Section 4.9,** *Hazards and*	Less than Significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Hazardous Materials), **MM 4.10-1, MM 4.10-2, MM 4.19-3**, and **MM 4.19-4** (see **Section 4.19**, *Utilities and Service Systems*) would be required.	
4.11 Land Use and Planning			
Impact 4.11-1: The project would physically divide an established community.	Less than significant impact	No mitigation would be required.	Less than significant
Impact 4.11-2: The project would cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.	Less than significant impact	**MM 4.11-1:** Prior to the issuance of building permits, the operator shall consult with the Meadows Field Airport to identify the appropriate Frequency Management Office officials to coordinate the use of telemetry to avoid potential frequency conflicts with airport operations. **MM 4.11-2:** Prior to the issuance of building permits, the project operator shall submit to the Kern County Planning and Natural Resources Department an executed avigation easement, approved as to form by County Counsel, for the benefit of the Meadows Field Airport.	Less than significant
Impact 4.11: Cumulative Impacts	Less than significant impact	Implementation of Mitigation Measures **MM 4.1-3,** (see **Section 4.1,** *Aesthetics*, for full mitigation measure text),**MM 4.11-1** and **MM 4.11-2** would be required.	Less than significant
4.12 Mineral Resources			
Impact 4.12-1: The project would result in the loss of availability of a known mineral resource that would be of value to the region and residents of the State.	Less than significant impact	No mitigation would be required.	Less than significant
Impact 4.12-2: The project would result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.	Less than significant impact	No mitigation would be required.	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Impact 4.12-3: Cumulative Impacts	Less than significant impact	No mitigation would be required.	Less than significant
4.13 Noise			
Impact 4.13-1: The project would result in generation of a substantial temporary or permanent increase in the ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	Potentially significant impact	Implement Mitigation Measure MM 4.1-3 (see Section 4.1, *Aesthetics*) **MM 4.13-1:** The following measures are required to reduce short-term noise levels associated with project construction: a. Construction activities at the project site shall comply with the hourly restrictions for noise-generating construction activities, as specified in the Kern County NoiseOrdinance (Municipal Ordinance Code 8.36.020). Accordingly, construction activities shall be prohibited between the hours of 9:00 PM to 6:00 AM on weekdays, and between 9:00 PM to 8:00 AM on weekends. These hourly limitations shall not apply to activities where hourly limitations would result in increased safety risk to workers or the public or nighttime concrete pours that have been granted prior authorization from the County. b. Equipment staging and laydown areas shall be located at the furthest practical distance from nearby residential land uses. To the extent possible, staging and laydown areas should be located at least 500 feet of existing residential dwellings. c. Where feasible construction equipment shall be fitted with approved noise- reduction features such as mufflers, baffles and engine shrouds that are no lesseffective than those originally installed by the manufacturer. d. Haul trucks shall not be allowed to idle for periods greater than five minutes,except as needed to perform a specified function (e.g., concrete mixing). e. On-site vehicle speeds shall be limited to 15 miles per hour, or less (except incases of emergency). f. Back-up beepers for all construction equipment and vehicles shall be broadbandsound alarms or adjusted to the lowest noise levels possible, provided that the Occupational Safety and Health Administration and California Division of Occupational Safety and	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Health's safety requirements are not violated. On vehicles where back-up beepers are not available, alternative safety measures such as escorts and spotters shall be employed. **MM 4.13-2:** Prior to the issuance of grading permits,a "Noise Disturbance Coordinator" shall be established. The project operator shall submit evidence of methods of implementation and shall continuously comply with the following during construction: a. The disturbance coordinator shall be responsible for responding to any local complaints about construction noise. b. The disturbance coordinator shall determine the cause of the noise complaint(e.g., starting to early, bad muffler, etc.) and shall be required to implement reasonable measures such that the complaint is resolved. **MM 4.13-3:** Prior to commencement of any on-site construction activities (i.e., fence construction, mobilization of construction equipment, initial grading, etc.), the project proponent/operator shall provide written notice to the public through mailing a notice, which shall include: a. The mailing notice shall be to all residences within 1,000 feet of the project site, no sooner than 15 days prior to construction activities. The notices shall include: the construction schedule, telephone number and email address where complaints and questions can be registered with the Noise Disturbance Coordinator. b. A minimum of one sign, legible at a distance of 50 feet, shall be posted at the construction site or adjacent to the nearest public access to the main construction entrance throughout construction activities that shall provide the construction schedule (updated as needed) and a telephone number where noise complaints can be registered with the Noise Disturbance Coordinator. c. Documentation that the public notice has been sent and the sign has been posted shall be provided to the Kern County Planning and Natural Resources Department. **MM 4.13-4:** The following notes shall be placed on allgrading and	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		building permits issued for the project site: *"Construction noise reduction methods such as shutting off idling equipment, installingtemporary acoustic barriers around stationary construction noise sources, maximizingthe distance between construction equipment staging areas and occupied residential areas, and use of electric air compressors and similar power tools, rather than diesel equipment, shall be used where feasible.* During construction, stationary construction equipment shall be placed such that emitted noise is directed away from sensitive noise receivers. All equipment shall be fitted with factory equipped mufflers, and be in good working condition. Construction contracts shall specify that all construction equipment, fixed ormobile, shall be equipped with properly operating and maintained mufflers and other state required noise attenuation devices".	
Impact 4.13-2: The project would generate excessive ground borne vibration or ground borne noise levels.	Potentially Significant	No mitigation would be required.	Less than significant
Impact 4.13-3: The project is located within the Kern County Airport Land Use Compatibility Plan and would expose people residing or working in the area to excessive noise levels.	Less than Significant	No mitigation would be required.	Less than significant
Impact 4.13: Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measures MM 4.1-3** (see **Section 4.1,** *Aesthetics*, for full mitigation measure text)**,** and **MM 4.13-1** through **MM 4.13-4** would be required.	Significant and Unavoidable (construction)
4.14 Population and Housing			
Impact 4.14-1: The project would induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension	Less than significant impact	Implementation of **Mitigation Measure MM 4.15-2** (see **Section 4.15**, *Public Services*) would be required.	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
of roads or other infrastructure).			
Impact 4.14-2: The project would displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.	No impact	No mitigation would be required.	No impact
Impact 4.14: Cumulative Impacts	Less than significant impact	Implementation of **Mitigation Measure MM 4.15-2** (see **Section 4.15**, *Public Services*) would be required.	Less than significant
4.15 Public Services			
Impact 4.15-1: The project would result in substantial adverse physical impacts associated with the provisions of new or physically altered governments facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service rations, response times, or to other performance objectives for any of the public services: Fire Protection, Police Protection, Schools, Parks, Other Public Facilities.	Potentially significant impact (fire facilities)	**Implement Mitigation Measures MM 4.9-11 (see Section 4.9, *Hazards and Hazardous Materials),*** MM 4.17-1, MM 4.17-2, and MM 4.17-3 (see Section 4.17, *Transportation and Traffic*), **and** **MM 4.15-1:** The project proponent/operator shall work with the County to determine how the use of sales and use taxes from construction of the project can be maximized. This process shall include, but is not necessarily limited to, the project proponent/operator obtaining a street address within the unincorporated portion of Kern County for acquisition, purchasing and billing purposes, and registering this address with the State Board of Equalization. As an alternative to the aforementioned process, the project proponent/operator may make arrangements with Kern County for a guaranteed single payment that is equivalent to the amount of sales and use taxes that would have otherwise been received (less any sales and use taxes actually paid); with the amount of the single payment to be determined via a formula approved by Kern County. The project proponent/operator shall allow the County to use this sales tax information publicly for reporting purposes. **MM 4.15-2:** Prior to the issuance of any building permits on the property, the project operator shall submit a letter detailing the hiring efforts prior to commencement of construction, which encourages all contractors of the project site to hire at least 50 percent of their workers	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		from local Kern County communities. The project operator shall provide the contractors a list of training programs that provide skilled workers and shall require the contractor to advertise locally for available jobs, notifying the training programs of job availability, all in conjunction with normal hiring practices of the contractor.	
Impact 4.15: Cumulative Impacts	Potentially significant impact (fire services)	Implementation of **Mitigation Measures MM 4.9-11** (see **Section 4.9**, *Hazards and Hazardous Materials*), and **MM 4.15-1** and **MM 4.15-2** would be required.	Less than significant
4.16 Recreation			
Impact 4.16-1: The project would increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would occur or be accelerated.	Less than significant impact	No mitigation would be required.	Less than significant
Impact 4.16-2: The project would include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.	No impact	No mitigation would be required.	No impact
Impact 4.16: Cumulative Impacts	Less than significant impact	No mitigation would be required.	Less than significant
4.17 Transportation and Traffic			
Impact 4.17-1: The project would conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.	Potentially significant impact	**MM 4.17-1:** To improve traffic during operation of the project, the following traffic improvements shall be constructed at the intersection of Airport Drive / Olive Drive / Decatur Street prior to the buildout year of opening day; costs shall be funded entirely by the project proponent and at no cost to either the County of Kern or the California Department of Transportation (Caltrans):	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		a. Convert the inside eastbound and westbound through lanes to shared left-through lanes to provide two lanes for the eastbound and westbound left turn movements b. Implement split phased signal operation to all the separation of traffic movements in the eastbound and westbound direction c. Implement a split phasing scheme that re-optimizes the intersection timing including increasing the cycle length to 140 seconds in both the AM and PM peak hours Prior to final occupancy, the project proponent shall complete the following: a. Record an irrevocable offer of dedication to the County of Kern of all subject frontage along: 1. Airport Drive, 55 feet in width, and additional right-of-way for right turn channelization, per the Kern County Land Division Ordinance, and Development Standards 2. Boughton Drive, 55 feet in width, and additional right-of-way for right turn channelization, per the Kern County Land Division Ordinance, and Development Standards 3. Hangar Way, 45 feet in width, and additional right-of-way for right turn channelization, per the Kern County Land Division Ordinance, and Development Standards b. Under street improvement plans submitted for review and approval by the Kern County Public Works Department: 1. Construct Airport Drive project frontage to "Type A" Subdivision Standard, half width Arterial Street, and right turn lane (Plate R-40), per the Kern County Development Standards and the Land Division Ordinance. These improvements shall be, but not limited to: curb, gutter, sidewalk, wheelchair ramps, asphalt concrete, and the necessary tie-ins. 2. Construct Type B1 curb (Plate R-52), raised median curb along the Airport Drive project frontage, from Boughton Drive to Skyway Drive, per the Kern County Development Standards and Land Division Ordinance.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		3. Construct Boughton Drive project frontage to "Type A" Subdivision Standard, half width Arterial Street, and right turn lane (Plate R-40), per the Kern County Development Standards and the Land Division Ordinance. These improvements shall be, but not limited to: curb, gutter, sidewalk, wheelchair ramps, asphalt concrete, and the necessary tie-ins. 4. Construct Hangar Way project frontage to "Type A" Subdivision Standard, half width Collector Street, and right turn lane (Plate R-40), per the Kern County Development Standards and the Land Division Ordinance. These improvements shall be, but not limited to: curb, gutter, sidewalk, wheelchair ramps, asphalt concrete, and the necessary tie-ins. 5. Construct a traffic signal at the intersection of Airport Drive and Park Meadows Avenue in accordance with Kern County Development Standards and Land Division Ordinance. 6. Include a striping plan and streetlight plan A. Provide a 20-foot by 20-foot right of way corner cutoff at all intersections. B. All employee drive approaches shall conform to Plate R-58, widths to be determined in consultation with Kern County Public Works Department and per the Kern County Development Standards and the Land Division Ordinance. C. All truck drive approaches shall conform to Plat eR-58, widths to be determined in consultation with Kern County Public Works Department and per the Kern County Development Standards and the Land Division Ordinance. D. All easements shall be kept open, clear, and free from buildings and structures of any kind pursuant to Chapters 18.50 and 18.55 of the Kern County Land	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Division Ordinance. All obstructions, including utility poles and lines, trees, pole signs, fences, or similar obstructions, shall be removed from the ultimate road right-of-way. Compliance with this requirement is the responsibility of the applicant and may result in significant expenditures. **MM 4.17-2:** Prior to the issuance of any building permit within Metropolitan Bakersfield, the project proponent shall pay the required Transportation Traffic Impact fees. **MM 4.17-3:** Prior to the issuance of construction or building permits, the proposed project shall prepare a Transportation Demand Management program to reduce Vehicle Miles Travelled associated with employee trips. The program shall include Transportation Demand Management measures that would individually reduce the proposed project's Vehicle Miles Traveled and trips, with the goal of obtaining a Vehicle Miles Traveled reduction to lessen the proposed project's Vehicle Miles Traveled impact. The following Transportation Demand Management measures would be implemented by the proposed project as part of the Transportation Demand Management program: a. Alternative-Mode Subsidies and Incentives: provide subsidization of transit fares, carpool, or electric vanpool for employees of the project site. Provide monetary incentives for alternate modes of transportation. b. Travel Behavior Change Program: Provide a web site that allows employees to research other modes of transportation for commuting to the site. c. Promotions and Marketing: Provide marketing and promotional tools to educate and inform travelers about site-specific transportation options and the effects of their travel choices with passive educational and promotional materials. d. Commute Assistance Center: Provide a computer kiosk that allows employees to research other modes of transportation for commuting. e. Preferential Carpool/Vanpool Parking Spaces: Provide reserved carpool/vanpool spaces closer to the building entrance.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		f. Passenger Loading Zones: Provide passenger loading zones for easy access to carpools or vanpools. g. Bike Share: Implement bike share to allow people to have on-demand access to a bicycle, as needed. h. Bike Parking and Facilities: Include secure bike parking and showers to provide additional end-of-trip bicycle facilities to support safe and comfortable bicycle travel. Provide on-site bicycle repair tools and space to use them supports ongoing use of bicycles for transportation	
Impact 4.17-2: The project would conflict or be inconsistent with CEQA Guidelines Section 15064.3(b).	Less than significant	Implementation of Mitigation Measure **MM 4.17-3** would be required.	Less than significant
Impact 4.17-3: The project would substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	Less than significant	**MM 4.17-4:** Prior to the issuance of construction or building permits, the project proponent/operator shall: a. Prepare and submit a Construction Traffic Control Plan to Kern County Public Works Department – Traffic Division and the California Department of Transportation offices for District 6, as appropriate, for approval. The Construction Traffic Control Plan must be prepared in accordance with both the California Department of Transportation Manual on Uniform Traffic Control Devices and Work Area Traffic Control Handbook and must address, at a minimum, the following issues: 1. Timing of deliveries of heavy equipment and building materials; 2. Directing construction traffic with a flag person; 3. Placing temporary signing, lighting, and traffic control devices if required, including, but not limited to, appropriate signage along access routes to indicate the presence of heavy vehicles and construction traffic; 4. Ensuring access for emergency vehicles to the project sites; 5. Temporarily closing travel lanes or delaying traffic during materials delivery, transmission line stringing activities,	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		or any other utility connections; 6. Maintaining access to adjacent property, 7. Specifying both construction-related vehicle travel and oversize load haul routes, minimizing construction traffic during the AM and PM peak hours; and, 8. Consult with the County to develop coordinated plans that would address construction-related vehicle routing and detours adjacent to the construction area for the duration of construction overlapping with neighboring projects. Key coordination meetings would be held jointly between applicants and contractors of other projects for which the County determines impacts may overlap. b. Obtain all necessary encroachment permits for the work within the road right-of-way or use of oversized/overweight vehicles that will utilize county maintained roads, which may require California Highway Patrol or a pilot car escort. Copies of the approved traffic plan and issued permits shall be submitted to the Kern County Planning and Natural Resources Department, the Kern County Public Works Department-Traffic Division, and Caltrans. c. Enter into a secured agreement with Kern County to ensure that any County roads that are demonstrably damaged by project-related activities are promptly repaired and, if necessary, paved, slurry-sealed, or reconstructed as per requirements of the State and/or Kern County. d. Submit documentation that identifies the roads to be used during construction. The project proponent/operator shall be responsible for repairing any damage to county and non-county maintained roads that demonstrably result from construction activities. The project proponent/operator shall submit a pre-construction video log and inspection report regarding roadway conditions for roads used during construction to the Kern County Public Work Department-Traffic Division and the Kern County Planning and Natural Resources Department.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		e. Within 30 days of completion of construction, the project proponent/operator shall submit a post-construction video log and inspection report to the County. This information shall be submitted in electronic format on USB. The County, in consultation with the project proponent/operator's engineer, shall determine project responsibility for the damage and the extent of remediation required, if any.	
Impact 4.17-4: The project would result in inadequate emergency access.	Potentially significant impact	Implementation of **Mitigation Measure MM 4.17-4** and **MM 4.17-5** would be required.	Less than significant
Impact 4.17: Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measures MM 4.17-1** through **MM 4.17-5**.	Less than significant
4.18 Tribal Cultural Resources			
Impact 4.18-1a: The project would cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k).	Potentially significant impact	Implementation of **Mitigation Measures MM 4.5-1** through **MM 4.5-3** would be required (see **Section 4.5**, *Cultural Resources*, for full mitigation measure text).	Less than significant
Impact 4.18-1b: The project would cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in	Less than significant impact	Implementation of **Mitigation Measures MM 4.5-1** through **MM 4.5-3** would be required (see **Section 4.5**, *Cultural Resources*, for full mitigation measure text).	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.			
Impact 4.18: Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measure MM 4.5-1** through **MM 4.5-4** would be required (see **Section 4.5**, *Cultural Resources*, for full mitigation measure text).	Less than significant
4.19 Utilities and Service Systems			
Impact 4.19-1: The project would require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.	Less than significant impact	MM 4.19-1: Prior to issuance of building permits the project proponent shall coordinate with PG&E staff to determine the specific requirements regarding any potential electric service or facility issues needed to adequately accommodate the proposed project. The project proponent shall comply with and adhere to all requirements identified by PG&E to fully mitigate impacts to electric services and facilities, as needed as project construction progresses. MM 4.19-2: Prior to issuance of building permits the Project proponent shall coordinate with Pacific Gas and Electric Company (PG&E) staff to determine the specific requirements regarding any potential natural gas service or facility issues needed to adequately accommodate the proposed project. The project proponent shall comply with and adhere to all requirements identified by Pacific Gas and Electric Company (PG&E) to fully mitigate impacts to natural gas services and facilities,	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		as needed as Project construction progresses.	
Impact 4.19-2: The project would have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years.	Less than significant impact	**MM 4.19-3:** Prior to issuance of grading permits, the owner/operator shall provide information on any groundwater that will be used. Unmetered water wells cannot be used as a source of groundwater for the permit activity. Groundwater may only be used in a permitted activity from a water well equipped with a water meter. A copy shall be sent to all Groundwater Sustainability Agencies and the Kern County Water Agency after being posted on the website. The information submitted on the permit shall include the following data: a. The source and estimated amount of any groundwater being used in the permit activity. b. Confirmation that any water well used in permit activity is metered. c. The source and estimated amount of any reclaimed water used in the permit activity. **MM 4.19-4:** Water meters shall be installed on all facilities. Once operations of the first facility constructed on-site have commenced, the Master Developer or subsequent future land owners shall be required to submit annual reportsto the Kern County Planning Department and the Kern County Environmental Health Services Department detailing the annual water usage on site.	Less than significant
Impact 4.19-3: The project would result in a determination by the wastewater treatment provider which serves may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.	Less than significant impact	No mitigation would be required.	Less than significant impact
Impact 4.19-4: The project would generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid	Less than significant impact	**MM 4.19-5:** During construction and operation, debris and waste generated shall be recycled to the extent feasible. The provisions listed below shall apply to the project: a. A Recycling Coordinator shall be designated by the project	Less than significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
waste reduction goals.		applicant to facilitate recycling as part of the Construction, Operation and Maintenance, and Decommissioning, Trash Abatement and Pest Management Program. b. The Recycling Coordinator shall facilitate recycling of all construction waste through coordination with contractors, local waste haulers, and/or other facilities that recycle construction/demolition wastes. c. The Recycling Coordinator shall also be responsible for ensuring wastes requiring special disposal are handled according to State and County regulations that are in effect at the time of disposal. d. Contact information of the coordinator shall be provided to the Kern County Planning and Natural Resources Department prior to issuance of building permits. e. The project applicant shall provide a storage area for recyclable materials within the fenced project area that is clearly identified for recycling. This area shall be maintained on the site during construction and decommissioning. A site plan showing the recycling storage area for construction shall be submitted prior to the issuance of any grading or building permit for the site.	
Impact 4.19-5: The project would comply with federal, State, and local management and reduction statutes and regulations related to solid waste.	Less than significant impact	Implementation of **Mitigation Measure MM 4.19-5** would be required.	Less than significant
Impact 4.19: Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measures MM 4.19-1** through **MM 4.19-5** would be required.	Less than significant (Wastewater, Storm Drainage, Solid Waste, Landfills, Electricity, Natural Gas, Telecommunications)

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
			Significant and Unavoidable (Water Supply)
4.20 Wildfire			
Impact 4.20-1: The project would substantially impair an adopted emergency response plan or emergency evacuation plan.	Less than significant impact	Implementation of Mitigation Measures **MM 4.17-1** through **MM 4.17-4 (**see **Section 4.17,** *Transportation and Traffic***)** would be required.	Less than significant
Impact 4.20-2: The project would, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.	Potentially significant impact	Implementation of **Mitigation Measures MM 4.9-11** (see **Section 4.9**, *Hazards and Hazardous Materials*) would be required.	Less than significant
Impact 4.20-3: The project would require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.	Potentially significant impact	Implementation of **Mitigation Measures MM 4.9-11** (see **Section 4.9**, *Hazards and Hazardous Materials*) would be required.	Less than significant
Impact 4.20-4: The project would expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.	Less than significant	No mitigation is required	Less than significant
Impact 4.20: Cumulative Impacts	Potentially significant impact	Implementation of **Mitigation Measures MM 4.9-11 (**see **Section 4.9,** *Hazards and Hazardous Materials)* would be required.	Less than significant

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Chapter 2

Introduction

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Chapter 2
Introduction

2.1 Intent of California Environmental Quality Act

The Kern County Planning and Natural Resources Department (KCPNR), as the lead agency, has determined that an Environmental Impact Report (EIR) is the appropriate environmental analysis document pursuant to the California Environmental Quality Act (CEQA) for the proposed IPG Industrial Project (Project) proposed by IPG Kern County 52 Holdings, LLC (Project proponent). The Project is located on approximately 49.05 acres of vacant land comprised of two parcels in unincorporated Kern County.

The Project site is located within the unincorporated community of Oildale and within the Metropolitan Bakersfield sphere of influence. The Project includes an approximately 923,130-square-foot warehouse and distribution logistics facility, with a combined 15,000 square feet of office space. Development would include the construction of two single-story buildings. Building 1 would total 655,690 square feet, including 10,000 square feet of office area, and Building 2 would total 267,440 square feet with 5,000 square feet of office area, totaling 923,130 square feet, with 15,000 square feet of dedicated office space. The Project would include all applicable site improvements on 49.05 acres of privately owned land.

The overall Project's primary function would be high-cube transload warehouse and distribution buildings to facilitate material handling equipment, and storage and logistics uses, that could include up to 20% of the buildings being used for cold storage. The warehouses would serve trucks exclusively and would require various types of truck doors. Interior warehouse design would be subject to tenant improvements to accommodate any specialized storage and distribution of a wide variety of goods and materials used in commerce including but not limited to: finished products, consumer goods, parts, materials, tires, and tools that are typically used in a modern distribution and logistics facility and are consistent with a Light Industrial – Precise Development Combining – Airport Approach Height Combining (M-1 PD-H) Zone District. Outdoor storage of bulk and wholesale materials is not proposed as part of this Project.

The Project includes land use entitlement requests for a precise development plan for overall Project development and a Zone Variance to exceed the 35-foot height limitations specified in the M-1 PD H Zoning District pursuant to Sections 19.36.020.E.2, 19.36.020.D.1 and 19.76.080 of the Kern County Zoning Ordinance.

This Draft EIR has been prepared pursuant to the following:

- CEQA (Public Resources Code, Section 21000 et seq.).
- CEQA Guidelines (California Code of Regulations, Title 14, Chapter 3, Section 15000 et seq.).

- The Kern County CEQA Implementation Document.

The overall purposes of the CEQA process are to:

- Ensure that the environment and public health and safety are protected in the face of discretionary projects initiated by public agencies or private concerns.
- Provide full disclosure of the Project's environmental effects to the public, the agency decision-makers who will approve or deny the Project, and responsible and trustee agencies charged with managing resources (for example, wildlife and air quality) that may be affected by the Project.
- Provide a forum for public participation in the decision-making process with respect to environmental effects.

2.2 Purpose of this Environmental Impact Report

An EIR is a public informational document used in the planning and decision-making process. This Project-level EIR analyzes the environmental impacts of the Project. The Kern County Board of Supervisors will consider the information in the EIR, including the public comments and staff response to those comments, during the public hearing. The decision of the Board of Supervisors, who may approve, conditionally approve, or deny the Project is final and non-appealable. The purpose of an EIR is to identify the following:

- The significant potential impacts of a project on the environment and indicate how those significant impacts can be avoided or mitigated.
- Any unavoidable adverse impacts that cannot be mitigated.
- Reasonable and feasible alternatives to a project that would eliminate any significant adverse environmental impacts or reduce the impacts to a less than significant level.

An EIR also discloses growth-inducing impacts; impacts found not to be significant; and significant cumulative impacts of the project when taken into consideration with past, present, and reasonably anticipated future projects.

CEQA requires that an EIR reflect the independent judgment of the lead agency regarding the impacts, the level of significance of the impacts both before and after mitigation, and mitigation measures proposed to reduce the impacts. A draft EIR is circulated to responsible agencies, trustee agencies with resources affected by a project, and interested agencies and individuals. The purposes of public and agency review of a draft EIR include sharing expertise, disclosing agency analyses, checking for accuracy, detecting omissions, discovering public concerns, and soliciting mitigation measures and alternatives capable of avoiding or reducing the significant effects of a project, while still attaining most of the basic objectives of a project.

2.2.1 Areas of Controversy

Areas of controversy were identified through written agency and public comments received during the EIR Notice of Preparation and scoping period. Public comments received during the scoping period are summarized in this **Chapter 2**, *Introduction*, and provided in Appendix A. Although not controversial, key issues were identified as they relate to the various environmental topics in **Chapter 4**, *Environmental Setting, Impacts, and Mitigation Measures*:

- Impacts related to air quality
- Impacts related to greenhouse gas emissions
- Impacts related to noise
- Impacts related to utilities and service systems

2.2.2 Issues to Be Resolved

Section 15123(b) (3) of the *CEQA Guidelines* requires that an EIR contain issues to be resolved that include the choices among alternatives and whether or how to mitigate significant impacts. The major issues to be resolved regarding a project include the following decisions by the lead agency:

- Determine whether the Draft EIR adequately describes the environmental impacts of the project.
- Identify a preferred choice among alternatives.
- Determine whether the recommended mitigation measures should be adopted or modified.
- Determine whether additional mitigation measures need to be applied to the project.

2.3 Terminology

To assist readers in understanding this Draft EIR, terms used are defined in the following manner:

- ***Project*** means the whole of an action that has the potential for resulting in a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment.
- ***Environment*** means the physical conditions that exist within the area that will be affected by the Project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The area involved is the locale in which significant direct or indirect impacts would occur as a result of the Project. The environment includes both natural and human-created conditions.

- ***Impacts*** analyzed under CEQA must be related to a physical change. Impacts are:
  - Direct or primary – Impacts that would be caused by the Project and would occur at the same time and place of project implementation; or
  - Indirect or secondary – Impacts that are caused by the Project at a later time or farther removed in distance but are still reasonably foreseeable. Indirect or secondary impacts may include growth-inducing impacts and other effects related to induced changes in the pattern of land use, population density or growth rate, or related effects on air, water, and other natural systems, including ecosystems.
- ***Significant impact on the environment*** means a substantial, or potentially substantial, adverse change in any of the physical conditions in the Project vicinity affected by the Project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. An economic or social change resulting from a project by itself is not considered a significant impact on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant.
- ***Mitigation*** consists of measures to avoid or substantially reduce the Project's significant environmental impacts by:
  - Avoiding the impacts altogether by not taking a certain action or parts of an action;
  - Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
  - Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
  - Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the actions; or
  - Compensating for the impacts by replacing or providing substitute resources or environments.
- ***Cumulative Impacts*** are two or more individual impacts that, when considered together, are considerable or compound or increase other environmental impacts. The following statements also apply when considering cumulative impacts:
  - The individual impacts may be changes resulting from a single project or separate projects.
  - The cumulative impact from several projects is the change in the environment that results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor, but collectively significant, projects taking place over time.

This Draft EIR uses a variety of terms to describe the level of significance of adverse impacts. These terms are defined as follows:

- ***Less than significant***: An impact that is adverse but that does not exceed the defined thresholds of significance. Less than significant impacts do not require mitigation.
- ***Significant***: An impact that exceeds the defined thresholds of significance and would or could cause a substantial adverse change in the environment. Mitigation measures are recommended to eliminate the impact or reduce it to a less than significant level.
- ***Significant and unavoidable***: An impact that exceeds the defined thresholds of significance and cannot be eliminated or reduced to a less than significant level through the implementation of mitigation measures.

2.4 Decision-Making Process

CEQA requires lead agencies, in this case Kern County, to solicit and consider input from other interested agencies, citizen groups, and individual members of the public. CEQA also requires the Project to be monitored after it has been permitted to ensure that mitigation measures are carried out.

CEQA requires the lead agency to provide the public with a full disclosure of the expected environmental consequences of the Project and with an opportunity to provide comments. In accordance with CEQA, the following is the process for public participation in the decision-making process:

- **Initial Study (IS)/Notice of Preparation (NOP).** Kern County prepared and circulated an IS/NOP for 30 days to the responsible agencies, trustee agencies, and local agencies as well as other interested parties for review and comment beginning on November 16, 2023, and ending on December 18, 2023.
- **Draft EIR Preparation/Notice of Completion.** The Draft EIR is prepared, incorporating public and agency responses to the IS/NOP and the scoping process. The Draft EIR is circulated for review and comment to appropriate agencies and additional individuals and interest groups who have requested to be notified of EIR projects. Per Section 15105 of the *CEQA Guidelines*, Kern County will provide for a 45-day public review period on the Draft EIR. Kern County will subsequently respond to each comment on the Draft EIR received in writing through a Response to Comments chapter in the Final EIR. The Response to Comments will be provided to each agency or person who provided written comments on the EIR a minimum of 10 business days before the scheduled Board of Supervisors hearing on the Final EIR and Project.
- **Preparation and Certification of Final EIR**. The Board of Supervisors will consider the Final EIR, all public comments, and the Project, and take final action on the Project. At least one public hearing will be held by the Board of Supervisors to consider the Final EIR, take public testimony, and then approve, conditionally approve, or deny the Project.

2.4.1 Initial Study and Notice of Preparation

In accordance with CEQA Guidelines Section 15082 (a) (NOP) and the County's Guidelines, the KCPNR circulated an IS/NOP for a 30-day public review. The IS/NOP was sent to the State Clearinghouse, public agencies, special districts, responsible and trustee agencies, and other interested parties for a public review period that began on November 16, 2023, and ended on December 18, 2023.

The purpose of the IS/NOP is to formally convey that Kern County, as the lead agency, solicited input regarding the scope and proposed content of the EIR. The IS/NOP, scoping meeting, and community workshop materials, comment letters received, and a complete summary of all scoping comments are included in Appendix A.

2.4.2 Scoping Meeting

Pursuant to Section 15082 (c)(1) of the CEQA Guidelines, for projects of statewide, regional, or area-wide significance, the lead agency is required to conduct at least one scoping meeting. The scoping meeting is for jurisdictional agencies and interested persons or groups to provide comments regarding, but not limited to, the range of actions, alternatives, mitigation measures, and environmental effects to be analyzed. Kern County hosted a scoping meeting on December 6, 2023, at 1:30 p.m., at the KCPNR, located at 2700 "M" Street, Suite 100, Bakersfield, California. During the December 6, 2023, scoping meeting, three members of the public were present, one of whom provided comments. Jorge Torres, a representative from the Western States Regional Council of Carpenters and a resident of the surrounding area, discussed the Project's need to hire local union labor and how such hiring efforts are associated with a reduction of air quality impacts.

IS/NOP and Scoping Meeting Results

Specific environmental concerns were received as written comments during the IS/NOP public scoping period and are presented below. The IS/NOP, scoping meeting materials and all comments received are included in Appendix A.

IS/NOP Written Comments

The County received 12 letters with substantive comments in response to the IS/NOP. The comments are summarized in **Table 2-1.**

Table 2-1: Summary of Comments on the Notice of Preparation

Commenter	Summary of Comment
State Agencies	
Native American Heritage Commission Letter: November 21, 2023	Recommends consultation with California Native American tribes in the geographic area. Compliance with Assembly Bill 52 and Senate Bill 18 and provides recommendations for cultural resource assessment.
Department of Justice Attorney General Rob Bonta Letter: November 28, 2023	States that priority should be placed on avoiding land use conflicts between warehouses and sensitive receptors. Raises concerns about associated environmental impacts from warehouses, such as emissions of nitrogen oxide and particulate matter of 2.5 microns or less, and their associated health impacts including respiratory problems, cancer, heart disease, and premature death. Also provides the Attorney General Office's Bureau of Environmental Justice best practices and mitigation measures for warehouse projects.
California Department of Conservation Geologic Energy Management Division Letter: November 29, 2023	Indicates there are no known oil and gas wells located within the Project boundary and maintains that the Division has statutory authority over the drilling; operation and maintenance; and abandonment of oil, gas, and geothermal wells and attendant facilities.
California Department of Transportation Scott Lau, Associate Transportation Planner Email: December 1, 2023	Verified receipt of the NOP by the California Department of Transportation. No comments were made on the content of the NOP.
State of California – Natural Resources Agency Department of Fish and Wildlife Letter: December 22, 2023	Indicates there are special-status species that may be present at the Project site. Recommends that a qualified biologist conduct focused habitat assessments to determine the absence or presence of special-status species within the Project site. Recommends that individual Project sites be surveyed for Bakersfield cactus (*Opuntia basilaris var. treleasei*), and avoided with no disturbance buffer of 50 feet or consultation if no buffer can be achieved. Recommends assessing the presence/absence of San Joaquin kit fox (*Vulpes macrotis mutica*) by conducting den surveys following the U.S. Fish and Wildlife Service standards with repeat surveys at the beginning of ground and/or vegetation disturbing activities if there is no issued Incidental Take Permit. Worker awareness training is recommended for the qualified biologist. Recommends compensation for loss of Swainson's hawk (*Buteo swainsoni*) foraging habitat and proximity of potential nesting trees on the parcel east of the Project. Recommends conducting protocol surveys within the survey season immediately prior to Project construction. Recommends focus habitat assessment for suitable habitat of the Crotch's bumble bee (*Bombus crochii*) and avoidance measures if the species is detected during surveys. Recommends focused habitat assessment for species presence/absence for Burrowing owl (*Athene cunicularia*), California glossy snake (*Arizona elegans occidantalis),* Bakersfield legless lizard (*Anniella grinnelli*), and American badger (*Taxidea taxus*) as State species of special concern. Avoidance measures are recommended.

Commenter	Summary of Comment
	Also recommends consulting with the U.S. Fish and Wildlife Service regarding federally listed species including the Bakersfield cactus and San Joaquin kit fox.
Local Agencies	
Kern County Superintendent of Schools Letter: November 22, 2023	Indicates that the Project will have no significant effects on school district facilities so long as statutory school fees, if any, are collected as required by law and that no further mitigation measures regarding school facilities are necessary.
North of the River Recreation and Park District Steph Thisius-Sanders Letter: November 29, 2023	Indicates the Project will have no impact on the services or facilities North of the River Recreation and Park District.
Kern County Public Works, County Surveyor Letter: December 4, 2023	Recommends placing the following conditions on the Project: all survey monuments be tied out by a licensed land surveyor, all survey monuments destroyed be reset or have a suitable witness corner set, and all survey monuments shall be accessible by a licensed land surveyor or representative.
Kern County Public Works Department, Development Review, Floodplain Management Section, Sewer and Water Section, County Service Area Section Letter: December 5, 2023	Verified receipt of the NOP by the Public Works Department and "no comments" noted for the Development Review Section, Sewer and Water Section, and CSA Section. The Floodplain Management Section recommends the Project applicant shall provide a plan for the disposal of drainage waters originating on site and from adjacent road rights-of-way.
San Joaquin Valley Air Pollution Control District Letter: December 19, 2023	Recommends the Project use the cleanest available off-road construction equipment. Recommends reducing operational emissions to levels below the San Joaquin Valley Air Pollution Control District's significance through design elements. States the review should adequately characterize and justify trip length distance for off-site truck travel to and from the site with consideration of logistics facility and high generation of truck trips for distribution. States the environmental review should evaluate the risk associated with sensitive receptors with a prioritization method for a conservative screening-level health risk assessment using the California Air Pollution Control Officers Association's methodology. Recommends performing an ambient air quality analysis for the Project if emissions exceed 100 pounds per day of any pollutant. Includes recommendations for industrial/warehouse emission reduction strategies. Recommends the County evaluate Heavy Heavy-Duty truck routing patterns to limit exposure in residential communities, reduce idling of heavy-duty trucks, use of electric or zero-emission equipment, and implement vegetative barriers and urban greening to reduce air pollution exposure on sensitive receptors. Recommends on-site solar use and electric infrastructure such as electric vehicle charging equipment. Also lists District Rules that the Project may be subject to.
Southern California Gas Company Nerses Papazyan Email: December 20, 2023	Indicates the receipt of the NOP and states the Project would not conflict with the Distribution's pipeline system.
Interested Parties	
Western States Regional Council of Carpenters Email: December 6, 2023	Suggests the County requires using the local workforce for Project development to improve positive economic impact and reduce vehicle miles traveled. Also suggests the County should require training to prevent the spread of COVID-19 and other infectious diseases.

Key:
NOP = Notice of Preparation

2.4.3 Availability of the Draft Environmental Impact Report

This Draft EIR has been distributed directly to agencies, organizations, and interested groups and persons for comment during a 45-day formal review period in accordance with Section 15087 of the *CEQA Guidelines*. This Draft EIR and the full administrative record for the Project, including all studies, is available for review during normal business hours Monday through Friday at the Kern County Planning Department, located at:

Kern County Planning and Natural Resources Department
2700 "M" Street, Suite 100
Bakersfield, California 93301-2370
Contact: Mark Tolentino, Planner III
Phone: (661) 862-5041, Fax: (661) 862-8601
TolentinoM@kerncounty.com

This Draft EIR is also available on the KCPNR website:
http://kernplanning.com/planning/environmental-documents.

Additionally, this EIR is available at the following libraries:

Kern County Library/Beale
Local History Room
701 Truxtun Avenue
Bakersfield, California 93301

2.5 Format and Content

This Draft EIR addresses the potential environmental effects of the Project and was prepared using input from the public and responsible and affected agencies, and the EIR scoping process, as discussed previously. The contents of this Draft EIR were based on the findings in the IS/NOP, and public and agency input. Based on the findings of the IS/NOP, a determination was made that this Draft EIR must contain a comprehensive analysis of all environmental issues identified in Appendix G of the CEQA Guidelines. No resource areas were eliminated from discussion through the IS. The Draft EIR is organized by the following resources:

- Aesthetics and Visual Resources
- Agricultural and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions

- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire

2.5.1 Required Environmental Impact Report Content and Organization

Table 2-2 contains a list of sections required under CEQA, along with a reference to the chapter

Table 2-2: Required Environmental Impact Report Contents

Requirement (California Environmental Quality Act Section)	Location in the Draft Environmental Impact Report
Table of Contents (Section 15122)	Table of Contents
Executive Summary (Section 15123)	Chapter 1
Introduction (Section 15132)	Chapter 2
Project Description (Section 15124)	Chapter 3
Environmental Setting (Section 15125)	Sections 4.1 – 4.20
Significant Environmental Impacts (Section 15126.2)	Sections 4.1 – 4.20
Environmental Setting (Section 15125)	Sections 4.1 – 4.20
Mitigation Measures (Section 15126.4)	Chapter 1 and Sections 4.1 – 4.20
Cumulative Impacts (Section 15130)	Chapter 1 and Sections 4.1 – 4.20
Effects Found not to be Significant (Section 15128)	Chapters 1, 4, and 5
Unavoidable Significant Environmental Impacts (Section 15126.2(b))	Chapters 4 and 5
Significant Irreversible Changes (Section 15126.2(c))	Chapter 5
Growth-Inducing Impacts (Section 15126.2(d))	Chapter 5
Alternatives to the Proposed Project (Section 15126.6)	Chapter 6
Response to Comments (Section 15132)	Chapter 7
Organizations and Persons Consulted (Section 15129)	Chapter 8
List of Preparers (Section 15129)	Chapter 9
References (Section 15148)	Chapter 10

The content and organization of this Draft EIR are designed to meet the requirements of CEQA and the CEQA Guidelines, as well as to present issues, analysis, mitigation, and other information in a logical and understandable way. This Draft EIR is organized into the following sections:

- Chapter 1, *Executive Summary*, provides a summary of the Project description and a summary of the environmental impacts and mitigation measures.
- Chapter 2, *Introduction*, provides CEQA compliance information, an overview of the decision-making process, organization of the Draft EIR, and a responsible and trustee agency list.
- Chapter 3, *Project Description*, provides a description of the location, characteristics, and objectives of the Project, and the relationship of the Project to other plans and policies associated with the Project.
- Chapter 4, *Environmental Setting*, *Impacts, and Mitigation Measures*, contains a detailed environmental analysis of the existing conditions, Project impacts, mitigation measures, and cumulative impacts.
- Chapter 5, *Consequences of Project Implementation*, presents an analysis of the Project's cumulative and growth-inducing impacts and other CEQA requirements, including significant and unavoidable impacts and irreversible commitment of resources.
- Chapter 6, *Alternatives*, describes a reasonable range of alternatives to the Project that could reduce the significant environmental effects that cannot be avoided.
- Chapter 7, *Responses to Comments*, is reserved for responses to comments on the Draft EIR.
- Chapter 8, *Organizations and Persons Consulted*, lists the organizations and persons contacted during preparation of this Draft EIR.
- Chapter 9, *Preparers*, identifies persons involved in the preparation of the Draft EIR.
- Chapter 10, *Bibliography*, identifies reference sources for the Draft EIR.
- Appendices provide information and technical studies that support the environmental analysis contained within the Draft EIR.

The analysis of each environmental category in Chapter 4, *Environmental Setting, Impacts, and Mitigation Measures* is organized as follows:

- "Introduction" provides a brief overview of the purpose of the section analyzed regarding the Project.
- "Environmental Setting" describes the physical conditions that exist at this time and that may influence or affect the topic analyzed.
- "Regulatory Setting" provides State and federal laws and the Kern County General Plan (KCGP) goals, policies, and implementation measures that apply to the topic analyzed.

- "Impacts and Mitigation Measures" discusses the impacts of the Project in each category, presents the determination of the level of significance, and provides a discussion of feasible mitigation measures to reduce any impacts.
- "Cumulative Setting, Impacts, and Mitigation Measures" provides a discussion of the cumulative geographic area for each resource area, and analysis of whether the Project would contribute to a significant cumulative impact, and, if so, identifies cumulative mitigation measures.

2.6 Responsible and Trustee Agencies

Projects or actions undertaken by the lead agency, in this case, the KCPNR, may require subsequent oversight, approvals, or permits from other public agencies to be implemented. Other such agencies are referred to as "responsible agencies" and "trustee agencies." Pursuant to Sections 15381 (Responsible Agency) and 15386 (Trustee Agency) of the CEQA Guidelines, as amended, responsible agencies and trustee agencies are defined as follows:

- A "responsible agency" is a public agency that proposes to carry out or approve a project, for which a lead agency is preparing or has prepared an EIR or Negative Declaration. For the purposes of CEQA, the term "responsible agency" includes all public agencies other than the lead agency that have discretionary approval power over the project (Section 15381).
- A "trustee agency" is a state agency having jurisdiction by law over natural resources affected by a project that are held in trust for the people of the State of California (Section 15386).
- "Public agency" does not include agencies of the federal government (CEQA Guidelines 15379).

The various public, private, and political agencies and jurisdictions with a particular interest in the Project include the following:

Federal Agencies

- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- Federal Aviation Administration

State Agencies

- California Air Resources Board
- California Department of Conservation, Geologic Energy Management Division

- California Department of Fish and Wildlife
- California Native American Heritage Commission
- Governor's Office of Planning and Research
- Office of the State Fire Marshall
- Regional Water Quality Control Board, Central Valley District
- State Water Resources Control Board

Local Agencies

- San Joaquin Air Pollution Control District
- Kern Council of Governments
- Kern County Public Works Department, Operations Division
- Kern County Public Works Department, Engineering and Surveying Services Division
- Kern County Fire Department
- KCPNR
- Kern County Public Health Services Department, Environmental Health Division
- Kern County Public Services Department, Development Review Division
- Kern County Planning Commission
- Kern County Board of Supervisors

2.7 Incorporation by Reference

In accordance with Section 15150 (Incorporation by Reference) of the CEQA Guidelines, to reduce the size of the EIR, the following documents are hereby incorporated by reference into this Draft EIR and are available for public review at the KCPNR. A brief synopsis of the scope and content of these documents is provided in the following subsections.

Metropolitan Bakersfield General Plan (Unincorporated Planning Area)

The Metropolitan Bakersfield General Plan (MBGP) is a policy document with land use designations and related information designed to give long-range guidance to Kern County officials who make decisions affecting the growth and resources of the unincorporated Kern County portions of the Metropolitan Bakersfield planning area. The MBGP, adopted on December 3, 2002, helps to ensure that day-to-day decisions conform to long-range policies designed to protect the public interest related to the County's growth and development. The

MBGP is available at the following link: https://kernplanning.com/planning/planning-documents/general-plans-elements/.

Kern County Zoning Ordinance

According to Chapter 19.02.020, Purposes, Title 19 was adopted to promote and protect the public's health, safety, and welfare through the orderly regulation of land uses throughout the unincorporated area of Kern County. The purposes of this title are as follows:

- Provide the economic and social advantages resulting from an orderly planned use of land resources.
- Encourage and guide development consistent with the KCGP.
- Divide Kern County into zoning districts of a number, size, and location deemed necessary to carry out the KCGP and this title.
- Regulate the size and use of lots, yards, and other open spaces.
- Regulate the use, location, height, bulk, and size of buildings and structures.
- Regulate the intensity of land use.
- Regulate the density of population in residential areas.
- Establish requirements for off-street parking.
- Regulate signs and billboards.
- Provide for the enforcement of the regulations of Chapter 19.02.

Regional Transportation Plan

The 2022 Regional Transportation Plan (RTP) is a 24-year blueprint that establishes a set of regional transportation goals, policies, and actions intended to guide the development of the planned multimodal transportation systems in Kern County. It was developed through a continual, comprehensive, and cooperative planning process; and provides for effective coordination between local, regional, State, and federal agencies. Included in the 2022 RTP is the Sustainable Communities Strategy (SCS), which is required by California's Sustainable Communities and Climate Protection Act, Senate Bill (SB) 375. The California Air Resources Board set Kern greenhouse gas emissions reductions from passenger vehicles and light-duty trucks at 9% per capita by 2020 and 15% per capita by 2035 as compared to 2005. In addition, SB 375 provides for closer integration of the RTP/SCS with the Regional Housing Needs Allocation ensuring consistency between low-income housing needs and transportation planning. Kern Council of Governments (Kern COG) engaged in the Regional Housing Needs Allocation process concurrently with the development of the 2022 RTP/SCS. This process required Kern COG to work with its member agencies to identify areas within the region that can provide sufficient housing for all economic segments of the population and ensure that the State's housing goals are met.

The SCS intends to achieve the State's emissions reduction targets for automobiles and light trucks. The SCS will also provide opportunities for a stronger economy, healthier environment, and safer quality of life for community members in Kern County. The RTP/SCS seeks to improve economic vitality, air quality, the health of communities, and transportation and public safety; promote the conservation of natural resources and undeveloped land; and increase access to community services, regional and local energy independence, and opportunities to help shape our community's future.

The 2022 RTP/SCS financial plan identifies available funds to support the region's transportation investments. The plan includes a core revenue forecast of existing local, State, and federal sources along with funding sources that are considered to be reasonably available over the time horizon of the RTP/SCS. These new sources include adjustments to State and federal gas tax rates based on historical trends and recommendations from two national commissions (National Surface Transportation Policy and Revenue Study Commission and National Surface Transportation Infrastructure Financing Commission), leveraging of local sales tax measures, local transportation impact fees, potential national freight program/freight fees, future State bonding programs, and mileage-based user fees.

The 2022 RTP/SCS plan is available at the following link: https://www.kerncog.org/wp-content/uploads/2022/12/2022_RTP.pdf.

2.8 Sources

This Draft EIR is dependent upon information from many sources. Some sources are studies or reports that have been prepared specifically for this document. Other sources provide background information related to one or more resource areas that are discussed in this document. The sources and references used in the preparation of this Draft EIR are listed in Chapter 10, *Bibliography,* and are available for review by appointment during normal business hours at:

Kern County Planning and Natural Resources Department
2700 "M" Street, Suite 100
Bakersfield, California 93301-2370
Contact: Mark Tolentino, Planner III
TolentinoM@kerncounty.com

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Chapter 3

Project Description

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Chapter 3

Project Description

3.1 Project Overview

This Draft Environmental Impact Report (EIR) has been prepared by Kern County, the California Environmental Quality Act (CEQA) Lead Agency, to identify and evaluate potential environmental impacts associated with implementation of the proposed IPG Industrial Project (Precise Development [PD] Plan No. 72, Map No. 102; Zoning Variance [ZV] No. 57, Map No 102) (Project) by IPG Kern County 52 Holdings, LLC (Project proponent). The Project would be located on approximately 49.05 acres of privately owned parcels (Assessor Parcel Numbers [APNs]: 492-010-13 and 492-010-17).

The Project would include the development of a 923,130-square-foot warehouse distribution facility and associated improvements on approximately 49.05 acres located in the central portion of unincorporated Kern County. The facility contains two, single-story buildings: one building (Building 1) would total approximately 655,690 square feet, including 10,000 square feet of office, and the second (Building 2) would total 267,440 square feet, including 5,000 square feet of office. The warehouse buildings would be primarily constructed from architecturally enhanced concrete panels and would not be taller than 56 feet above the finished floor elevation.

The Project's primary function would be a high cube and cold storage warehouse to facilitate material handling equipment and storage uses, where cold storage would occupy up to 20% of the facility. The warehouses would exclusively serve trucks and would require truck doors of various types. Improvements to roadways would be required to adhere to Kern County Public Works Department development standards. Other improvements include utility, water, gas lateral extensions, and storm drainage systems (collectively, "the Project").

3.2 Project Location

The Project site is located on approximately 49.05 acres, comprised of two privately owned parcels, in the central portion of unincorporated Kern County, California. The Project site is approximately 1.7 miles north of the incorporated City of Bakersfield and approximately 3.1 miles east of the incorporated City of Shafter. The unincorporated community of Oildale directly abuts the east side of the Project site. The Project site is approximately 1.4 miles northeast of State Route (SR) 99. Regional access to the Project site is provided by SR 99 and Merle Haggard Drive via Airport Drive. Local access to the Project site is available via Airport Drive and Boughton Drive. **Figure 3-1** shows the regional location and surrounding vicinity of the Project. **Figure 3-2** illustrates the Project site boundary and surrounding area. The Project vicinity is characterized by industrial and commercial uses (such as distribution, storage, and shipping centers), transportation, vacant land, and residential uses that are primarily east of the Project site.

Figure 3-1: Regional Location

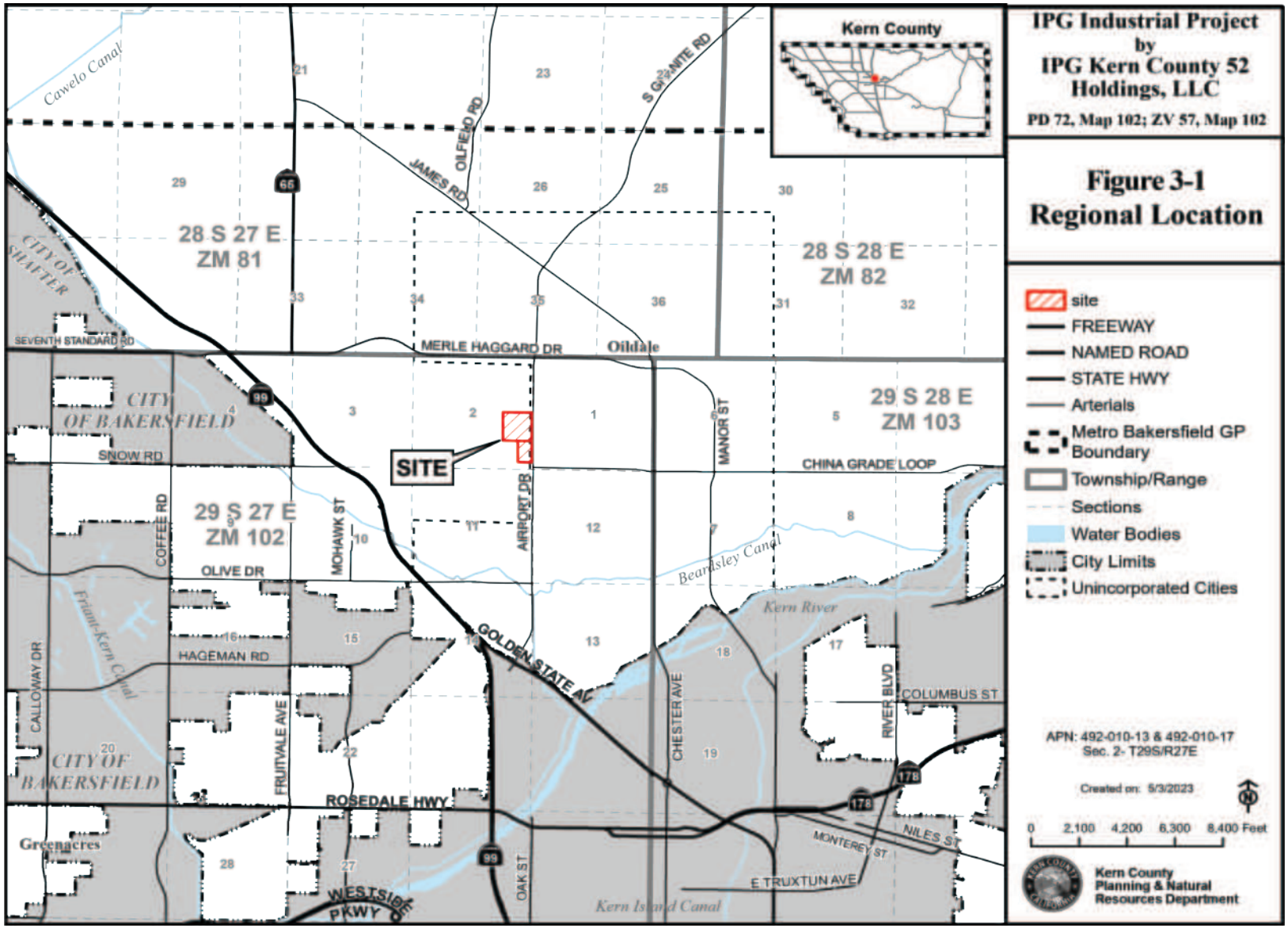
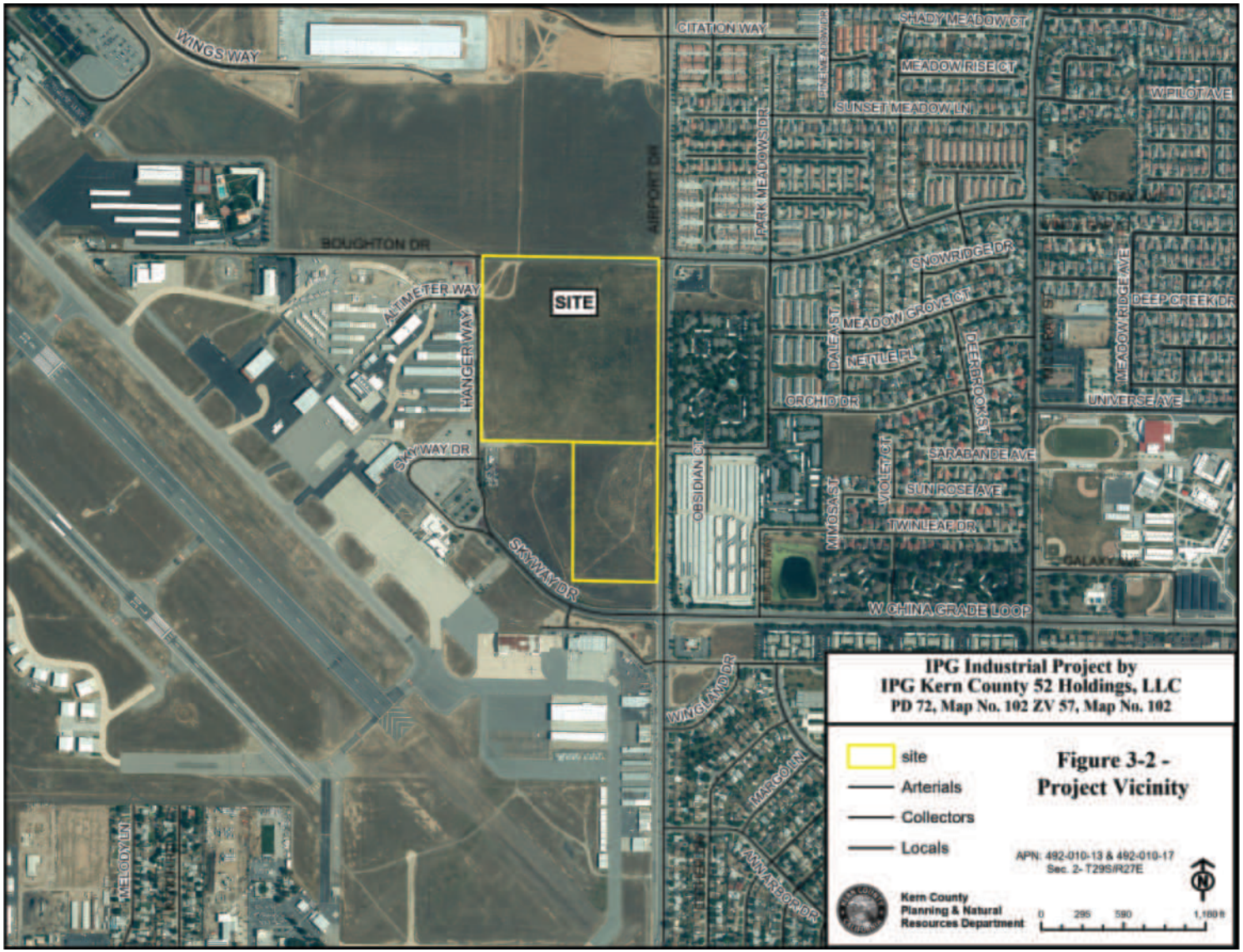


Figure 3-2: Project Vicinity



The Project site lies within the administrative boundaries of the Metropolitan Bakersfield General Plan (MBGP). **Table 3-1** lists the existing MBGP designations, which are also depicted on **Figure 3-3**. The entire Project site is subject to the provisions of Kern County Zoning, illustrated on **Figure 3-4. Table 3-1** provides Project APNs, map code designations, existing zoning, and total acreage per parcel. The primary entrance to the Project site would be located off Airport Drive, which would lead to on-site parking stalls for employees located at both buildings. Building 1 would be located within APN 492-010-13 and Building 2 would be located within APN 492-010-17.

Table 3-1: Project Assessor Parcel Numbers, Existing Land Uses, and Acreages

Parcel	APN	Map Code Designation	Existing Zoning	Acres
1	492-101-13	LI	M-1 PD H	35.17
2	492-101-17	LI	M-1 PD H	13.88
Approximate Project Total Acreage				49.05

Key:
APN = Assessor Parcel Number
H = Airport Approach Height District
LI = Light Industrial
M-1 = Light Industrial District
PD = Precise Development District

3.3 Applicant Submitted Project Objectives

State CEQA Guidelines Section 15124(b) requires that a project description include a clearly written statement of objectives. The statement of objectives should include the project's underlying purpose and may discuss the project's benefits. The following are Project objectives submitted by the Project proponent:

- Develop state-of-the-art warehouse and distribution facilities near major transportation corridor
- Meet regional demand for Class A industrial facilities that address local traffic patterns and needs
- Develop a visually appealing industrial project that is consistent with the provisions of the Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards
- Promote land use compatibility with adjacent airport-related uses by developing a warehouse and distribution facility
- Contribute to the local economy through new capital investment, the creation of new employment opportunities, expansion of the tax base, economic growth and development, and payment of development fees
- Site an industrial project in a location consistent with current and future market demands that minimize conflicts with surrounding uses

3.4 Environmental Setting

3.4.1 Regional Character

Kern County is California's third-largest county in land area and encompasses approximately 8,161 square miles. The county's geography includes, mountainous areas, agricultural lands, and deserts. As noted, the Project site is located north of the City of Bakersfield, which serves as the county seat and sits at the southern end of the San Joaquin Valley, bound by the Coast Range to the west, the Transverse Range (San Emigdio Mountains) to the south, and the Sierra Nevada (including the Tehachapi Mountains) to the east. According to the California Department of Finance's 2023 Population estimates, Kern County's current estimated population is 907,476 residents and Bakersfield is the largest city in the county with a current estimated population of 408,373 residents. The Project site and surrounding land are relatively flat and exhibit little topographic variation.

The elevation of the Project site ranges from approximately 495 feet above mean sea level to approximately 540 feet above mean sea level with a gentle north-easterly slope. The Project site can be described as flat; however, outside of leveled fields and orchards, the area is better described as an uneven plain consisting of extensive alluvial fans, debris flow, and over-bank deposits. Vegetation on the valley floor is predominated by modern cultigens and other non-native species, such as Russian thistle (tumbleweed) and grasses. The Project site does not contain jurisdictional waters of the United States including wetlands, per the National Wetlands Inventory maintained by the U.S. Fish and Wildlife Service.

3.4.2 Local Character

The Project is in unincorporated Kern County and adjacent to the unincorporated community of Oildale. The City of Bakersfield is 1.7 miles south of the Project site, and the City of Shafter is 3.1 miles northeast of the site. Existing development in the area includes access roads, residential communities, industrial and commercial uses, and an airport.

The Project is within the Sphere of Influence of the Meadows Field Airport, approximately 0.6 mile west of the Project, as shown on **Figure 3-5**. Meadows Field Airport is recognized as an Airport Influence Area, which means policies of the Airport Land Use Compatibility Plan would apply to the Project.

The Project site is not within a Special Flood Hazard Area based upon the Federal Emergency Management Agency Flood Insurance Rate Map (FIRM), per FIRM number 060291825F, effective October 21, 2021. The nearest flood hazard areas are located approximately 1 mile west and east of the Project site. There are no identified State-designated Alquist-Priolo Earthquake Fault Zones on the Project site. The nearest major faults of the San Andreas Fault and Garlock Fault are approximately 40 miles southwest and 40 miles southeast of the Project site, respectively (refer to Section 4.7, *Geology and Soils*). The Project site is not within an area that is designated by the California Department of Conservation Farmland Mapping and Monitoring Program as Prime

Farmland, Farmland of Statewide Importance, or Unique Farmland. No lands within the Project site are subject to a Williamson Act Land Use contract. The Project site is not part of an Agricultural Preserve.

The Project site is not designated as a mineral resource zone. Based on records maintained by the California Department of Conservation provided by the Geologic Energy Management Division's online mapping tool, there are no oil or gas wells identified on site.

The Project would be served by the Kern County Sheriff's Office for law enforcement and public safety, Kern County Fire Department for fire protection, and Kern County Medical Emergency Service for emergency medical and rescue services. The nearest Kern County Sheriff's Office substation and Kern County Fire Department fire station (Station No. 63) that would serve the Project are both in the unincorporated community of Oildale, approximately 1.3 miles west and 1.5 miles south of the Project site, respectively. The nearest hospitals are the Good Samaritan Hospital−Bakersfield at 901 Olive Drive, Bakersfield, California, approximately 1.6 miles south, and Memorial Hospital, approximately 5 miles southwest of the Project site.

3.5 Land Use and Zoning

3.5.1 Surrounding Land Uses

Existing land uses immediately surrounding the Project site are varied and consist of industrial, commercial, transportation, and residential uses. To the north, the Project boundary runs parallel to Boughton Drive with vacant undeveloped land across Boughton Drive, which is also designated for light industrial use. An aeronautical university is also northwest of the site at the terminus of Boughton Drive. To the east, the Project boundary runs parallel to Airport Drive, with a mix of uses across Airport Drive including Derrel's Mini Storage, Park Meadows Apartments, and Fabulous Burgers. The residential uses, located east of Project site, are comprise single- and multifamily residences, with the nearest residences being the Park Meadows apartment complex sited approximately 100 feet directly east. The Project has been designed so that no truck docks face the residences located east of the site and incorporates a heavy landscaping barrier along the Project's eastern setback and incorporates a dense landscaping barrier along the Projects eastern setback. To the south and opposite of Skyway Drive are a FedEx Ship Center, Epic Jet Center, and Airman Flight Training facilities. To the west is Hanger Way, and approximately 0.6 miles, to the west, is Meadows Field Airport and transportation-related facilities. **Table 3-2** summarizes the Project site and surrounding land uses.

Table 3-2: Project Site and Surrounding Land Uses

	Existing Land Use	Existing Map Code Designation	Existing Zone Classification
Project Site	Vacant	Light Industrial (LI)	Light Industrial Precise Development Airport Approach Height Combining

	Existing Land Use	Existing Map Code Designation	Existing Zone Classification
			District (M-1 PD H)
North	Vacant	Light Industrial (LI)	Light Industrial Precise Development Airport Approach Height Combining District (M-1 PD H)
East	Residential, Storage, Restaurant	Major Commercial (MC), General Commercial (GC)	General Commercial Precise Development Combining District (C2 PD); High Density Residential – Precise Development Combining (R-3 PD); Medium Density Residential – Precise Development Combining (R-2 PD); Low Density Residential (R-1)
South	Shipping Centers, Transportation services	Public Transportation (PT)	Medium Industrial Airport Approach Height Combining District (M-2 H)
West	Airport, Transportation Services	Public Transportation (PT)	Medium Industrial Airport Approach Height Combining District (M-2 H)

Key:
C2 = General Commercial District
GC = General Commercial
H = Airport Approach Height
LI = Light Industrial
MC = Major Commercial
M-1 = Light Industrial
M-2 = Medium Industrial
PD = Precise Development
PT = Public Transportation
R-1 = Low Density Residential
R-2 = Medium Density Residential
R-3 = High Density Residential

3.5.2 Existing General Plan and Zoning

Kern County and the City of Bakersfield have jointly prepared and separately adopted a general plan known as the MBGP for an unincorporated planning area in which the Project is located. This 409-square-mile planning area is a separate, but interrelated plan to the Kern County General Plan. The MBGP guides future development in the area through the adoption of all mandated elements per Government Code Section 65302.

Within the MBGP, the Project site has a Land Use Map Code (Land Use Designation) of LI (Light Industrial), which is consistent with the existing zone classification of M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District. This base M-1 District contains the PD and H (Precise Development – Airport Approach Height) combining districts overlays to ensure that development in these designated areas are compatible with surrounding land uses, as discussed in the following subsections. The surrounding MBGP land use designations and zoning districts are shown on **Figure 3-3** and **Figure 3-4**, respectively**.**

Figure 3-3: General Plan Land Use Designation

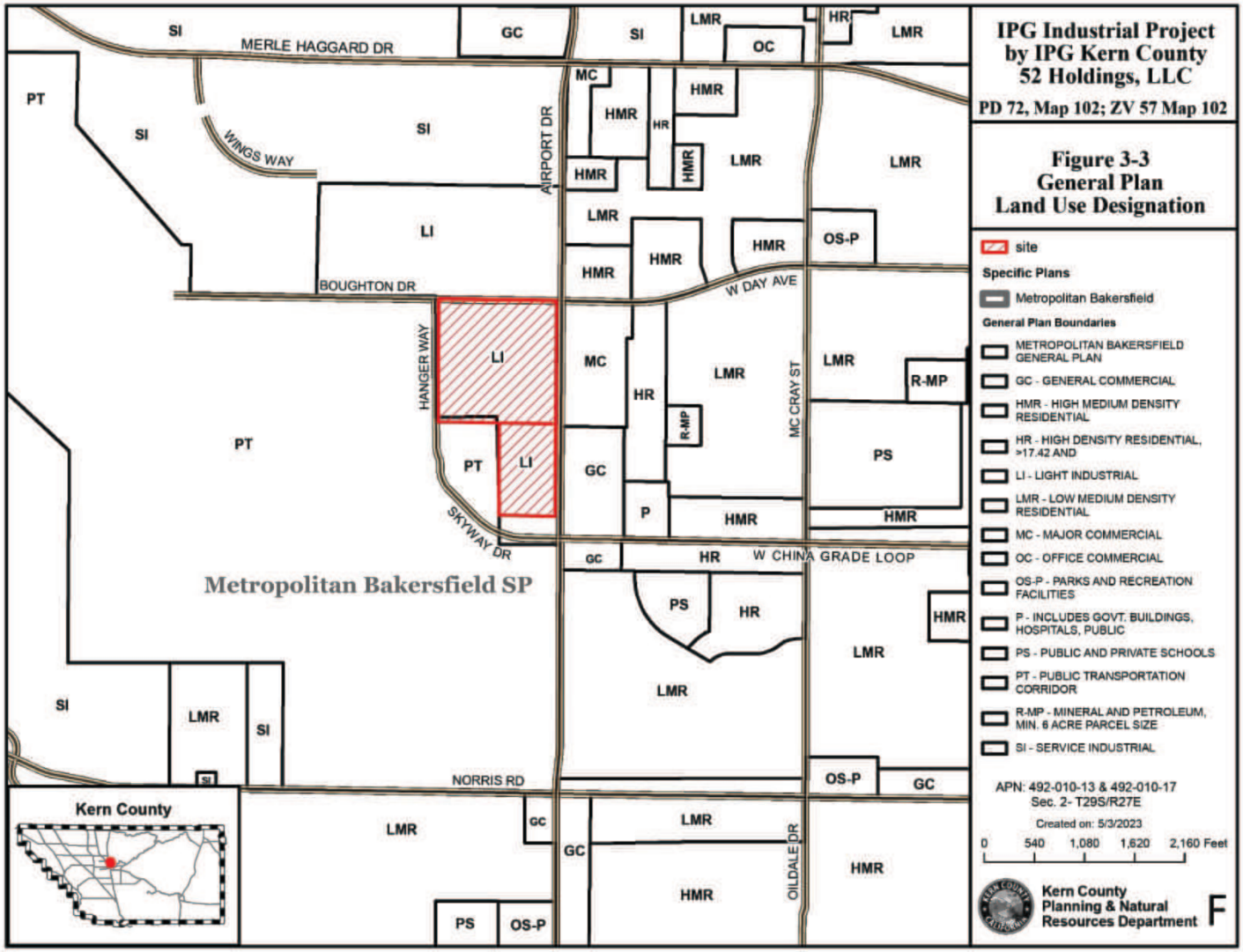


Figure 3-4: Zoning Classifications

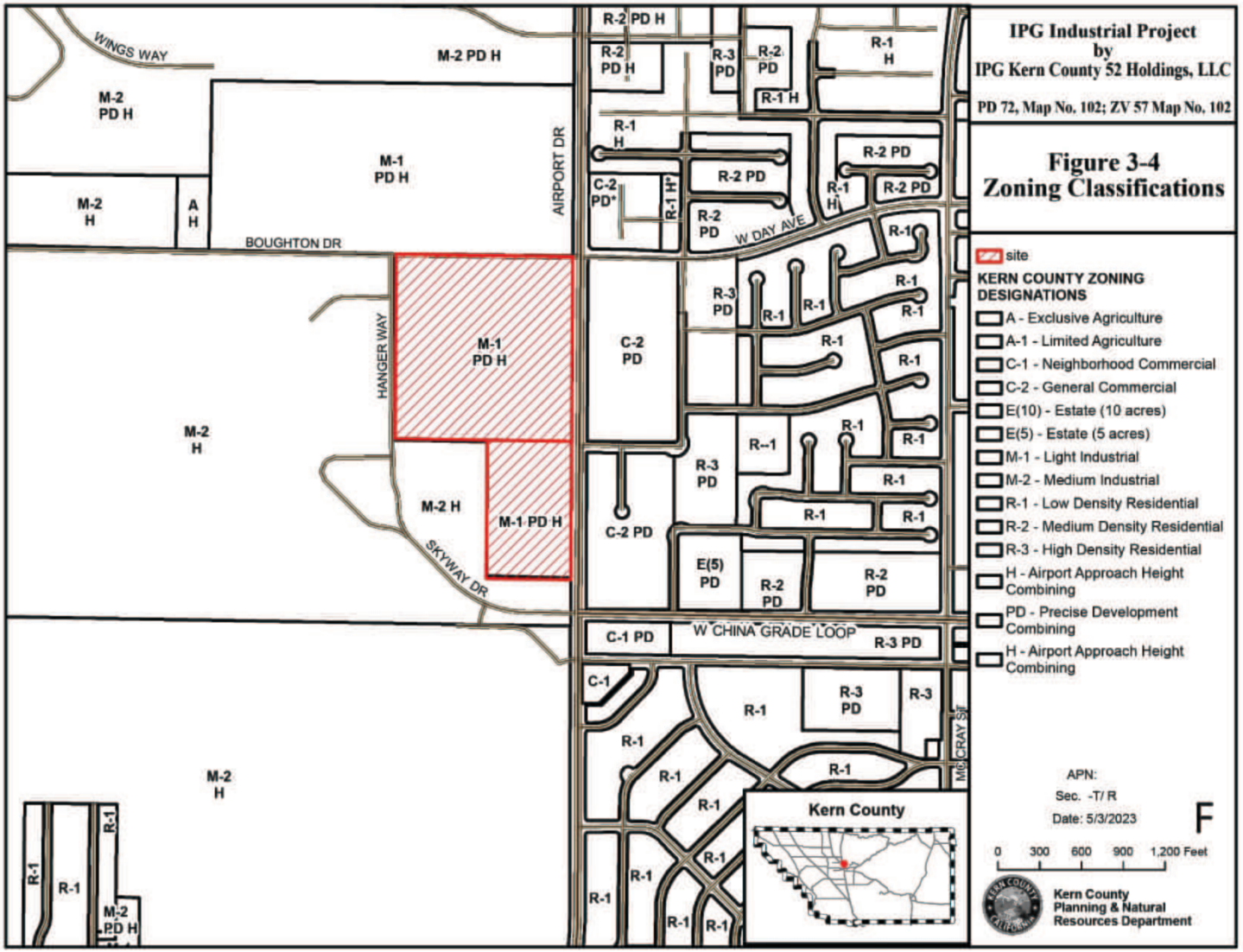
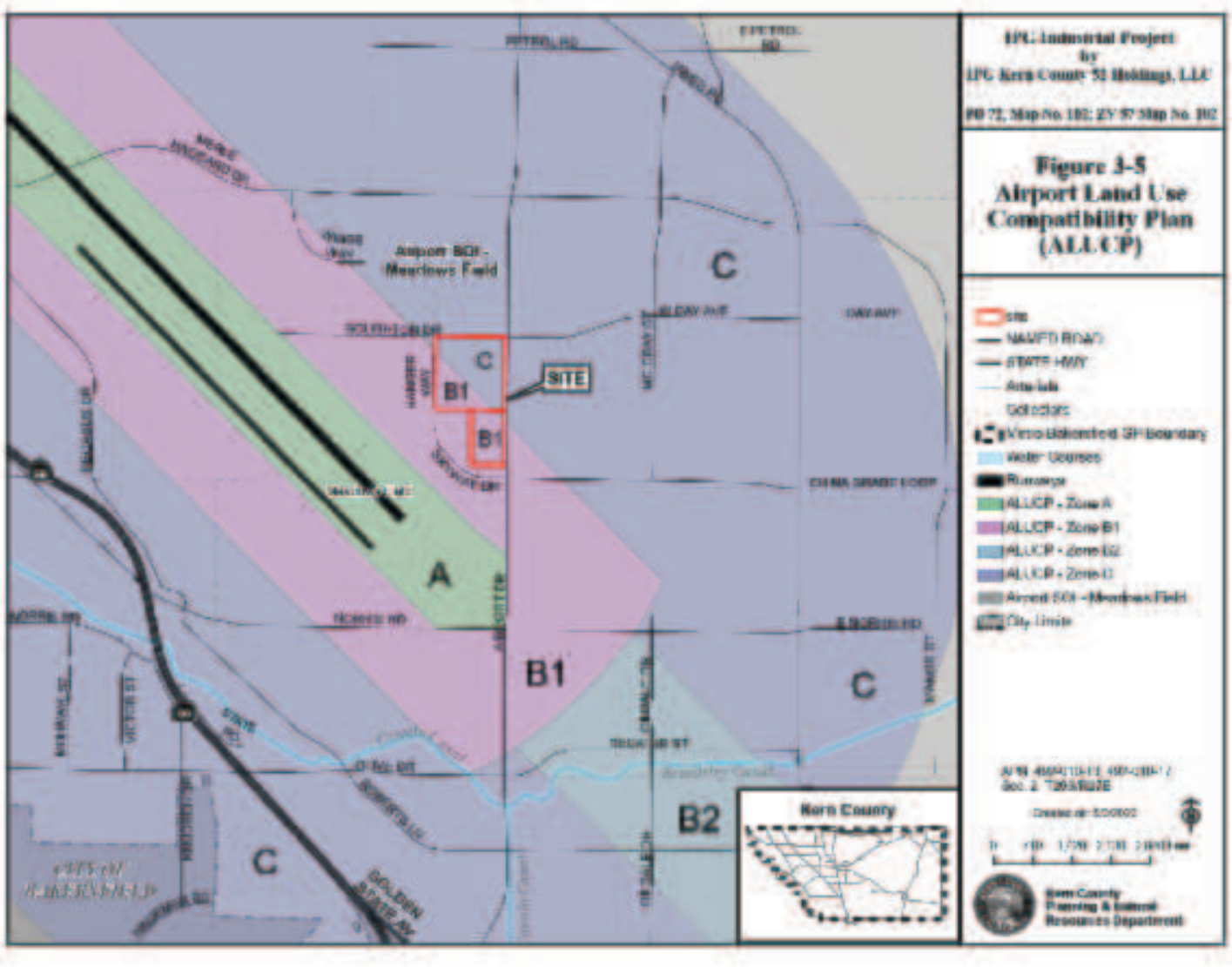


Figure 3-5: Airport Land Use Compatibility Plan



3.5.3 Kern County Zoning Ordinance

As discussed in the previous subsections the base zoning districts are defined in Title 19 of the Zoning Ordinance of Kern County and classified by combining zoning districts to further regulate land uses within these districts. **Figure 3-4** shows the Project site's zoning districts M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District.

The purpose of the Light Industrial (M-1) District is to designate areas for wholesale commercial, storage, trucking, assembly-type manufacturing, and other similar industrial uses. Processing or fabrication will be limited to activities conducted within a building that does not emit fumes, odor, dust, smoke, or gas beyond the confines of the building within which the activities occur or produce significant levels of noise or vibration.

The purpose of the PD Combining District is to designate areas with unique site characteristics or environmental conditions or areas surrounded by sensitive land uses to ensure that development in such areas is compatible with such constraints. The application of the PD District may be initiated by either the property owner or the county. The PD District may be combined with any base district. The regulations established by the PD District shall be in addition to the regulations of the base district with which the PD District is combined.

The purpose of the Airport Approach Height (H) Combining District is to minimize aviation hazards by regulating land uses, restricting the height of buildings and vegetation, and specifying design criteria necessary to promote aviation safety and to implement the requirements of the adopted Airport Land Use Compatibility Plan. The H District may be applied to areas within the vicinity of any public or general-use airport as provided for in the adopted Airport Land Use Compatibility Plan. The standards established by the H District shall be in addition to the regulations of the base district with which the H District is combined.

3.6 The Project

The Project would include an approximately 923,130-square-foot logistics facility and associated improvements, with a combined 15,000 square feet of office space. The facility would include two single-story warehouses that exclusively serves trucks. The Project site comprises two privately owned parcels for a total of approximately 49.05 acres. Implementation of the Project includes the following approvals from Kern County:

- **Precise Development Plan (PD No. 72, Map No. 102)** to allow construction and operation of a warehouse distribution and logistics facility within two single-story warehouses totaling 923,130 square feet, with 15,000 square feet of dedicated office space (Sections 19.36.020.E.2 and 19.36.020.D.1) on an approximate 49.05 acre Project site across two parcels in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District at the corner of Boughton Drive and Airport Drive:

- **Building 1:** 655,690 square feet, including 10,000 square feet of dedicated office space
- **Building 2:** 267,440 square feet, including 5,000 square feet of dedicated office space

- **Zoning Variance (ZV No. 57, Map No. 102)** to allow construction of a 56-foot-tall warehouse building where 35 feet is authorized (Section 19.76.080) in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District.

3.7 Project Characteristics

3.7.1 Project Facilities

The overall Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage and logistics uses, with a secondary application of cold storage occupying up to 20% of the facility. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage and distribution for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, and tools. typically found in a modern distribution/logistics facility consistent with M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) Zone District. Outdoor storage of bulk and wholesale materials is not proposed as part of this Project. **Table 3-3** summarizes the Project facilities.

Table 3-3: Project Facilities Summary

	Acreage	Proposed End Use	Maximum Building Footprint	Maximum Building Height	Truck Dock Trailer Parking Spaces	Automobile Parking Spaces	Truck Trailer Spaces
Total	49.04	~923,130 square foot high-cube with up to 20% cold storage warehouse	923,130	+/- 56 feet	124	547 stalls	307 stalls

The proposed PD Plan is depicted in **Figure 3-6a** through **Figure 3-6i**, which contains specific sheets for the Overall Site Plan (**Figure 3-6a)**, enlarged views of Building 1 and Building 2 (**Figure 3-6b** and **Figure 3-6c)**, and their respective elevations (**Figure 3-6d** through **Figure 3-6g**) and landscaping (**Figure 3-6h** and **Figure 3-6i)**.

Figure 3-6a: Precise Development Plan - Overall Site Plan

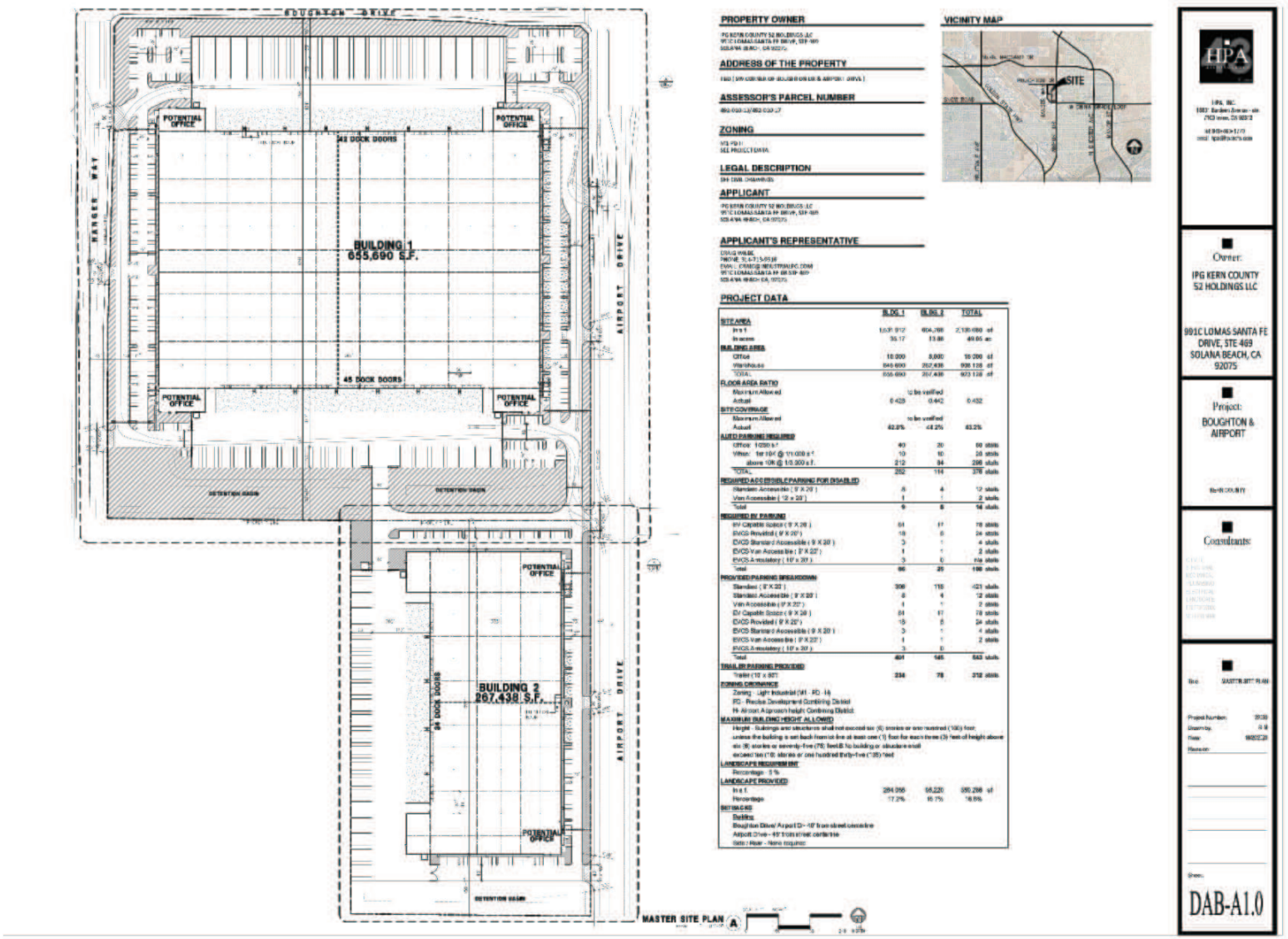


Figure 3-6b: Precise Development Plan - Building 1 Site Plan

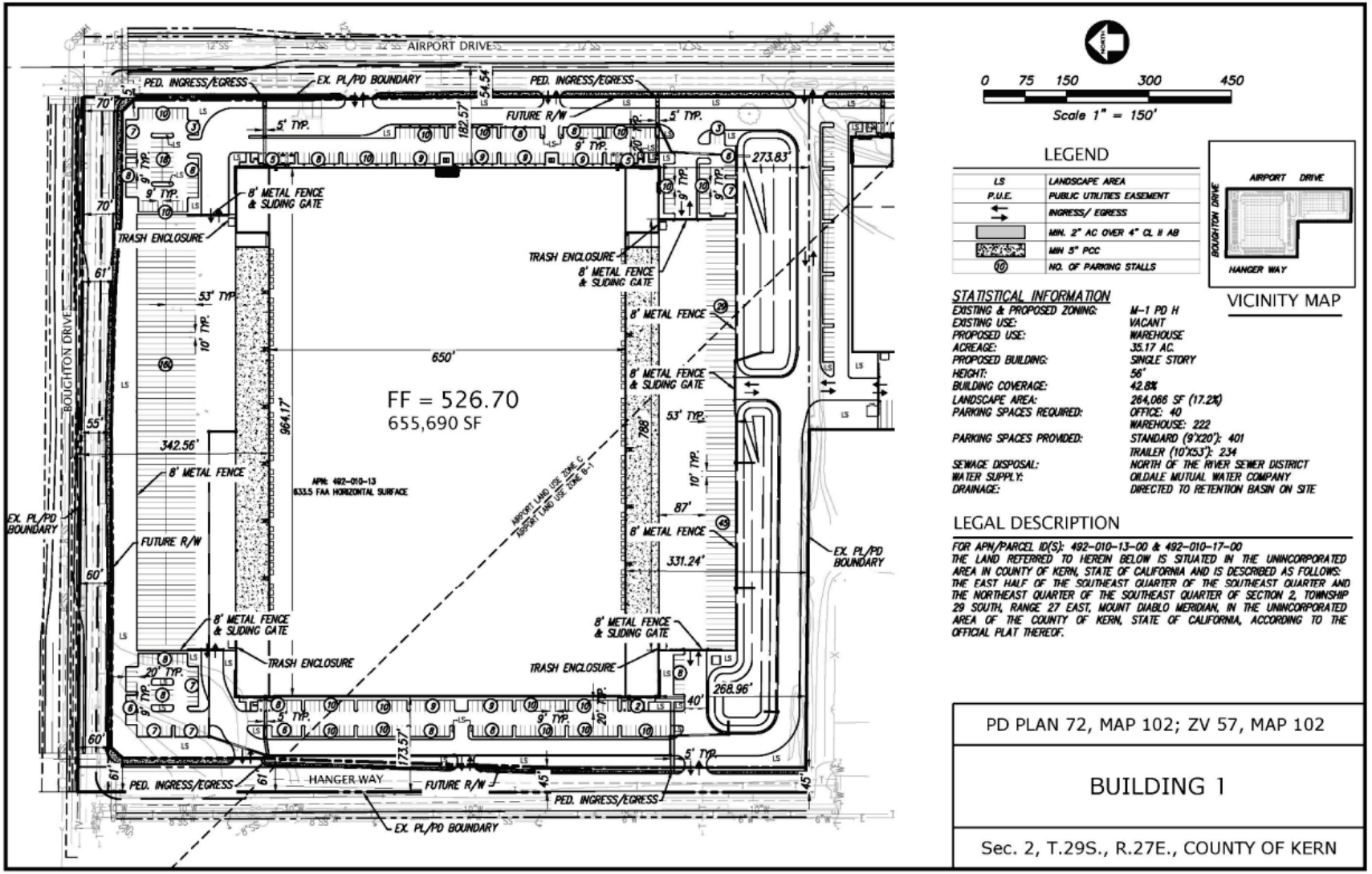


Figure 3-6c: Precise Development Plan - Building 2 Site Plan

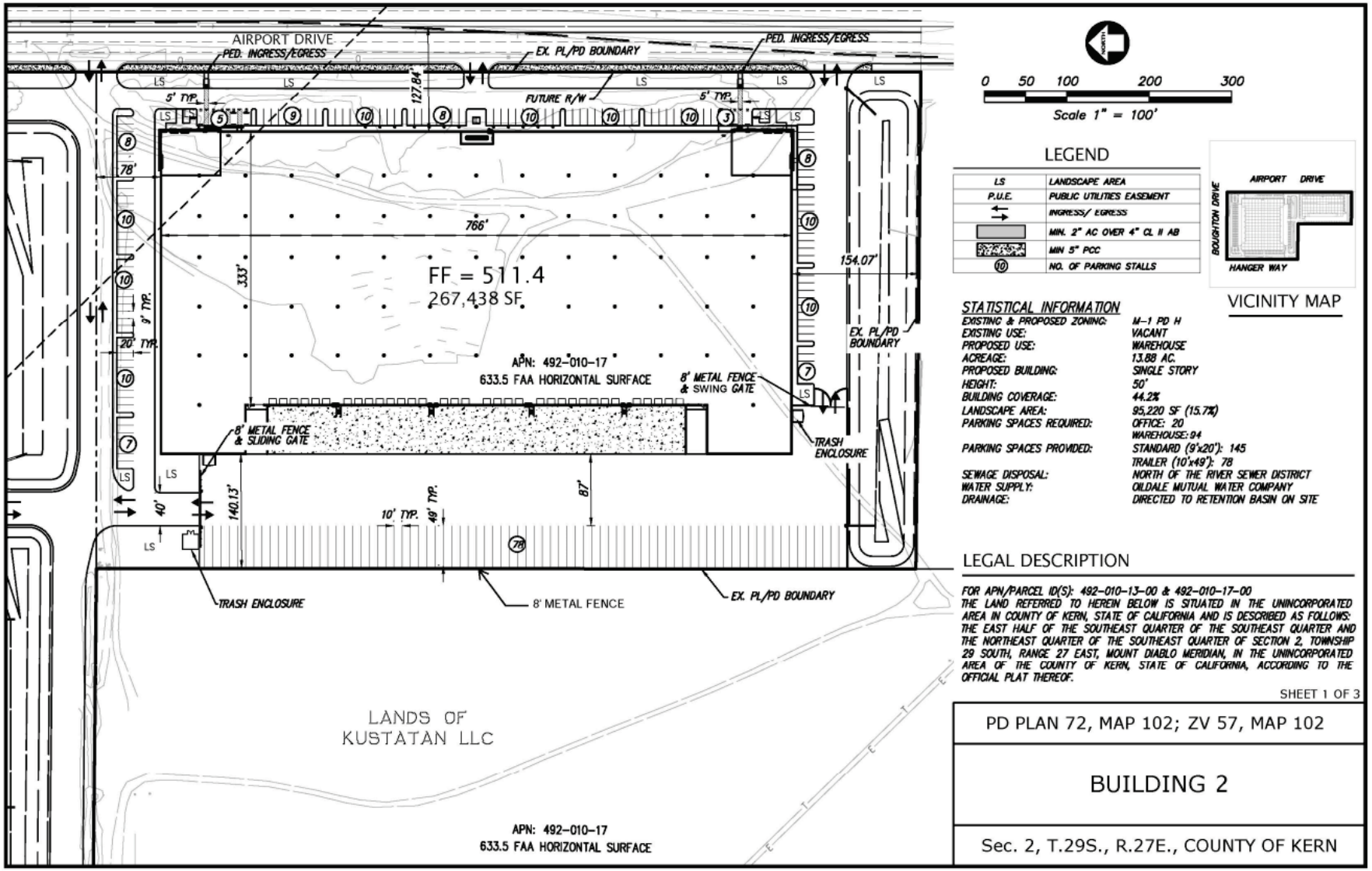


Figure 3-6d: Precise Development Plan - Building 1 Engineered Elevations

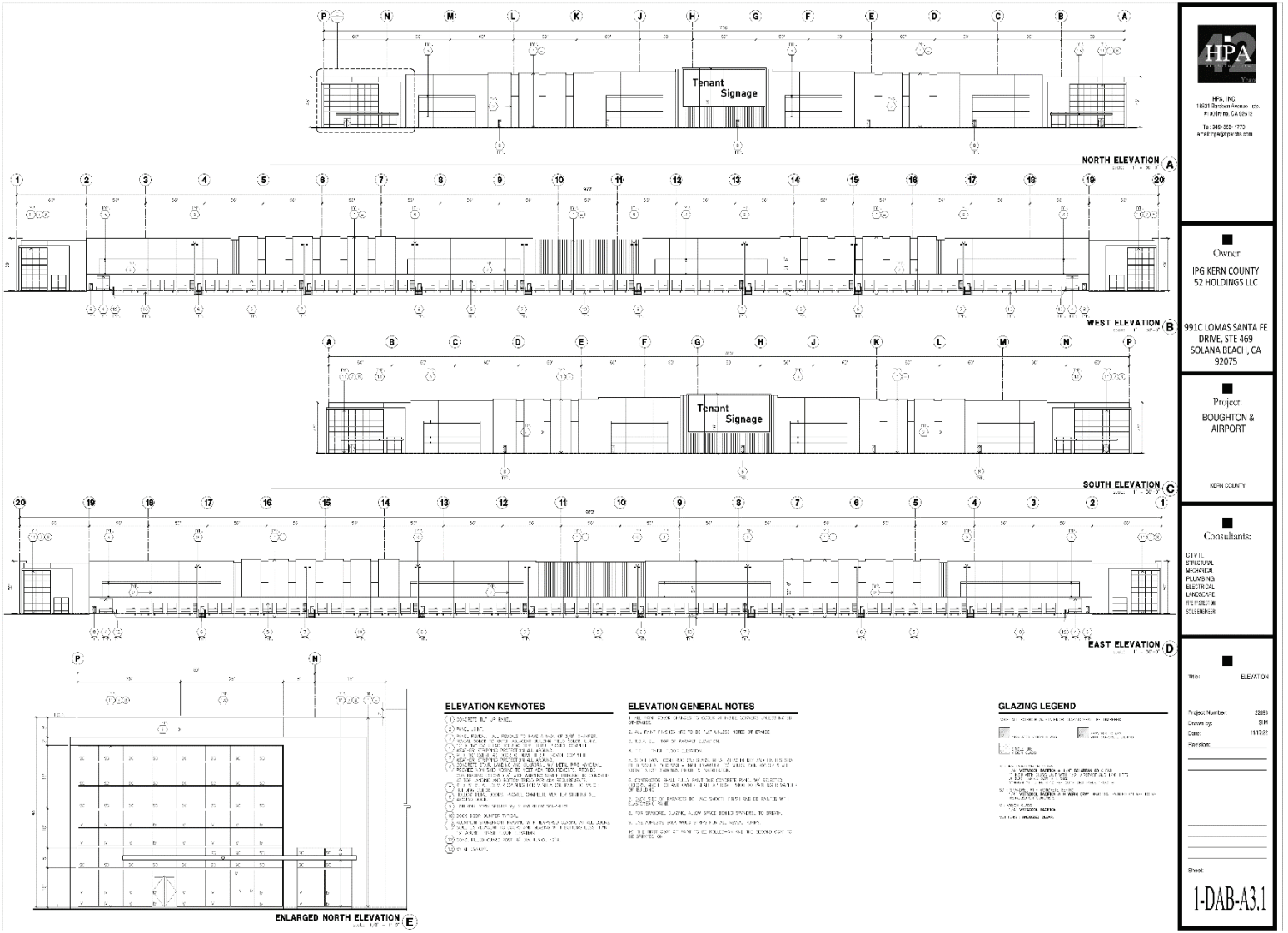


Figure 3-6e: Precise Development Plan - Building 2 Engineered Elevations

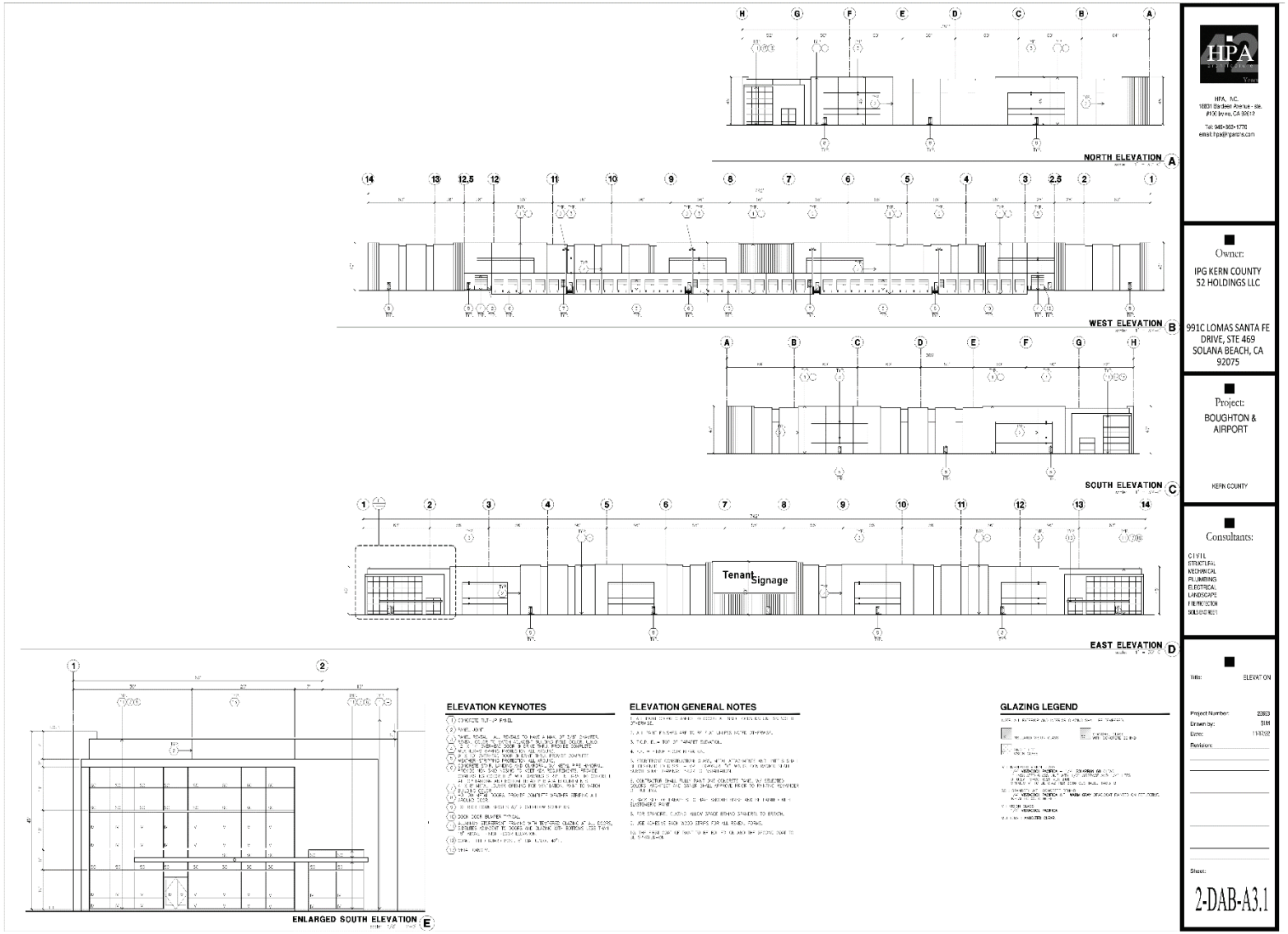


Figure 3-6f: Precise Development Plan - Building 1 Elevations

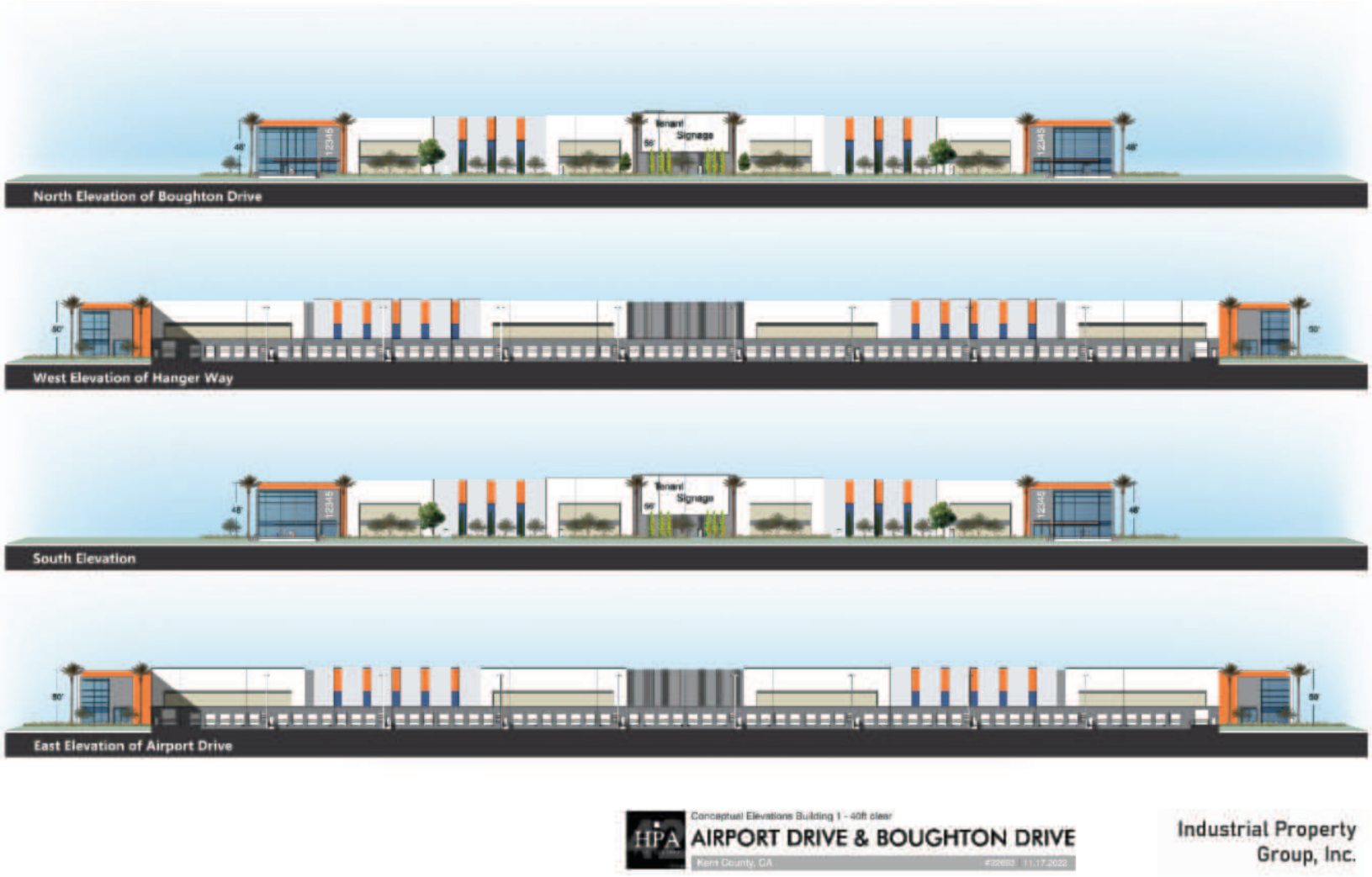


Figure 3-6g: Precise Development Plan - Building 2 Elevations

Figure 3-6h: Precise Development Plan - Building 1 Landscape Plan

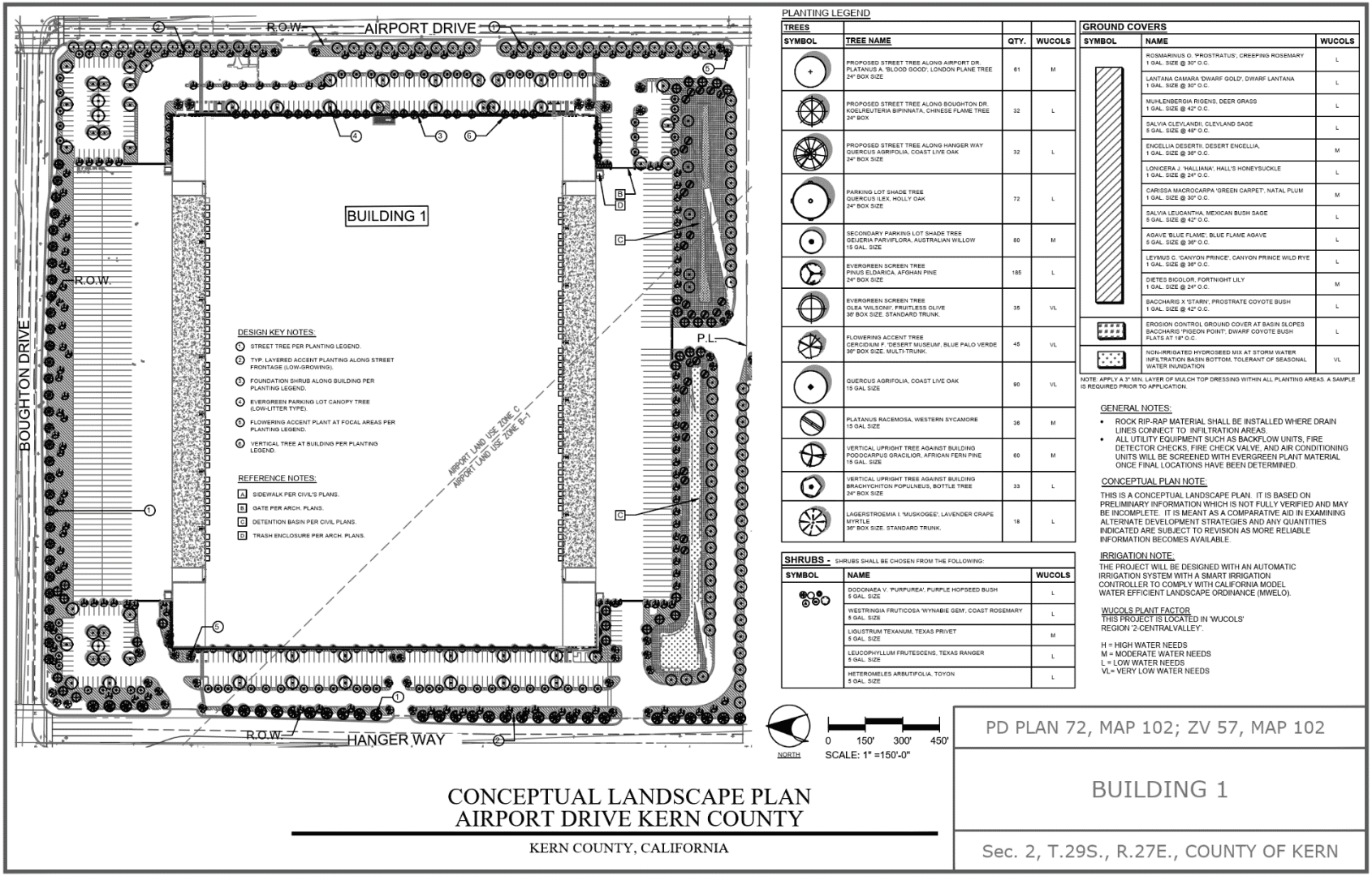
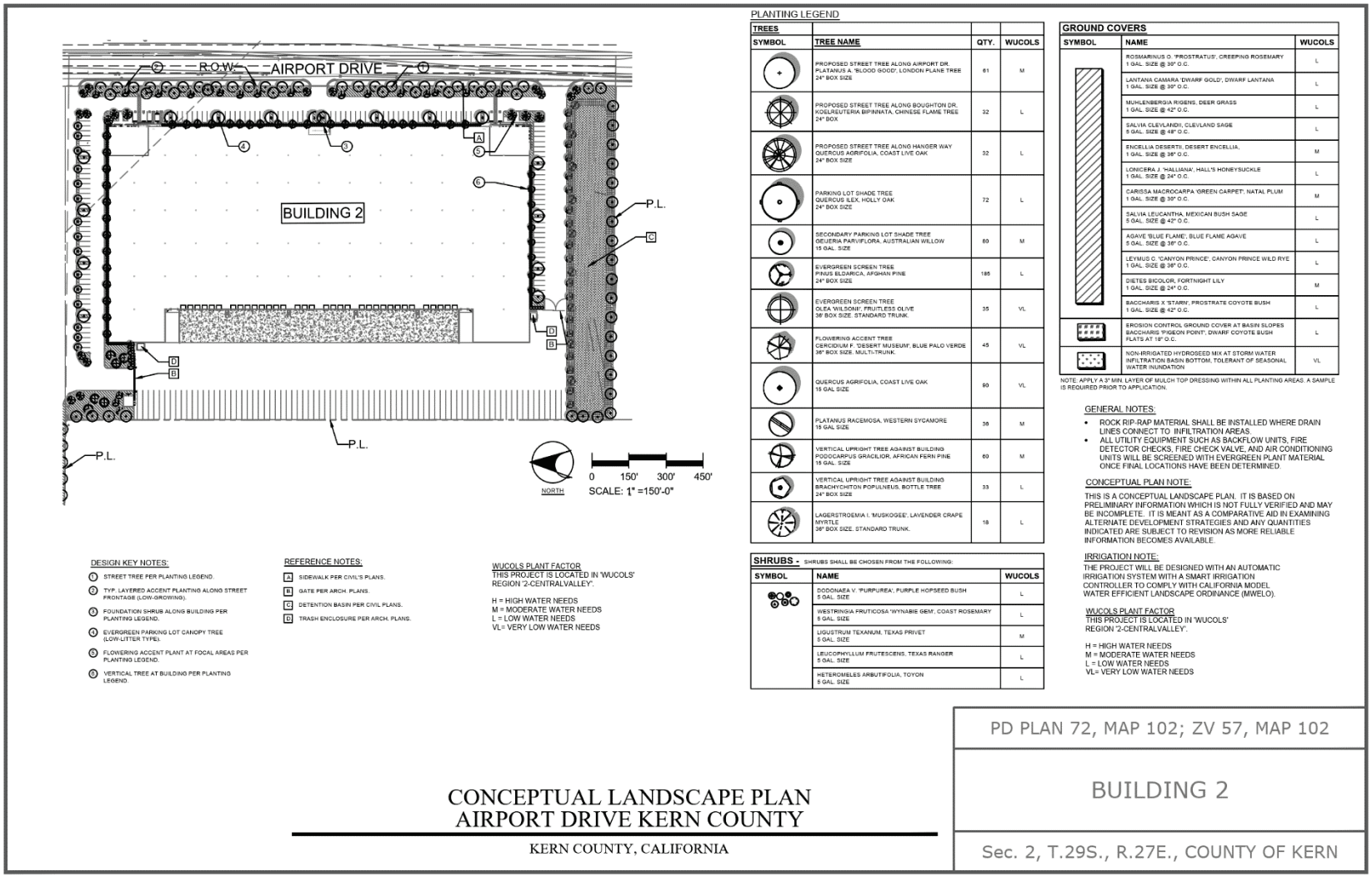


Figure 3-6i: Precise Development Plan - Building 2 Landscape Plan



Warehouse Buildings – The 923,130-square-foot facility includes two single-story warehouses.

Building 1

- Site area of 1,631,912-square-foot site area or 35.17 acres
- Building area of 655,690 square feet
  - 10,000 square feet of office space
  - 545,690 square feet of warehouse
- Trailer Parking Total: 234 stalls (10 feet by 53 feet)
- Standard Automobile: 401 (9 feet by 20 feet)
- Accessible Parking Total: Nine stalls
  - Eight standard stalls (9 feet by 20 feet)
  - One van accessible stall (12 feet by 20 feet)
- Electric Vehicle (EV) Parking Total: 86 stalls
  - Electric Vehicle Capable Space (EVCS): 61stalls
  - EVCS Provided: 18 stalls
  - EVCS Standard Accessible: three stalls
  - EV Van Accessible: one stall
  - EVCS Ambulatory: three stalls
- Loading Docks
  - 45 on the northern side
  - 45 on the southern side

Building 2

- Site area of 604,756-square-foot site area or 13.86 acres
- Building area of 267,438 square feet
  - 5,000 square feet of office space
  - 262,440 square feet of warehouse
- Trailer Parking Total: 78 stalls (10 feet by 49 feet)
- Standard Automobile: 145 (9 feet by 20 feet)
- Accessible Parking Total: five stalls
  - Four standard stalls (9 feet by 20 feet)
  - One van accessible stall (12 feet by 20 feet)

- EV Parking Total: 25 stalls
  - EV Capable Space: 17 stalls
  - EVCS Provided: six stalls
  - EVCS Standard Accessible: one stall
  - EV Van Accessible: one stall
  - EVCS Ambulatory: zero stalls

Building 1 and Building 2 Total:

- Site area of 2,136,680-square-foot site area or 49.05 acres
- Building area of 923,130 square feet
  - 15,000 square feet of office space
  - 908,130 square feet of warehouse
- Parking Total:
  - Automobile: 543 stalls
  - Truck Trailer 312 stalls
  - Accessible: 14 stalls
  - EVCS: 108 stalls
- Trailer Parking Total: 312 stalls (10 feet by 53 feet)
- Accessible Parking Total: 14 stalls
  - 12 standard stalls (9 feet by 20 feet)
  - 2 van accessible stall (12 feet by 20 feet)
- EV Parking Total: 108 stalls
  - EV Capable Space: 76 stalls
  - EVCS Provided: 24 stalls
  - EVCS Standard Accessible: four stalls
  - EV Van Accessible: two stalls
  - EVCS Ambulatory: three stalls

Additional Site Components

As a facility that is intended to serve trucks exclusively, development would include truck doors at each warehouse. In total, there would be 114 dock-high doors and 10 grade-level doors, totaling 124 truck doors. The site has been designed so no truck doors face the adjacent residential properties. Trash enclosures would be located throughout the site, with four enclosures at Building 1 and two enclosures at Building 2.

Project Site Access and Parking

The Project would include off-site improvements along Airport Road, Boughton Road, and Hanger Way. These include right-of-way dedications and Project frontage improvements. The existing roads would be improved with new pavement, curb and gutter, and sidewalk. Additionally, signing and markings would be constructed for the new pavement delineations. For further discussions regarding required road improvements, see Section 4.17, *Transportation and Traffic.*

As illustrated on **Figure 3-6a**, access to the Project site is provided along the eastern boundary of the Project site at Airport Drive, with ingress and egress at both buildings. Building 1 would have additional ingress and egress at Hanger Way located on the western boundary of Parcel 1, providing Building 1 access at both the eastern and western boundaries of the site. Building 2 would receive access from Hanger Way on site through Parcel 1. Regional access to the Project site is provided by SR 99 and Merle Haggard Drive via Airport Drive.

Parking for employees at Building 1 would total 401 stalls at the eastern and western boundaries of Parcel 1, with ingress and egress at Airport Drive and Hanger Way. Pedestrian access is provided along both roadways. At Building 1, 234 truck trailer stalls would include 160 stalls on the northern side along Boughton Way and 74 stalls on the southern side between Buildings 1 and 2. At Building 2, a total of 145 standard stalls for employees would be located at the northern, eastern, and southern boundaries of the site, with truck trailer parking available on the western side with a total of 78 stalls for trailers. Access to Building 2 would be provided via Airport Drive with pedestrian ingress and egress, and on-site vehicular access from Parcel 1 off Hanger Way. In total, the site would have 312 truck trailer stalls and 543 standard automobile parking spaces.

Site Security

The Project would operate 24 hours a day, 7 days a week as a warehouse facility. Security would include an 8-foot metal fence enclosing the entire developed area, with an 8-foot sliding fence and sliding gate to enclose truck trailer parking. An 8-foot metal fence and sliding gate are also proposed between Building 1 and Building 2 vehicular access.

Lighting would be designed to maximize employee safety and security while complying with county standards to confine light spread within the Project site. Proposed lighting would adhere to the requirements of Chapter 19.81 Outdoor Lighting “Dark Skies Ordinance” of the Kern County Municipal Code, which promotes the reduction of unnecessary light and glare, the reduction of light spillover onto adjacent properties, and energy conservation through the reduction of excessive or unwanted outdoor lighting. Lighting would be located throughout the proposed parking areas.

Landscaping

The Project would include approximately 359,286 square feet (8.25 acres) of landscaping and irrigation, which would consist primarily of drought tolerant and low maintenance plants. Detention basins are proposed south of Building 2, and in the central portion of the site between Buildings 1 and 2 located near parking. Islands with canopy trees would be provided to reduce the heat island effect. Landscaping would also be used to provide visual screening where needed. Landscaping would exceed the 5% landscaping requirement of Section 19.86.060 of the Kern County Zoning Ordinance. There are no existing on-site trees and, therefore, no trees would need to be removed.

3.7.2 Construction Activities

The construction phase is anticipated to last approximately 24 months and grading is anticipated to last approximately 60 days. Construction is anticipated to begin in December 2024, and conclude in November 2026, with operation proposed to commence in 2026. Should commencement of construction be delayed, the start month of December 2024 represents a conservative estimate for this Draft EIR.

The typical construction activities would occur from 7 a.m. to 8 p.m. Monday through Friday. Additional hours and days may be necessary to facilitate the schedule. Noise generated from construction shall be prohibited between 9 p.m. and 6 a.m. on weekdays and between 9 p.m. and 8 a.m. on weekends. Construction activities would consist of site preparation, grading, building construction, paving, and architectural coating. During the construction of the Project, water would be required for common construction-related purposes, including dust suppression, soil compaction, and grading. Construction water would be transported via truck and is expected to be sourced from Oildale Mutual Water Company. Dust control water may be used for ingress and egress of on-site construction vehicle equipment traffic and the construction of the warehouse infrastructure. Typical equipment associated with these construction activities would be used such as bulldozers, motor graders, front end loaders, and cement and dump trucks. Any construction work performed outside of the normal work schedule would be coordinated with the appropriate agencies and would conform to the MBGP and the Kern County Noise Ordinance (Chapter 8.36).

The on-site construction workforce would consist of up to 503 full-time equivalent jobs; however, the average daily workforce would vary depending upon the stage of construction. The average daily workforce would include construction, supervisory, support, and construction management personnel on site during construction. It is anticipated that the construction workforce would commute to the Project site each day from local communities and report to the designated construction staging yards before the start of each workday. Parking for construction personnel would be provided on the site. Portable toilets would be used and would be maintained by a private off-site company during the construction period. The anticipated route for construction activities, including deliveries will be from SR 99 to Merle Haggard Drive to Airport Drive to Boughton Drive to Hanger Way.

During construction, the building contractor would arrange to have trash, construction recycling, and regular recycling bins delivered to the site in accordance with Kern County Building Code

requirements and guidelines. During construction, every effort would be made to minimize packaging and construction waste. Construction recycling, regular recycling, and nonrecyclable trash would be regularly picked up during the construction period.

Hazardous materials used for construction would be typical of most construction projects of this type. Materials would include small quantities of gasoline, diesel fuel, oils, lubricants, solvents, detergents, degreasers, paints, ethylene glycol, dust palliatives, herbicides, and welding materials and supplies. A hazardous materials business plan would be provided to the Kern County Environmental Health Services Division, Hazardous Materials Section. The hazardous materials business plan would include a complete list of all materials used on site and information regarding how the materials would be transported and in what form they would be used. This information would be recorded to maintain safety and prevent possible environmental contamination or worker exposure. During Project construction and operation, safety data sheets for all applicable materials present at the site would be made readily available to on-site personnel.

To ensure minimum exposure of construction workers to hazardous materials (for example, construction-related fuels and paints) and other hazardous materials, construction activities would comply with applicable worker protection laws and regulations, including the Occupational Safety and Health Act, Title 9 of the Code of Federal Regulations, and Title 8 of the California Code of Regulations (CCR). The construction contractor selected for the Project would ensure that construction workers are trained in accordance with local, state, and federal requirements for handling hazardous materials.

3.7.3 Project Operations and Maintenance Activities

Within the 49.05-acre site, the Project would result in an approximate total building coverage of 43%, or roughly 923,130 total square feet. The proposed facility would operate 24 hours a day, 365 days a year. The facility would employ approximately 437 employees throughout up to three shifts, with additional indirect and induced economic impacts from the Project supporting approximately 159 additional jobs. The Project is anticipated to generate approximately 371 daily truck trips. There would be eight entrances to the Project, five off Airport Drive and three off Hanger Way. Once operational, the Project would use standard equipment such as electric forklifts and pallet jacks. The following subsections provides additional operational details.

Utilities and Infrastructure

The Project would be served with potable water provided by the Oildale Mutual Water Company. Service laterals would be extended from an existing water line located within Airport Road. The Project would be served by the North of River Sanitary District. Electricity and natural gas services would be provided by Pacific Gas and Electric Company. Service laterals would be extended to the Project site from existing utility facilities along Boughton Drive and Airport Drive. The Project would install an on-site storm drainage system consisting of inlets, underground piping, and surface and underground basins. Runoff would drain to retention basins located on the south side of each building within the boundaries of the Project site. The basins would be designed to accommodate a 100-year storm event and would detain runoff and release it at a rate no greater than the pre-

development condition of the Project site. The Project would be required to retain the stormwater per Kern County's drainage requirements and all other applicable standards.

Solid and Non-Hazardous Waste Disposal

The Project would produce a small amount of waste associated with maintenance activities, which may include typical refuse generated by office and warehouse uses. Most of these materials would be collected and delivered back to the manufacturer or recyclers. Nonrecyclable waste would be placed in covered dumpsters and removed regularly by a certified waste-handling contractor for disposal at a Class III landfill. The closest Class III municipal landfill is the Bena Sanitary Landfill located approximately 16 miles southeast of the site, whereas the Shafter-Wasco Sanitary Landfill is the next closest at approximately 21 miles northwest of the site.

Hazards and Hazardous Materials Compliance

The Project would produce a small amount of hazardous waste associated with maintenance activities that may include paint, solvents, cleaners, and waste oil. Workers would be trained to properly identify and handle all hazardous wastes. Fuels and lubricants used in operations would be subject to the Spill Prevention, Containment, and Countermeasure Plan to be prepared for the Project. Hazardous waste would be recycled or disposed of at a permitted and licensed treatment or disposal facility, or both. All hazardous waste shipped off-site for recycling or disposal would be transported by a licensed and permitted hazardous waste hauler and disposed of at an approved location.

Interior Storage of Wholesale and Bulk Storage of Materials

The Project's primary function as a warehouse and distribution facility may require modifications to the interior design and would be subject to tenant improvements to accommodate specialized storage for products as described in **Section 3.7.1**. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (for example, building, fire, and plumbing codes). Outdoor storage is not proposed as part of this project.

For zoning, the Project may be occupied by a tenant specializing in the wholesale distribution of tire and tire accessories that would be shipped off-site for the retail market. This specific type of occupancy would typically require interior warehousing spaces to be equipped with unique fire-prevention fixtures, limitations on stacking heights. Nonetheless, storage of tires on site would be incidental to the proposed warehouse and distribution use, which is permitted on a by-right basis in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District. Any unique recommended specifications related to interior safety design offered by agencies, such as the Kern County Fire Department, during the review of this document or during the public hearing process will be incorporated as a development requirement accordingly.

3.8 Entitlements Required

The Kern County Planning and Natural Resources Department as the Lead Agency (per the CEQA Guidelines Section 15052) for the Project has staff responsibility for the preparation of the Draft EIR and recommendations to the decision-makers on the Project. To implement this Project, the Project proponent may need to obtain discretionary and ministerial permits and approvals including the following:

3.8.1 Federal

- Federal Aviation Administration
  - Determination of No Hazard to Air Navigation

3.8.2 State

- Central Valley Regional Water Quality Control Board
  - National Pollution Discharge Elimination System Construction General Permit
  - General Construction Stormwater Permit (Preparation of a Stormwater Pollution Prevention Plan)
- California Department of Transportation
  - Right-of-Way Encroachment
  - Permit for Transport of Oversized Loads (if required)

3.8.3 Local

- Kern County
  - Certification of the Final EIR
  - Adoption of 15091 Findings of Fact and 15093 Statement of Overriding Considerations
  - Adoption of Mitigation Monitoring and Reporting Program
  - Approval of a Precise Development Plan
  - Approval of a Zone Variance
  - Approval of Kern County Grading and Building Permits
  - Approval of Kern County Encroachment Permits
  - Approval of a Fire Safety Plan

- San Joaquin Valley Air Pollution Control District
  - Authority to Construct
  - Construction Fugitive Dust Control Plan
  - Permit to Operate
  - Indirect Source Rule and Voluntary Emission Reduction Agreement
  - Other permits as required

3.9 Cumulative Projects

CEQA requires that a EIR evaluate a project's cumulative impacts. Cumulative impacts are the Project's impacts combined with the impacts of other related past, present, and reasonably foreseeable future projects. As set forth in the CEQA Guidelines, the discussion of cumulative impacts must reflect the severity of the impacts, as well as the likelihood of their occurrence; however, the discussion need not be as detailed as the discussion of environmental impacts attributable to the Project alone. As stated in CEQA, Public Resources Code, Section 21083(b) (2), "a project may have a significant effect on the environment if the possible effects of a project are individually limited but cumulatively considerable."

According to the CEQA Guidelines:

> *"Cumulative impacts" refer to two or more individual effects, which, when considered together, are considerable and which compound or increase other environmental impacts.*
>
> *(a) The individual effects may be changes resulting from a single project or a number of separate projects.*
>
> *(b) The cumulative impact from several projects is the change in the environment, which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time (CCR [California Code of Regulations], Title 14, Division 6, Chapter 3, §15355).*

In addition, as stated in the CEQA Guidelines, it should be noted that:

> *"The mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable." (CCR, Title 14, Division 6, Chapter 3, Section 15064[I][5]).*

Cumulative impact discussions for each environmental topic area are provided at the end of each technical analysis contained within Chapter 4, *Environmental Setting, Impacts, and Mitigation Measures*, under "Impacts and Mitigation Measures." As previously stated, and as set forth in the CEQA Guidelines, related projects consist of "closely related past, present, and reasonably

foreseeable probable future projects that would likely result in similar impacts and are located in the same geographic area" (CCR, Title 14, Division 6, Chapter 3, Section 15355).

The geographic scope for the cumulative impact analysis considers anticipated development to occur within 6 miles of the Project vicinity. For each environmental topic area, cumulative effects are assessed differently. For example, the San Joaquin Valley Air Pollution Control District (SJVAPCD) requires using a 1-mile radius to identify the cumulative effects of hazardous air pollutant emissions as well as most odor sources. The SJVAPCD also recommends a one-mile limit for hazardous air pollutants because such emissions primarily affect individuals who reside or work within the immediate vicinity (1 mile) of the emissions source. However, the Kern County Planning and Natural Resources Department's Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports requires a 6-mile radius to assess cumulative impacts because developments in rural areas tend to affect a larger geographical area than developments located in urban areas. Kern County, City of Bakersfield, and City of Shafter files were reviewed to determine the number of permitted or planned projects within the 6-mile radius, as well as similar projects beyond 6 miles but within the same air basin.

The cumulative analysis within each environmental resource section of Chapter 4, *Environmental Setting*, *Impacts, and Mitigation Measures,* of this Draft EIR is based on a qualitative cumulative analysis, which includes all of the projects located within a 6-mile radius of the Project site, as well as growth projections to the Year 2030. Different resource-specific analyses use this 6-mile radius unless specific methodology deems other supplemental approaches are appropriate. Some projects that have initiated applications but have not been deemed complete for review by Kern County or the City of Bakersfield may be excluded from this analysis because insufficient information is available to analyze cumulative effects.

Cumulative projects planned within a 6-mile radius of the Project site and cumulative industrial projects planned within Kern County are identified in **Table 3-4** and illustrated on **Figure 3-7**. These projects were considered in the analysis of cumulative conditions and impacts.

Table 3-4: Cumulative Projects List

Name	Project Location	Project	Zone Map	Section/ Township/ Range	Approx. Acreages	Status
1. Malibu Vineyards	34344 Imperial Avenue, Bakersfield, CA	Industrial Park/Distribution Warehousing	80 and 81	Section 24, Township 28, Range 26	739	EIR Circulation
2. N/A	6400 Price Way, Bakersfield, CA	Warehouse and outdoor industrial storage yard	102	Section 22, Township 29S, Range 27E	N/A	applied
3. PD 34, Map 102-10	7117 Dole Court, Bakersfield, CA	Trucking facility with truck service, repair, and truck wash	102-10	Section 10, Township 29S, Range 27E	10.5	Applied

Name	Project Location	Project	Zone Map	Section/ Township/ Range	Approx. Acreages	Status
4. ZCC, Map 102	5950 State Road, Bakersfield, CA	Industrial retail operations	102	Section 11, Township 29S, Range 27E	0.6	Applied
5. N/A	0 Downing Avenue, Bakersfield, CA	Warehouse and office	102	N/A	3.51	In Review
6. PD 86, ZV 24	3017 Fruitvale Avenue, Bakersfield, CA	Office warehouse for industrial services	102	Section 21, Township 29S, Range 27E	2.35	Applied
7. Commerce Construction Co. by John R Burroughs	SE corner of Imperial Ave and Hwy 65	Four warehouse buildings for passenger vehicles and trailers	81	Section 33, T. 28S/ R.27ESE	266	Deemed Complete
8. PD Mod	Intersection of Carrier Parkway Avenue and James Road, Bakersfield, CA	Concrete tilt-up warehouse	81-35	Section 35, Township 28S, Range 27E	N/A	Applied
City of Shafter						
9. Tract 7244 – Phase 1	Marcona Preserve Specific Plan Area	Development Agreement, Improvement Agreement, CFD Annexation, Final Map for development of 188 SFR units	80	Section 36/T.28S/R. 27E	60.3	In review
10. Tract 7388 - Phase 2	Gossamer Grove Specific Plan Area	Final Map for 13 SFR units	81	Section 31/T.28S/R. 27E	2.2	In Review
10. Tract 7422	Gossamer Grove Specific Plan Area	Tentative Map for 1,251 SFR units	81	Section 31/T.28S/R. 27E	352.0	In Review
10. Tract 7447	Gossamer Grove Specific Plan Area`	Tentative Map for 147 SFR lots	81	Section 31/T.28S/R. 27E	32.2	In Review
11. Wonderful Industrial Park Expansion	Northeast Corner of Seventh Standard Road/Santa Fe Way	Expansion of Development of industrial and logistics center	80	Multiple Sections; T.28S/R.26 E	1,800	In Review
City of Bakersfield						
12. Rosedale Ranch Trade and Transportation Park	Southeast corner of Seventh Standard Road/ Santa Fe Way; North of Olive	Drive development of logistics center	101	Multiple sections; T.29S/R.26 E	1,600	In Review

Name	Project Location	Project	Zone Map	Section/ Township/ Range	Approx. Acreages	Status
	Drive					
13. GPA/ZCC 22-01278; PDR 22-0073	North of Hwy 178 between Vista Montana Drive and Valley Street	Mini warehouse storage	104_16	Section 16/T.29S/R.29E	44.32	DENIED
14. GPA/ZCC 21-0136	612 Fairview Road	LR to HMR; R-1 to R-2	124_19	Section 19/T.30S/R.28E	17.32	Applied
15. GPA/ZCC 21-0322	7100 South H Street	LR/LMR to GC; R-1/R-1 PUD to C-2/PCD	124_30	Section 124_30/T.30S/R.28E	25.83	Approved
16. GPA/ZCC 21-0302	9700 and 9850 Camino Media	OC to HMR; C-O to R-2	123	Section 6/T.30S/R.27E	11.22	Approved
17. GPA/ZC 21-0326	3300 Rio Mirada Drive	HC to HR; M-1 to R-4	102-14	Section 14/T.29S/R.27E	4.33	Approved
18. GPA/ZC 22-0125	SW Corner of Berkshire Road and Ashe Road	336-unit apartment complex	123	Section 28/T.30S/R.27E	19.96	Approved
19. GPA/ZC 20-0109	4021 Mt. Vernon Ave; Southeast Corner of Mt Vernon Frontage Road and Church Avenue	OC to HR; C-O to R-3	103	Section 15/T.29S/28E	0.68	Applied
20. GPA/ZC 20-0339	1/4 mile south of Renfro on Santa Fe Way	LR to LI; R-1 to M-1	101-14	Section 14/T.29S/R.26E	3.5	Approved
21. GPA/ZC 20-0397	2323 Chester Lane; Southeast corner of Chester Lan and A Street	GC to HR; R-2/R-3 to R-4	102_36	Section 36/T.29S/R.27E	0.64	Approved
22. GPA/ZC 21-0008	1108 H Street; Southeast Corner of California Avenue and H Street	OC to GC; C-O to C-1	103	Section 31/T.29S/R.28E	0.15	Approved
23. GPA/ZC 20-0172	Northwest corner of Fairfax and College Avenue	LR to HMR/GC; R-1 to R-2/C-2	103	Section 24/T.29S/28E	15.45	Applied
24. GPA/ZC 23-0015; CUP	Southeast Corner of	LR/LMR/HMR/MUC/GC to LI; R-1/R-	101	Section 3/T.29S/R2	920	Approved

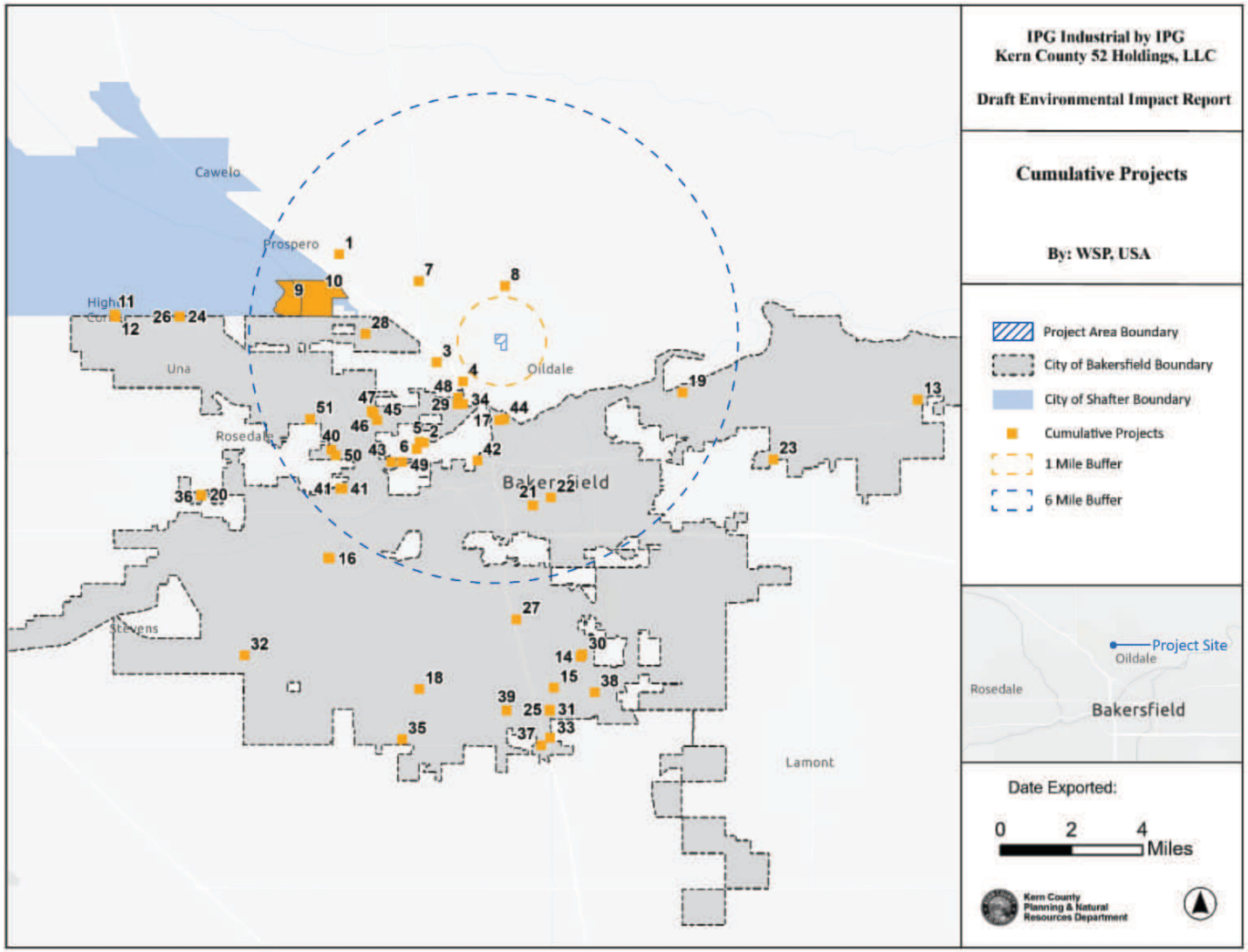
Name	Project Location	Project	Zone Map	Section/ Township/ Range	Approx. Acreages	Status
23-0023	Seventh Standard and Rudd Avenue	1-PUD/R-2-PUD/C-1/C-2-P.C.D/DI to M-1; CUP for freight terminal		6E		
25. GPA/ZC 21-0179	South of Hosking Avenue and West of South H Street	LR to GC; R-1 to C-2-PCD	123_ 36	Section 36/T.30S/27 E	21.4	Approved
26. GPA/ZC 22-0027; CUP 22-0310	Southwest Corner of Seventh Standard and Rudd Avenue	LMR/HMR to LI; R-1-PUD/R-2-PUD to M-1; CUP for freight terminal	101	Section 3/T.29S/R26E	458.54	Approved
27. GPA/ZC 22-0421	2700 White Lane	GC to HR; C-2 to R-4	123	Section 13/T.30S/27 E	2.49	REFERRED BACK
28. GPA (Circ) 21-0089	Etchart Road between Shane Street and Jewetta	removed planned collector	101	Section1/T. 29S/R.26E	n/a	approved
29. GPA (Circ) 21-0265	Southwest of Knudsen Drive/Hageman Road intersection, between Knudsen Drive and Seventh Standard Street	removed planned collector	102	Section15/T .29S/R.26E	n/a	approved
30. GPA/ZC 22-0104	North of Fairview Road between Monitor Street and S. Union Avenue	LR to GC; R-1 to C-2-PCD	124_ 19	Section 19/T.30S/R. 28E	19.35	Approved
31. Majestic Gateway Industrial Project; GPA/ZC 21-0184	Northwest Corner of Hosking Ave and South H Street	GC to LI (90.5 ac); C-2/PCD to M-1 (56.75 ac portion) and C-2/PCD to PCD (33.75 ac portion)	123_ 25	Section 25/T.30S/R. 27E	90.5	Approved
32. GPA/ZC 22-0337; PDR 23-0331; ZC 23-0508	Northeast corner of South Allen Road and Pensinger Road	LR to HMR; R-1 to R-3/PUD; Circ delete Pacheco Road between South Allen and Buena Vista	122_ 23	Section 23/T.30S/R. 26E	80	Approved
33. GPA/ZC 23-0012	9407 South H Street; Northwest Corner of Taft	LR/GC to HMR; R-1 to R-3	123	Section 11/T.30S/R. 27E	5.65	Approved

Name	Project Location	Project	Zone Map	Section/ Township/ Range	Approx. Acreages	Status
	Hwy and South H					
34. GPA/ZC/PDR 22-0122	Southeast Corner of Hageman Road and Landco Drive	SR to GC; A to C-2/PCD; Truck Rental and Self-Storage	123_ 36	Section 36/T.30S/27 E	11.23	Approved
35. GPA/ZC 21-0284	North of Taft Hwy between Gosford Road and Ashe Road (Kaiser Permanente Sports Village)	HI to SI; M-3 to M-2	102_ 14	Section 14/T.29S/R. 27E	79.84	Approved
36. GPA/ZC 21-0383	westside of Renfro Road at Brimhall Road	GC to OS-P (25 ac portion) and OS-P to GC (28 ac portion); C-2/PCD to RE (25 ac portion) and RE to C-2 (28 ac portion) and C-2/PCD to C-2 (12 ac portion)	123	Section 33/T.30S/R. 27E	65	Approved
37. N/A	Taft Highway west of Highway 99	Conditional Use Permit: Truck stop	142	Section 1/ T.31S/R.27 E	16	In Review
38. N/A	South Union at Berkshire Road	General Plan Amendment and Zone Change	124	Section 29/ T.30S/28E	Unknown	In Review
39. N/A	Hosking Avenue at Wible Road	General Plan Amendment and Zone Change:	123	Section 35/ T.30S/27E	4	In Review
40. N/A	2901 Calloway Drive	Site Plan Review for 971-square-foot drive-thru coffee shop	102-19	Section 19/T.29S/R. 27E	0.39	In Review
41. N/A	9301-9315 Thistlewood Court	N/A	102-29	Section 29/ T.29S/R.7E	1.07	In Review
42. N/A	3925 Rosedale Highway	Site Plan Review for 4,990-square-foot retail building	102-26	Section 26/ T.29S/R.27. E	.39	In Review
43. N/A	7511 Rosedale Highway	Site Plan review for warehouse and office	102	Section 28/ T.29S/R.27 E	5.22	In Review
44. N/A	3220 Rio Mirada Drive	Site Plan Review for 971-square-foot drive-thru coffee shop	102-19	Section 19/ T.29S/R.27 E	.39	In Review

Name	Project Location	Project	Zone Map	Section/ Township/ Range	Approx. Acreages	Status
45. N/A	4420 Coffee Road	Site Plan review for an 1,811-square-foot addition (coffee shop with drive-thru)	102-16	Section 16/ T.29S/R.27 E	1.15	In Review
46. N/A	4601 Coffee Road	Site Plan Review for the addition of a new pad for a 1,906-square-foot drive-thru restaurant in a retail center	102	Section 17/ T.29S/R.27 E	.89	In Review
47. N/A	4733 Centennial Plaza Way	Site Plan Review for a 8,492-square-foot office building	102	Section 17/ T.29S/R.27 E	.74	In Review
48. N/A	5512 Knudsen Drive	Site Plan Review for a 39,648-square-foot medical outpatient facility	102-15	Section 15/ T.29S/R.27 E	10.11	In Review
49. N/A	2420 Wedding Lane	Conditional Use Permit for expansion of existing legal non-conforming mobile home park	102-28	Section 28/ T.29S/R.27 E	.20	In Review
50. N/A	9600 Retail Drive	Conditional Use Permit to allow operation of a cocktail bar	102	Section 20/ T.29S/R.27 E	.80	In Review
51. N/A	4301 Verdugo Lane	Conditional Use Permit to allow 200-unit complex in C-1 Zone	102	Section 18/ T.29S/R.27 E	3.88	In Review

Key:
Hwy = Highway
I-5 = Interstate 5
SR = State Route
GPA = General Plan Amendment
ZC = Zone Change
sf = square feet

Figure 3-7: Cumulative Projects Map



Chapter 4

Environmental Setting, Impacts, and Mitigation Measures

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Chapter 4

Environmental Setting, Impacts, and Mitigation Measures

Introduction

This chapter is devoted to resource topics. Impacts on a resource are evaluated for the project site in each section of this chapter. For each resource, a description of the environmental setting, including relevant data, is presented. The impacts of the project on the resource are evaluated in terms of significance, and mitigation measures are identified. As lead agency, Kern County is responsible for determining what mitigation measures are appropriate and feasible. Resource sections include:

Section 4.1 – Aesthetics

Section 4.2 – Agriculture and Forestry Resources

Section 4.3 – Air Quality

Section 4.4 – Biological Resources

Section 4.5 – Cultural Resources

Section 4.6 – Energy

Section 4.7 – Geology and Soils

Section 4.8 – Greenhouse Gas Emissions

Section 4.9 – Hazards and Hazardous Materials

Section 4.10 – Hydrology and Water Quality

Section 4.11 – Land Use and Planning

Section 4.12 – Mineral resources

Section 4.13 - Noise

Section 4.14 – Population and Housing

Section 4.15 – Public Services

Section 4.16 – Recreation

Section 4.17 – Transportation and Traffic

Section 4.18 – Tribal Cultural Resources

Section 4.19 – Utilities and Service Systems

Section 4.20 – Wildfire

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Section 4.1

Aesthetics and Visual Resources

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Section 4.1

Aesthetics and Visual Resources

4.1.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding aesthetics and visual resources. It also evaluates the impacts associated with the potential for the Project to degrade the existing visual character or quality of the proposed IPG Industrial Project (Project) site and its surroundings through changes in the existing landscape. Potential effects are evaluated relative to important visual features (for example, scenic highways, scenic features) of the existing visual landscape and its users. Degradation of visual character of a site is addressed through a qualitative evaluation of the changes to the aesthetic characteristics of the existing environment, and the Project-related modifications that would alter the visual setting. This section also identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the April 2024 visual simulations prepared by WSP, shown in Section 4.1.3, *Impacts and Mitigation Measures,* as these illustrate various representative views of the two buildings after buildout of the Project. The section is also informed by Google Street View images, to display a representative view of the Project site in its current state.

Visual Concepts and Terminology

Visual or aesthetic resources are generally defined as both the natural and built features of the landscape that contribute to the public's experience and appreciation of the environment. Depending on the extent to which a project's presence would alter the perceived visual quality of the environment a visual or aesthetic impact may occur.

The following terms and concepts are used in the discussion below to describe and assess the aesthetic setting and impacts from the Project:

Key Observation Point (KOP): One or a series of points on a travel route or at a sensitive use area, such as a residence, where the view of a project would be the most revealing.

Scenic Vista: An area identified or known for high scenic quality. Scenic vistas may be designated by a federal, State, or local agency. Scenic vistas can also include an area that is designated, signed, and accessible to the public for the express purposes of viewing and sightseeing.

Scenic Highway: Any stretch of public roadway that is designated as a scenic corridor by a federal, State, or local agency.

Visual (Sensitive) Receptor: Any scenic vista, designated scenic highway, residence, or public recreational area located within the Project viewshed that provides people with views of a site. Sensitive receptors or sensitive viewpoints—viewer responses to visual settings are inferred from

a variety of factors, including distance and viewing angle, type of viewers, number of viewers, duration of view, and viewer activities. The viewer type and associated viewer sensitivity are distinguished among Project viewers in recreational, residential, commercial, military, and industrial areas. Viewer activities can range from a circumstance that encourages a viewer to observe the surroundings more closely (such as recreational activities), to discouraging close observation (such as commuting in heavy traffic).

Residential viewers typically have extended viewing periods and are generally considered to have high visual sensitivity. For this reason, residential views are typically considered sensitive. Viewers from public parks, recreational trails, and/or culturally important sites also have high visual sensitivities; therefore, such locations are considered sensitive viewpoints. Viewers in commercial, military, and industrial areas are not typically focused on the views and the areas do not promote enjoyment of views; therefore, viewers in these locations are assumed to have low sensitivity.

Viewing distance zones—the landscape is subdivided into three distance zones based on relative visibility from travel routes or observation points. The three zones are: foreground, middle ground, and background. The foreground zone includes areas less than 0.25 mile away, the middle ground zone includes areas 0.25 mile to 3 miles away, and the background zone includes areas beyond 3 miles (FHWA 2015).

Viewshed—The surrounding geographic area from which the Project is likely to be seen, based on topography, atmospheric conditions, land use patterns, and roadway orientations. "Project viewshed" is used to describe the area surrounding a Project site where a person standing on the ground or driving a vehicle can view the Project site.

Visual sensitivity—the overall measure of an existing landscape's susceptibility to adverse visual changes. When viewing the same landscape, people may have different responses to that landscape and any proposed visual changes, based upon their values, familiarity, concern, or expectations for that landscape and its scenic quality. Because each person's attachment to and value for a particular landscape is unique, visual changes to that landscape inherently affect viewers differently. Nonetheless, generalizations can be made about viewer sensitivity to scenic quality and visual changes.

Residents and recreational users (for example, hikers, equestrians, tourists) are expected to be highly concerned with scenery and landscape character. Local motorists who commute daily through the same landscape may have a moderate concern for scenery, while people who work within highly urbanized areas may generally have a lower concern for scenic quality or changes to existing landscape character.

The visual sensitivity of a landscape is affected by the viewing distances at which it is seen. The visual sensitivity of a landscape also is affected by the travel speed at which a person is viewing the landscape (high speeds on a highway, low speeds on a hiking trail, or stationary at a residence).

The same feature of a Project can be perceived differently by people depending on the distance between the observer and the viewed object. When a viewer is closer to a viewed object in the

landscape, more detail can be seen, and there is greater potential influence of the object on visual quality because of its form or scale (relative size of the object in relation to the viewer). When the same viewed object is viewed at background distances, details may be imperceptible but overall forms of terrain and vegetation are evident, and the horizon and skyline are dominant. In the middle ground, some detail is evident in the foreground and landscape elements are seen in context with landforms and vegetation patterns in the background. The same levels of sensitivity apply in this case as with close-up and further away views—views from cars at high speeds would be less sensitive to changes than views at low speeds because more details can be drawn from the landscape at lower speeds.

4.1.2 Environmental Setting

Regional Character

The Project site is located in the Kern County region of the San Joaquin Valley in California. Kern County's geography spans across mountainous areas, agricultural lands, and desert areas. Kern County consists of three general areas or regions – Valley Region, Mountain Region, and Desert Region. The county encompasses more than 5 million acres within these diverse geographic regions. It is located within the southern San Joaquin Valley, which is characterized by a flat valley with gentle rolling hills that sweep toward steep rolling alluvial fans near the west, south, and east of the valley near encapsulating rugged mountain ranges.

The valley contains a variety of wetlands and rivers, with a majority of sections containing facilities for agriculture and irrigation such as pumps and aqueducts. Several stream corridors that flow into the valley from the east, including the Kern River in the southern portion and the San Joaquin River in the northern portion, also contain natural riparian vegetation. However, most of the region consists of diverse agricultural croplands, orchards, and grazing lands, or oil and gas facilities. Views of agricultural lands are considered an important attribute of the county's visual character and quality.

In the more urbanized portions of the region, which tend to be dispersed along major routes such as State Route 99 and Interstate 5, a combination of residential, commercial, and industrial scenes dominate the views, with smaller amounts of recreational, open space, and other typical urban structures and activities.

Local Character

The Project site is located on approximately 49 acres and comprises two privately owned parcels in the central portion of unincorporated Kern County, California, adjacent to Meadows Field Airport. The Project vicinity is characterized by industrial and commercial uses (distribution, storage, and shipping centers), transportation (airport to the west), vacant land, and residential uses to the east of the Project site. The Project is within the unincorporated community of Oildale and is approximately 1.7 miles north of the incorporated City of Bakersfield and approximately 3.1 miles east of the incorporated City of Shafter. The Project is situated approximately 1.4 miles northeast of State Route (SR) 99, which provides regional access to the site, as does Merle Haggard

Drive via Airport Drive. Local access to the Project site is available via Airport Drive and Boughton Drive.

The Project and surrounding area can be described as relatively flat and exhibit little topographic variation with elevation of the ranging between approximately 495 feet above mean sea level to approximately 540 feet with a gentle north-easternly slope. The Project site is characterized by grassland vegetation common to the Mojave Desert region, due to the influence of arid climatic conditions, topography, desert soils, and past land uses. A native species, San Joaquin bluecurl was observed in several areas throughout the Project site (see mapping in Figure 4.4-2). Additionally, there are no mapped or observed jurisdictional aquatic features within the Project site.

Land uses immediately surrounding the Project site are varied and sparsely developed. The Project vicinity is characterized by industrial and commercial uses (distribution, storage, and shipping centers), transportation, vacant land, and residential uses primarily east of the Project site. The residential uses comprise single- and multifamily residences, and are located east of the Project site, with the nearest residence approximately 100 feet directly east. To the north, is Boughton Drive with vacant undeveloped land across Boughton Drive, which is similarly zoned for light industrial use. To the east, the Project boundary runs parallel to Airport Drive, with a mix of uses across Airport Drive including Derrel's Mini Storage, Park Meadows Apartments, and Fabulous Burgers. To the south is Skyway Drive, where a FedEx Ship Center, Epic Jet Center, and Airman Flight Training are opposite of Skyway Drive. To the west is Hanger Way, and approximately 0.6 mile away is Meadows Field Airport and other transportation related services.

Scenic Highways

According to the California Department of Transportation (Caltrans) California Scenic Highway Mapping System, there are no designated State Scenic Highways within Kern County (Section 4.1.3, *Regulatory Setting*, provides more information on the State Scenic Highway Mapping System). There are three Eligible Scenic Highways in Kern County, all of which are located in the desert portion of eastern Kern County (Caltrans 2023). Route 1, which begins north of Mojave and continues to the Inyo County Line, consists of State Route (SR) 14 and State Highway 395. Route 2 consists of SR 58 between Mojave and Boron. Route 3 consists of 5 miles of SR 41 in northwest Kern County. The Project site would not be visible from any of these routes.

In addition to the State Scenic Highway Mapping System, the Kern County General Plan Circulation Element designates scenic routes and defines a scenic route as any freeway, highway, road, or other public right-of-way, which traverses an area of exceptional scenic quality and must be officially set as a Scenic Route by the Kern County Board of Supervisors or the State of California.

Lighting Environment

Light and Glare

Lighting effects are associated with the use of artificial light during the evening and nighttime hours. There is no existing site lighting on the Project site, and no structures are currently present on the Project site that would be a source of light. Furthermore, no sources of daytime glare occur on the site as it consists of vacant, industrially designated land. There is no off-site lighting beyond streetlamps fixed to stop light poles at several intersections on the streets surrounding the Project area and a couple overhead lights in nearby industrial building parking lots. There is no other local roadway lighting aside from the streetlamps at intersections on Airport Drive.

Glare is reflective light that can be visually unpleasant or possibly unsafe due to the potential for temporary blindness. Glare is primarily a daytime occurrence that may be caused by light from artificial sources or the sun reflecting off of light-colored or smooth, highly polished surfaces, such as metal, glass, water, or polished stone. Glare intensity varies depending on the source and intensity of the light, time of day, time of year, angle of reflectance, weather, atmospheric conditions, the reflectivity, color, and texture of material surface finish, length of exposure, nature and sensitivity of receptors, and other factors. There are developed areas surrounding the Project site, but these developments have minimal opportunities for glare to occur.

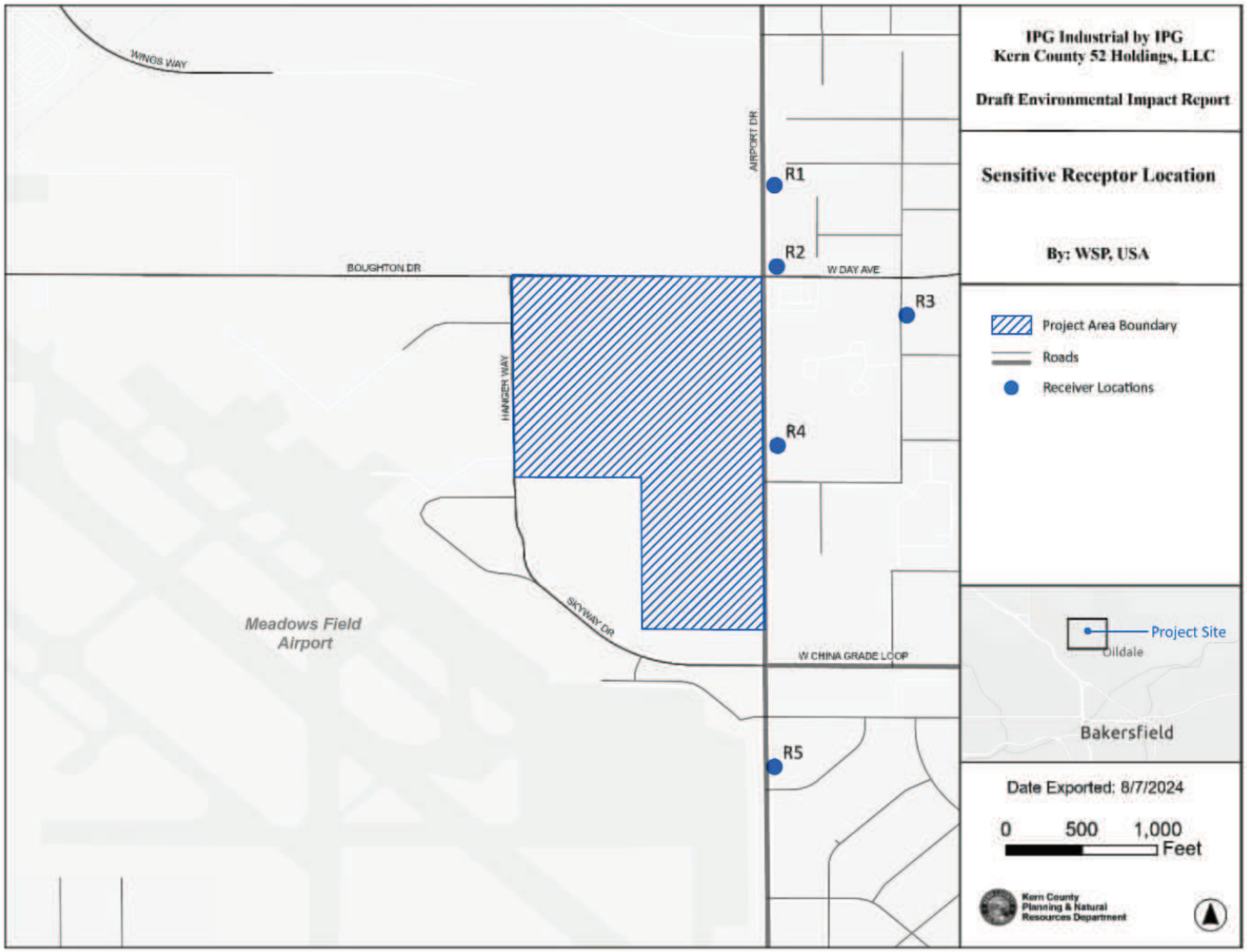
The nearest sensitive receptors are the Park Meadows Apartment community approximately 100 feet east of the Project site. Each sensitive receptor and proximity to the Project site is listed in **Table 4.1-1** with reference identification in relation to **Figure 4.1-1**. All sensitive receptors in the Project area are residential uses, including both single-family and multifamily dwelling units. These sensitive receptors may be affected by lighting generated as a result of the Project.

Table 4.1-1: Sensitive Receptors

Receptor[1]	Existing Land Use Designation	Proximity to Project Area
R1	Low Density Residential	667 feet northeast, on Greenwood Meadow Lane
R2	Low Density Residential	173 feet northeast, on Alhambra Meadow Court
R3	High Density Residential	809 feet east, on Meadow Grove Court
R4	General Commercial (current use is multifamily units)	102 feet east, on Park Meadows Avenue
R5	Low Density Residential	910 feet southeast, on Wingland Drive

Source: Airport Drive Warehouse Noise and Vibration Analysis, Urban Crossroads 2024

Figure 4.1-1: Sensitive Receptor Locations



4.1.3 Regulatory Setting

Federal

National Scenic Byways Program

The National Scenic Byways Program is part of the United States Department of Transportation, Federal Highway Administration (FHWA). The program was established under the Intermodal Surface Transportation Efficiency Act of 1991 and was reauthorized in 1998 under the Transportation Equity Act for the 21st Century. Under the program, the U.S. secretary of transportation recognizes certain roads as National Scenic Byways or All-American Roads based on their archaeological, cultural, historic, natural, recreational, and scenic qualities.

State

California Scenic Highway Program

Caltrans manages the California Scenic Highway Program, which was created by the State Legislature in 1963 (Caltrans 2023). The purpose of this program is to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways. The state laws governing the Scenic Highway Program are found in the Streets and Highways Code, Section 260 et seq. Caltrans manages the State Scenic Highway Program, provides guidance, and assists local government agencies, community organizations, and citizens with the process to officially designate a scenic highway.

A highway may be designated as scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The California Scenic Highway System includes a list of highways that are either eligible for designation as Scenic Highways or have been so designated. The status of a scenic highway in California changes from eligible to officially designated when the local jurisdiction adopts a scenic corridor protection program, applies to Caltrans for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a scenic highway (Caltrans 2023).

Several highways and state routes are located within the region that provide access to the Project site. As stated previously, the Project site is not in close proximity to any State-designated Scenic Highways.

Local

Construction and operation of the Project would be subject to the Metropolitan Bakersfield General Plan (MBGP), which include policies, goals, and implementation measures related to aesthetic resources, along with the Kern County Zoning Ordinance and the Kern County Code of Building Regulations, which include regulations pertaining to lighting and building design.

Metropolitan Bakersfield General Plan

The Project site is located within the MBGP area, and therefore, would be subject to applicable policies and measures within the plan. The Land Use Element and Open Space Element include relevant measures related to aesthetics that apply to the Project, as outlined below:

Chapter II: Land Use Element

Policies

Policy 35: Encourage upgrading of visual character of heavy manufacturing industrial areas through the use of landscaping or screening-of visually unattractive buildings and storage areas.

Policy 36: Require that industrial use provide design features, such as screen walls, landscaping and height, setbacks and lighting restrictions between the boundaries of adjacent residential land use designation so as to reduce impacts on residence due to light, noise, sound, and vibration.

Policy 37: Street frontage along all new industrial developments shall be landscaped.

Kern County Zoning Ordinance

Chapter 19.74, Scenic Corridor Combining District

Chapter 19.74 of the Zoning Ordinance establishes a Scenic Corridor Combining District. This zoning district is intended to protect areas with unique visual and scenic resources from intrusion by excessive or inappropriate forms of signage by requiring additional review by Kern County Planning and Natural Resources Department. The Project site is not located in a designated Scenic Corridor.

Chapter 19.81, Outdoor Lighting "Dark Skies Ordinance"

In November 2011, Kern County approved and adopted a Dark Skies Ordinance that is incorporated into the Kern County Zoning Ordinance as Chapter 19.81. The purpose of this ordinance is to maintain the existing character of Kern County by requiring a minimalist approach to outdoor lighting design, recognizing that excessive illumination can create a glow that may obscure the night sky and excessive illumination, or glare that may constitute a nuisance. Requirements for outdoor lighting within specified unincorporated areas of Kern County are crafted in order to accomplish the following objectives:

- Encourage a safe, secure, and less light-oriented nighttime environment for residents, businesses, and visitors.
- Promote a reduction in unnecessary light intensity and glare, and to reduce light spillover onto adjacent properties.
- Protect the ability to view the night sky by restricting unnecessary upward projections of light.

- Promote energy conservation and a reduction in the generation of greenhouse gases by reducing wasted electricity that can result from excessive or unwanted outdoor lighting.

Kern County Development Standards

The Kern County Development Standards have specific regulations pertaining to lighting standards, including the requirement that lighting must be designed so that light is reflected away from surrounding land uses so as not to affect or interfere with vehicular traffic, pedestrians, or adjacent properties.

4.1.4 Impacts and Mitigation Measures

This section describes the impact analysis relating to aesthetics and visual resources for the Project. It describes the methods used to determine the impacts of the Project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (that is, avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany each impact discussion, where applicable.

Methodology

In general, the potential character, quality, light, and glare impacts associated with the Project are evaluated on a qualitative basis. This visual impact assessment is being utilized to identify and assess any potential long-term adverse visual impacts to aesthetics and visual resources that might result from the implementation of the Project during construction and operation. This assessment is based on the approved visual assessment practices employed by the FHWA (FHWA 2015), the Bureau of Land Management (BLM), the U.S. Forest Service, and other federal regulatory agencies; a method that entails the following:

- Defining the Project and its visual setting by assessing the Project proponent's submitted project application materials, including plans and descriptions, and reviewing Google Earth Pro aerial photographs and street-level photography, Kern County GIS topographic and land use data, and U.S. Geological Survey topographic data.
- Conducting a field visit of the Project site and vicinity to document the following:
  - Project site's visual characteristics.
  - Project vicinity's visual characteristics.
  - Establish a visual characteristic baseline.
  - Location of visual (sensitive) receptors in the vicinity.

- Establishing KOPs within vicinity from which to evaluate potential visual impacts resulting from implementation of the Project.
  - KOPs that are the most representative and important viewpoints identified during the field survey to evaluate potential visual impacts that would result from the Project.
- Preparing visual simulations of post-development views of the KOPs.
- Assessing the Project's impacts to sensitive viewers by applying the visual quality rating system to each of the visual simulations.
- Proposing methods to mitigate or reduce any potentially significant visual impacts identified.

The evaluation of Project impacts is based on professional judgement, analysis of the MBGP goals and policies related to visual resources, and the significance criteria established by California Environmental Quality Act (CEQA) Guidelines, Appendix G. More detailed information on the methodology behind the selection of KOPs and visual simulations is provided below.

Selection of Key Observation Points

KOPs are selected to represent views that would be experienced from sensitive viewpoints. KOPs are single viewpoints that appropriately reflect the impact that implementation of the Project would have on one or more sensitive receptors. Sensitive receptors near the Project site fall into the following categories: motorists, employees, and residents. KOPs were identified based on review of available land use data, preliminary viewshed analysis, and a review of aerial maps.

The process of identifying KOPs focused on selecting viewpoints that could be used to accurately represent views from a broader range of viewpoints, particularly viewpoints from area sensitive receptors. Sensitive receptors near the Project site include motorists, employees of industrial uses nearby, and viewers of the Project site from residences along local roads. The familiarity with the view also influences how much attention is spent on the visual environment. Regular motorists may be highly familiar with the view and sometimes pay less attention; however, these motorists tend to be much more sensitive to changes in that view. People who are less familiar with the view may spend more time looking at the surrounding land but would not notice changes in the view. The majority of existing motorists are likely to be employees of nearby businesses and commerce centers, or residents driving to and from home or to and from the airport.

The Project site is located in a dispersed industrial and residential area. As described in Section 4.1.2, *Environmental Setting*, the Park Meadows residential apartment complex is located directly east of the Project site across Airport Drive. Among these residents, those with direct views of the Project site from their homes would tend to be the most sensitive to changes in the view. These residents tend to have much more familiarity with the existing viewshed and a heightened sensitivity to any visual changes within the landscape. Employees of Derrel's Mini Storage and Fabulous Burgers, to the east and FedEx Ship Center, Epic Jet Center, and Airman Flight Training to the south of the Project site also have heightened sensitivity to visual changes within the landscape.

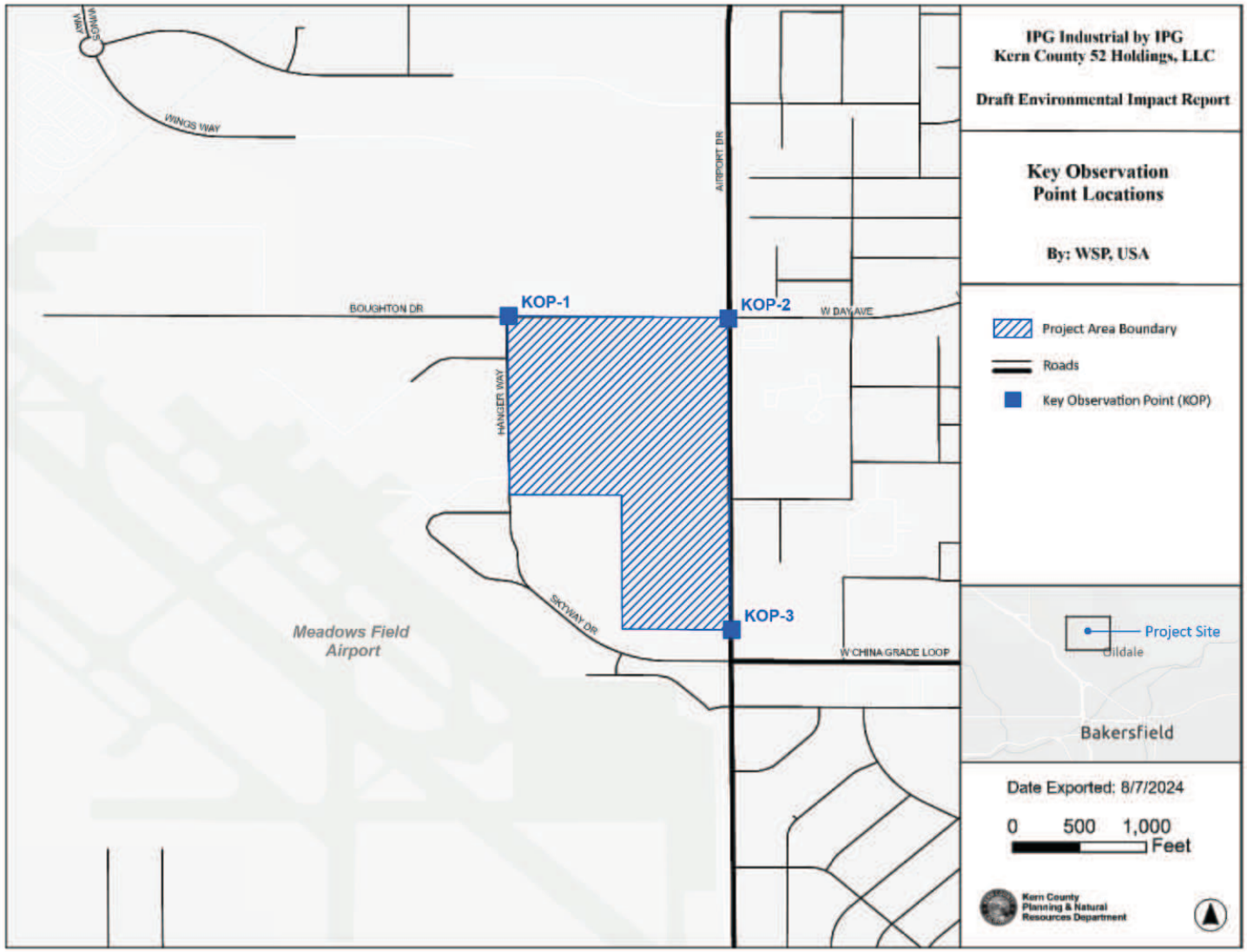
The lead agency selected three KOPs for to create post-development visual simulations. The evaluated KOPs are mapped on **Figure 4.1-2** and described below in **Table 4.1-2**. The KOPs selected for simulation were chosen because they represent views that residents, employees, and motorists would experience from their adjacent homes, place of work, and local roadways, respectively, when viewing the Project site.

Table 4.1-2: Key Observation Points

KOP	Location	Representative Sensitive Viewers
KOP-1	Intersection of Boughton Drive and Hanger Way looking southeast toward the Project site	Motorists, employees, and residents of California Aeronautical University on Boughton Drive and Hanger Way as they pass the Project site.
KOP-2	Intersection of Airport Drive and Boughton Drive looking southwest toward the Project site	Motorists, employees, and residents on Airport Drive as they pass the Project site.
KOP-3	Intersection of Airport Drive and Skyway Drive looking northwest toward the Project site	Motorists, employees, and residents on Airport Drive as they pass the Project site.

KOP = Key Observation Point

Figure 4.1-2: Key Observation Point Locations



Simulation Preparation

Visual simulations of the Project from the identified KOPs were prepared by WSP in January 2025 (**Figure 4.1-3** through **Figure 4.1-5**) to provide a representation of the pre- and post-project visual conditions as well as context for qualitative description of the aesthetic changes that would result from implementation of the Project. Photographs were taken by Kern County representatives during a site visit on March 19, 2024, and simulations were prepared by WSP using the assumptions and methodologies listed below in **Table 4.1-3**.

Table 4.1-3: Visual Simulation Methodology and Assumptions

Photography from Key Observation Points	Photos were taken on a clear day with scattered clouds on March 19, 2024 Photos were taken on an iPhone 15 Pro Max with following camera system: 48MP Main: 24 mm, *ƒ*/1.78 aperture, second generation sensor shift optical image stabilization, 100% Focus Pixels, support for super high resolution photos (24MP and 48MP) 12MP Ultrawide: 13 mm, *ƒ*/2.2 aperture and 120° field of view, 100% Focus Pixels 12MP 2x Telephoto (enabled by quad pixel sensor): 48 mm, *ƒ*/1.78 aperture, second generation sensor shift optical image stabilization, 100% Focus Pixels 12MP 5x Telephoto: 120 mm, *ƒ*/2.8 aperture, 3D sensor shift optical image stabilization and autofocus, tetraprism design 5x optical zoom in, 2x optical zoom out; 10x optical zoom range Digital zoom up to 25x Source: Apple, 2024
Visual simulation assumptions	Building height assumed at approximately 56 feet from finished grade to top of roof, plus between 4 feet and 10 feet to the top of parapet. Building 1 is assumed at a total of approximately 655,690 square feet, including 10,000 square feet of office, and Building 2 is assumed at a total of 267,440 square feet, including 5,000 square feet of office. Parking would include 124 spaces for truck doc trailer parking, 547 for automobile parking, and 307 for truck trailer spaces Generic landscaping is assumed with 10- to 15-year mature trees Fencing materials assumed to be a 6-foot-high chain-link fence with slats
Methods	Following the data gathering phase, the process begins with a determination of proposed camera locations and station points. Upon review and approval of camera locations, Kern County conducted a field visit to photograph the locations. Concurrently, WSP developed a computer model of the Project to illustrate its appearance from different points of view. Natural and finished pads, including existing and surrounding contextual elements such as streets, lights, trees, terrain, and adjacent development (where applicable), were used as a reference. Upon completion of the 3D modeling phase, realistic materials, maps, and textures were then applied. The next phase was assembly, during which the modeling was inserted into photographs taken during the field study using a full-frame camera and camera match technology. 3D pads and boundary outlines were used to situate the modules to the proposed positions as shown on the CAD drawings provided. During this process, a computer model camera was aligned with the onsite photography to depict the Project setting within each view.

3D = three-dimensional
CAD = computer-aided design
mm = millimeter
MP = megapixel
x = times

A comparison of existing views from the KOPs with visual simulations depicting visible Project features, aided in determining the Project-related impacts. The simulations are representative of the existing landscape setting contained within the Project site, as well as an illustration of how the Project may look from the identified KOPs at full buildout. While the warehouse buildings shown in visual simulations are not identical to those that would be developed at the Project site, modular warehouse buildings are visually similar based on proposed elevations (Chapter 3, *Project Description)*, regardless of the manufacturer, and are therefore similar enough to evaluate project impacts to aesthetics. **Figure 4.1-3** through **Figure 4.1-5** show each of the three KOPs in their existing and post-construction conditions.

Rating Visual and Scenic Quality

"Visual quality" is a measure of a landscape or view's visual appeal. While there are a number of standardized methods for rating visual quality, the "Scenic Quality Rating Criteria" method utilized by the BLM is believed to be the most comprehensive as it allows the various landscape elements that comprise visual quality to be easily quantified.

Scenic quality refers to the visual appeal of a landscape relative to desired scenic values and the abundance or scarcity of similar qualities in the region. Scenic quality can be measured quantitatively by evaluating the presence or absence of scenic features and the intrusion of features that detract from the scenic features.

According to this method, visual and scenic quality can be rated according to the presence and characteristics of seven key components of the landscape. As described below, these components include landform, vegetation, water, color, adjacent scenery, scarcity and cultural modifications.

The **landform** component of the visual quality rating criteria considers the fact that topography becomes more interesting visually as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, (as found in Yosemite Valley), or they may be exceedingly artistic and subtle (such as certain badlands, pinnacles, arches, and other extraordinary formations).

The **vegetation** component of the rating criteria gives primary consideration to the variety of patterns, forms, and textures created by plant life. Short-lived displays are given consideration when they are known to be recurring or spectacular. Consideration is also given to smaller scale vegetation features that add striking and intriguing detail elements to the landscape (for example, gnarled or wind beaten trees, Joshua trees).

The **water** component of the rating criteria recognizes that visual quality is largely tied to the presence of water in scenery, as it is that ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score for the water component.

The **color** component of the visual quality rating criteria considers the overall color(s) of the basic components of the landscape (for example, soil, rock, vegetation). Key factors that are used when rating the color of scenery are variety, contrast, and harmony.

The **adjacent scenery** component of the rating criteria considers the degree to which scenery outside the view being rated enhances the overall impression of the scenery under evaluation evaluated. The distance of influence for adjacent scenery normally ranges from 0 to 5 miles, depending upon the characteristics of the topography, the vegetation cover, and other such factors. This factor is generally applied to views that would normally rate very low in score, but the influence of the adjacent high visual quality would enhance the visual quality and raise the score.

The **scarcity** component of the visual quality rating criteria provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within a region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often, it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery – the scarcity factor can be used to recognize this type of area and give it the added emphasis it should have.

The **cultural modifications** component of the visual quality rating criteria considers any man-made modifications to the landform, water, vegetation, and/or the addition of man-made structures. Depending on their character, these cultural modifications may detract from the scenery in the form of a negative intrusion, or they may complement and improve the scenic quality of a view.

Based on the above criteria, views are rated numerically and a total score of visual quality can be tabulated. Based on the BLM's rating system, there are a total of 32 points possible. Views that score a total of 19 points or more are typically considered very high in visual quality. Views that score a total of 15 to 19 points are typically considered to have a high level of visual quality. Views that score a total of 12 to 15 points are typically considered to have an above average level of visual quality. Finally, views that score a total of 11 points or less are typically considered to have average visual quality. **Table 4.1-4** provides the point values associated with the various criteria.

An important premise of this evaluation method is that views with the most variety and most harmonious composition have the greatest scenic value. Another important concept is that human-made features within a landscape do not necessarily detract from the scenic value. In fact, certain human-made features that complement the natural landscape may actually enhance the visual quality. In making this determination, it is therefore important to assess Project effects relative to the "visual character" of the Project setting. Visual character is qualitatively defined by four primary components: form, line, color, and texture.

Projects that create a high level of contrast to the existing visual character of a project setting are more likely to generate adverse visual impacts due to visual incompatibility with the existing setting. Conversely, projects that create a low level of contrast to the existing visual character are less likely to generate adverse visual impacts due to inherent visual compatibility. On this basis, modifications within the existing project site that would result from project implementation are quantified and evaluated for impact assessment purposes.

By comparing the difference in visual quality ratings from the baseline ("before" condition) to post-project ("after" condition) visual conditions, the severity of project-related visual impacts can be

quantified. In some cases, visual changes caused by projects may actually have a beneficial visual effect and may enhance scenic quality. The following designations are used to rank the significance of project impacts according to the pre- and post-project differences in numerical visual quality scores:

Potentially Significant Impact: Any impact that could potentially lower the visual quality of an identified sensitive viewpoint by 2 points or more, and for which no feasible or effective mitigation can be identified.

Less than significant Impact with Mitigation Incorporated: Any impact that could potentially lower the visual quality of an identified sensitive viewpoint by 2 points or more but can be reduced to less than 2 points with mitigation incorporated. Therefore, specific mitigation measures are provided to reduce the impact to a less than significant level.

Less than significant Impact: Any impact that could potentially lower the visual quality of an identified sensitive viewpoint by 1 point or less. In visual impact analysis, a less than significant impact usually occurs when a project's visual modifications can be seen but do not dominate, contrast with, or strongly degrade a sensitive viewpoint.

No Impact: The project would not have an impact from an identified sensitive viewpoint. In visual impact analysis, there is no impact if the Project's potential visual modifications cannot be seen from an identified sensitive viewpoint.

Table 4.1-4: Visual Quality Rating System

Key Factors	Rating Criteria and Score (Points)		
Landform	**5** - High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers.	**3** - Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional.	**1 -** Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features.
Vegetation	**5** - A variety of vegetative types as expressed in interesting forms, textures, and patterns.	**3** - Some variety of vegetation, but only one or two major types.	**1 –** Little or no variety or contrast in vegetation
Water	**5** - Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape.	**3** - Flowing, or still, but not dominant in the landscape.	**0 -** Absent, or present but not noticeable.
Color	**5** - Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields.	**3** - Some intensity or variety in colors and contrast of the soil, rock, and vegetation, but not a dominant scenic element.	**1** - Subtle color variations, contrast, or interest; generally mute tones.
Influence of Adjacent Scenery	**5** - Adjacent scenery greatly enhances visual quality.	**3** - Adjacent scenery moderately enhances visual quality.	**0 -** Adjacent scenery has little or no influence on overall visual quality.
Scarcity	**5** - One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc.	**3** - Distinctive, though somewhat similar to others within the region.	**1** - Interesting within its setting but fairly common within the region
Cultural Modifications	**2** - Modifications add favorably to visual variety while promoting visual harmony.	**0** - Modifications add little or no visual variety to the area and introducing no discordant elements.	**-4** - Modifications add variety but are very discordant and promote strong disharmony.

Source: BLM Manual H-8410-1 – Visual Resources Inventory (BLM 1986).

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in CEQA Guidelines Appendix G, to determine whether a project could potentially have a significant adverse effect on aesthetic resources.

A project would have a significant impact on aesthetics if it does the following:

- Has a substantial adverse effect on a scenic vista
- Substantially damages scenic resources, including trees, rock outcroppings, and historic buildings within a State designated scenic highway
- In an urbanized area, conflicts with applicable zoning and other regulations governing scenic quality of the site and its surroundings
- Creates a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area

Project Impacts

The amount of potential visual change that would be introduced into the existing landscape and the degree to which viewers are likely to be impacted and react to the change are described below for each applicable threshold of significance. Impacts associated with implementation of the Project consists of the construction of the two buildings associated with the Project. As previously discussed, **Figure 4.1-3** through **Figure 4.1-5** illustrate the renderings of the two buildings that would be constructed as part of the Project from each KOP.

Impact 4.1-1: The Project would have a substantial adverse effect on a scenic vista.

Scenic vistas are areas identified or known for high scenic quality. Scenic vistas may be designated by a federal, State, or local agency, and can also include an area that is designated, signed, and accessible to the public for the express purposes of viewing and sightseeing. There are no officially designated scenic vistas on or visible from the Project site. As such, the proposed Project would not result in a substantial adverse effect on a scenic vista. No impacts would occur.

Mitigation Measures

No mitigation measures would be required.

Level of Significance After Mitigation

No impact would occur.

Impact 4.1-2: The Project would substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State Scenic Highway.

There are currently no designated State Scenic Highways within the Project area. The nearest officially designated State Scenic Highway to the Project is the southern section of Rt. 33, which is located 60 miles south of the Project site. The proposed Project would have no effect for travelers along this Scenic Highway.

Similarly, the closest highways that are eligible for designation are located in the desert portion of eastern Kern County (Caltrans 2023). Route 1, which begins north of Mojave and continues to the Inyo County Line, consists of State Route (SR) 14 and State Highway 395. Route 2 consists of SR 58 between Mojave and Boron. Route 3 consists of 5 miles of SR 41 in northwest Kern County. The project site would not be visible from any of these routes.

Given this distance and intervening topography, the proposed Project would have no effect for travelers along the Eligible State Scenic Highway. Additionally, construction of the proposed Project would not be visible from any officially designated or Eligible State Scenic Highway.

There would be no change to the viewshed from any officially designated or Eligible State Scenic Highway, and no impact would occur.

Mitigation Measures

No mitigation measures would be required.

Level of Significance After Mitigation

No impact would occur.

Impact 4.1-3: The Project would conflict with applicable zoning and other regulations governing scenic quality.

As described in Chapter 3, *Project Description*, and above under Section 4.1.2, *Environmental Setting*, existing development in the Project vicinity are varied and consist of industrial, commercial, transportation, and residential uses. To the north, the Project boundary runs parallel to Boughton Drive with vacant undeveloped land across Boughton Drive which is also zoned for light industrial use. An aeronautical university is also located northwest of the site at the terminus of Boughton Drive. To the east, the Project boundary runs parallel to Airport Drive, with a mix of uses across Airport Drive including Derrel's Mini Storage, Park Meadows Apartments, and Fabulous Burgers. The residential uses comprise single- and multifamily residences are also located east of the Project site, with the nearest residences being the Park Meadows apartment complex sited approximately 100 feet directly east. The Project has been designed so that no truck docks face the residences located east of the site as shown in Figure 3-6a, *Overall Site Plan*. Outdoor storage of any possible goods and materials, such as tires, is not proposed as part of this project. All products would be stored entirely within the proposed warehouses.

To the south is Skyway Drive, where a FedEx Ship Center, Epic Jet Center, and Airman Flight Training are opposite of Skyway Drive. To the west is Hanger Way, and approximately 0.6 mile is Meadows Field Airport and transportation uses.

As the Project is located within an urbanized area, the analysis below will focus on whether development of the Project would conflict with applicable zoning and other regulations governing scenic quality of the site and its surroundings.

Construction

Construction activities associated with the Project would create temporary changes in views of the Project site. During construction, surrounding areas would experience a change in visual quality due to the presence of construction equipment, land clearing and preparation of the site, and presence of vehicles and workers; however, following completion of construction, all exposed areas used for laydown and staging would be returned to pre-construction conditions and revegetated to native habitat conditions.

Short-term impacts could result from land clearing and grading for pads and work areas, temporary construction areas, and vehicle and equipment operations for building construction. This would cause short-term aesthetic impacts resulting in a reduction in unity, intactness, or vividness created by vegetation removal, and materials, equipment, vehicles, structures, fences, and other elements that would be present during construction.

On-site parking could be noticeable during construction if certain sites require a larger number of workers and, consequently, their vehicles. Nighttime lighting for construction or safety and security in construction areas may also result in short-term aesthetic impacts; these impacts associated with creating new sources of substantial light or glare are addressed separately under Impact 4.1-4.

The severity of construction-related aesthetic impacts would depend not only on the reduction in unity, intactness, and vividness produced by the construction activities, but also on the visibility and proximity of these activities to viewers and the sensitivity of viewers to changes in the landscape's character and quality. Additionally, activities may be temporary and somewhat brief (several weeks to several months). The construction activities would be visible and noticeable from public areas surrounding the Project for a relatively short distance (approximately 0.5 mile) due to the relative flatness of the topography, except where views are obstructed by vegetation, and structures. In addition, the visual effects associated with the presence of construction vehicles, equipment, and workers in the Project area landscape would be limited in duration, as discussed above, and would be spatially limited at any given time to the active area of construction. Therefore, impacts to existing visual character or quality of the Project site and surrounding area during construction of the Project would be less than significant.

Operation

The Project is a warehousing facility that is compatible with the underlying MBGP land use designation map code of LI (Light Industrial), and consistent with the zoning of M-1 PD H (Light Industrial – Precise Development Combining – Airport Height Approach Combining) District. The surrounding uses vary and consist of industrial, commercial, transportation, and residential uses.

In order to determine whether the Project would substantially degrade the existing visual quality of the Project site, the following visual analysis compares the existing setting with the visual simulations prepared by WSP showing post-construction visual conditions. As described above, three KOPs were selected for visual simulations, representing views that would be experienced from the surrounding sensitive receptors.

Visual simulations, representing the post-construction conditions, are compared side-by-side to the pre-construction conditions and are provided in Figures 4.1-3 through 4.1-5, below. The KOPs are described in **Table 4.1-2** and the Methodology section explains the process for determining impacts associated with operation of the Project, based on the viewer location at each KOP. The rating system and impacts methodology are discussed in the Rating Visual Quality Section above.

Once constructed, the Project would include two single-story logistics warehouses for a logistics facility. The warehouse buildings would be primarily constructed from architecturally enhanced concrete panels and would not be higher than 56 feet above the finished floor elevation. The two buildings and Project components would introduce additional industrial-looking elements into the landscape that would be visible to sensitive viewers. As noted previously, outdoor storage of goods and materials to be stored and distributed during implementation of the Project is not included in the proposal. Therefore, products such as tires, lumber, or other packaged goods are not expected to be visible to the nearest sensitive receptors as they will be stored entirely indoors, thereby alleviating the need for exterior screening fixtures that are commonly used for other industrial storage developments such as a contractor's storage yard or vehicle wrecking yard.

As mentioned in Chapter 3, *Project Description*, the Project may be occupied by a tenant that specializes in the wholesale distribution of tire and tire accessories that would be shipped off-site for the retail market. This specific type of occupancy would typically require unique fire prevention fixtures and limitations. However, these specifications would include interior safety designs that would occur entirely indoors and would not be visible to the nearest sensitive receptor. Additionally, storage of tires on site would be incidental to the proposed warehouse and distribution use, which is permitted on a by-right basis in the M-1 PD H District.

KOP-1: **Figure 4.1-3** shows the view from KOP-1 at the intersection of Boughton Drive and Hanger Way looking southeast toward the Project site. This KOP-1 accurately reflects views of the Project site that employees and residents would view while on the roadway. The pre-development view from KOP-1 captures a landscape that is flat and covered with low-lying grasslands vegetation in the foreground. Note that the color of the grasslands change seasonally, and contains varying degrees of green, brown, and golden hues. In the distant middle ground, trees along private

residential strips, and the Park Meadow Apartment complex can be seen. The background from KOP-1 consists mostly of sparse, low-lying mountains with distant hilltops visible. The post-development view from KOP-1 (**Figure 4.1-3**) would include changes and modifications that would primarily be located in the middle ground and the background of the landscape becomes mostly obscured. The facility buildings would be visible from KOP-1 and contrast with the flat grasslands in the existing conditions immediately north of the Project area. While the Project would change the landscape, it would not greatly contrast with the built environment, considering that the surrounding area consists of similar looking single story industrial buildings. As discussed in **Table 4.1-5** the pre-development score is 7, and the post-development score is 6, therefore, visual impacts from KOP 1 would be less than significant.

KOP-2 **Figure 4.1-4** shows the view from KOP-2 at the intersection of Airport Drive and Boughton Drive looking southwest toward the Project site. KOP-2 reflects views of the Project site that would be experienced by residents, employees, and motorists along the roadways adjacent to the Project. The pre-construction views from KOP-2 show that the landscape is flat and covered with low-lying grasslands vegetation in the foreground. In the distant middle ground, shrubs can be seen hedging the roadways that curve around the Project site, and airplane storage hangers and other industrial buildings can be viewed across the Project site. The background of KOP-2 consists mostly of residential development and low-lying mountains with distant hilltops visible. The post-development view from KOP-2 **(Figure 4.1-3**) would include changes and modifications that would be located primarily in the middle ground of the landscape. The facility buildings would be visible from KOP-2 and would create form on a previously flat terrain. The buildings and landscaping obscure most of the views of residential areas and mountains in the background. As discussed in **Table 4.1-6** the pre-development score is 7, and the post-development score is 5, therefore, visual impacts from KOP-2 would be potentially significant without mitigation.

KOP-3 **Figure 4.1-5** shows the view from KOP-3 at the intersection of Airport Drive and Skyway Drive looking northwest toward the Project site. KOP-3 reflects views of the Project site that would be experienced by employees, residents, and motorists along the roadways adjacent to the Project site. The pre-construction views from KOP-3 show that the landscape is flat and covered with low-lying grasslands vegetation in the foreground. In the distant middle ground, palm trees located in industrial parking lots can be seen, along with other industrial buildings and airplane storage hangers. Mature trees on residential property that line the street can be seen as well. The post-development view from KOP-3 (**Figure 4.1-4**) would include changes and modifications that would be located in the foreground and middle ground of the landscape. The facility buildings would be visible from KOP-3 and contrast with the surrounding environment and flat grasslands in the existing conditions of the Project area. While the Project would change the landscape, it would not greatly contrast with the built environment surrounding the Project area, which currently consists of light industrial, commercial, residential, and transportation uses. As discussed in **Table 4.1-7** the pre-development score is 7, and the post-development score is 8, therefore, visual impacts from KOP-3 would be less than significant.

Figure 4.1-3: KOP-1 Existing and Proposed Conditions at Boughton Drive and Hanger Way

Existing: Boughton Drive and Hanger Way

Proposed: Boughton Drive and Hanger Way

Table 4.1-5: Visual Quality Rating Analysis – KOP-1

Sensitive Receptor: Motorists driving along Boughton Drive and Hanger Pre-development and post-development conditions are depicted in Figure 4.1-3				
Rated Feature	**Pre-development Condition**	**Post-development Condition**	**Difference in Scores**	**Impact Significance**
Landform	1	0	-1	Less than significant.
Explanation	Flat terrain covered with low-lying grasslands vegetation dominates the landscape with distant views of southerly sloping mountains.	Though the proposed site is flat and would remain unchanged, the view from KOP-1, post development, would change substantially, as the facility would mostly obscure distant views of the mountains.		
Detail	The foreground from this KOP is dominated by flat landforms. In the distance, mountains can be seen that diminish in size toward the south. Post-development would obscure most of these views, however, some views of the mountains are still visible from Boughton Drive.			
Vegetation	1	2	+1	Less than significant.
Explanation	The foreground consists primarily of non-native grasslands. In the distant middle ground, trees are clustered near residential development.	Existing non-native grasslands would be removed from the Project site in the middle ground for development. Distant vegetation would be obscured. However, a vegetation barrier is proposed along the street frontage and includes trees, shrubs, and ground cover. Note that the KOP-1 depicts mature vegetation.		
Detail	The post- development views of vegetation from KOP-1 would be more varied, as compared to the pre-development views due to the proposed landscaping surrounding the building. Vegetation variability surrounding the Project would be improved from pre-construction conditions.			
Water	1	1	0	Less than significant.
Explanation	No water is present on the site or in the vicinity.	The Project would introduce an on-site storm drainage system consisting of inlets, underground piping, and surface and underground basins.		

Sensitive Receptor: Motorists driving along Boughton Drive and Hanger Pre-development and post-development conditions are depicted in Figure 4.1-3				
Detail	There are no natural water features on the Project site or within the surrounding area. The storm drainage system has not yet been designed but anticipates addition of a surface retention basin to accommodate a 100-year storm event.			
Color	1	1	0	Less than significant.
Explanation	The existing landscape features shades of browns, yellows, and greens across the foreground and middle ground, and dark green and grey are associated with soil and distant mountains in the background.	Buildings would introduce metal and tempered glass, giving cool colors, with occasional muted concrete paneling. A vegetation barrier would resemble earthy tones.		
Detail	The pre-construction coloring consists of yellow and green tones in the foreground and middle ground. The background offers blue tones and cool tones. The proposed facility would be flat and muted, with metal and concrete additions, and flat paints. Background colors would not be substantially altered and would remain a cool tone.			
Adjacent Scenery	1	0	-1	Less than significant.
Explanation	Scenery in the foreground consists mainly of grassland vegetation, with an electric transformer visible. The distant middle ground features deciduous and evergreen trees and an apartment complex, while distant mountains along the skyline are visible in the background.	Scenery in the foreground and middle ground would be changed, while the background would mostly be obscured, eliminating views of sparse mountains and hilltops.		
Detail	The Project would display prominently in the middle ground, obstructing most of the background views from KOP-1. The foreground would be changed as well to accommodate landscaping associated with the Project. The adjacent scenery has little to no influence on the overall visual quality.			
Scarcity	1	1	0	Less than significant.
Explanation	The available views are broad and there are no unique aspects from KOP-1. Similar views exist throughout the region.	Views would be slightly modified by the Project's industrial development in the middle ground.		
Detail	Existing views offered from KOP-1 are typical of the area and are not particularly unusual or unique. Alteration of the landscape to accommodate the Project would not result in visually significant impacts to view scarcity.			

Sensitive Receptor: Motorists driving along Boughton Drive and Hanger Pre-development and post-development conditions are depicted in Figure 4.1-3				
Cultural Modifications	1	1	0	Less than significant.
Explanation	Cultural modifications include roadway, residential apartment buildings, planted vegetation, commercial and industrial development, and a local airport.	The proposed development would mostly obscure the apartment buildings and clustered planted trees in the distant middle ground Project related development includes construction of two industrial warehouse buildings.		
Detail	Existing cultural modifications are particularly prominent in the distant middle ground. While the foreground would undergo modifications with the addition of the industrial warehouse buildings, the proposed development would be consistent with the surrounding cultural modifications, including other industrial uses and introduced vegetation.			
Totals	**7**	**6**	**-1**	**Less than significant.**

KOP = Key Observation Point

Figure 4.1-4: KOP-2 Existing and Proposed Conditions at Airport Drive and Boughton Drive

Existing: Airport Drive and Boughton Drive

Proposed: Airport Drive and Boughton Drive

Table 4.1-6: Visual Quality Rating Analysis – KOP-2

Sensitive Receptor: Residents and motorists on Airport Drive as they pass the Project site. Pre-development and post-development conditions are depicted in Figure 4.1-4				
Rated Feature	**Pre-development Condition**	**Post-development Condition**	**Difference in Scores**	**Impact Significance**
Landform	1	0	-1	Less than significant.
Explanation	Flat terrain covered with low-lying grasslands and scrub-shrub vegetation.	The buildings and vegetation would provide form to a previously flat terrain. From KOP-2, the distant landforms of mountains would be obscured.		
Detail	The landform viewed from KOP-2 would change due to erection of new buildings and landscape screening that would obscure most of the distant mountains. The landform would remain flat at the Project site.			
Vegetation	1	1	0	Less than significant.
Explanation	Low-lying vegetation, mostly non-native grasslands dominate the views from KOP-2. There are visible shrubs that hedge the Project site perimeter looking southwest and treetops in distant residential areas.	Existing grasslands vegetation would be removed from the Project site and distant shrubs and treetops would be obscured by the buildings and new landscaping. Vegetation in the parking lot and a vegetated barrier along the frontage would be added and would comprise the majority of the view visible from KOP-2.		
Detail	The post- development views of vegetation from KOP-2 would be more varied, compared to the pre-development dominant views of single vegetation of low-lying grassland. Distant shrubs and residential treetops would be obscured; however, new landscaping would be incorporated throughout the parking lot.			
Water	1	1	0	Less than significant.
Explanation	No water is present on the site or in the vicinity.	The Project would introduce an on-site storm drainage system consisting of inlets, underground piping,		

Sensitive Receptor: Residents and motorists on Airport Drive as they pass the Project site. Pre-development and post-development conditions are depicted in Figure 4.1-4				
		and surface and underground basins.		
Detail	There are no natural water features on the Project site or within the surrounding area from KOP-2. The storm drainage system has not yet been designed but anticipates addition of a surface retention basin to accommodate a 100-year storm event.			
Color	1	1	0	Less than significant.
Explanation	The existing landscape features shades of browns, yellows, and greens across the foreground. In the distant middle ground, shades of blues, greys, and dark greens are associated with trees and mountains in the background.	Buildings would introduce metal and tempered glass, giving cool colors, with occasional muted concrete paneling. Newly paved parking lots would offer striking darker colors balanced with overall earth tones of new vegetation.		
Detail	The pre-construction colors consist of vibrant yellows and greens in the foreground and cool blues and greens in the background. Note that vegetation in the foreground will change seasonally to colors with gold and brown. The proposed buildings would introduce cooler tones to the foreground, with the addition of tempered glass, metals, and occasional concrete paneling. Background colors of cool blues would not be substantially altered, would be less visible than pre-construction views due to the obstruction of vegetation in the foreground.			
Adjacent Scenery	1	0	-1	Less than significant.
Explanation	Scenery in the foreground consists mainly of grassland and scrub-shrub vegetation. The middle ground features shrubs hedging roadways, industrial buildings, and airport hangars, while distant treetops skirt mountains along the skyline in the background.	Scenery in the foreground and distant middle ground would be changed, as much of the industrial development would be obscured. The background of mountains and treetops would mostly become obscured by Project development.		
Detail	The Project would dominate foreground views and buildings would obstruct much of the industrial and residential development in the distant middle ground and background. Most of the background of treelined residential communities and vast mountains would be obscured by the Project.			

Sensitive Receptor: Residents and motorists on Airport Drive as they pass the Project site. Pre-development and post-development conditions are depicted in Figure 4.1-4				
Scarcity	1	1	0	Less than significant.
Explanation	The available views are broad and there are no unique aspects from KOP-2. Similar views exist throughout the region.	Views would be slightly modified by the Project's industrial development and dense vegetation in the middle ground.		
Detail	Existing views offered from KOP-2 are typical of the area and are not particularly unusual or unique. Alteration of the landscape to accommodate the Project would not result in visually significant impacts to view scarcity.			
Cultural Modifications	1	1	0	Less than significant.
Explanation	Cultural modifications include roadway (not pictured), residential apartment buildings, commercial and industrial development, and a local airport.	Project related development includes construction of two industrial warehouse buildings and dense vegetation screening.		
Detail	Existing cultural modifications are particularly prominent in the middle ground. While the foreground would experience modifications with the addition of the industrial warehouse buildings and vegetation, the proposed development would be consistent with the surrounding cultural modifications, and therefore, would be less than significant.			
Totals	**7**	**5**	**-2**	**Potentially significant without mitigation.**

KOP = Key Observation Point

Figure 4.1-5: KOP-3 Existing and Proposed Conditions at Airport Drive and Skyway Drive

Existing: Airport Drive and Skyway Drive

Proposed: Airport Drive and Skyway Drive

Table 4.1-7: Visual Quality Rating Analysis – KOP-3

Sensitive Receptor: Residents and motorists on Airport Drive as they pass the Project site. **Pre-development and post-development conditions are depicted in Figure 4.1-5**				
Rated Feature	**Pre-development Condition**	**Post-development Condition**	**Difference in Scores**	**Impact Significance**
Landform	1	1	0	Less than significant.
Explanation	Flat terrain dominates the middle ground with low-lying grasslands and vegetation. Exposed soil lines the foreground of the view.	Development would not affect the broad, flat terrain in the foreground and middle ground.		
Detail	The pre- and post-development view is dominated by flat terrain in the foreground and middle ground. Unlike the other KOPs, there are no distant mountains in view. The landform would remain unchanged with development of the Project.			
Vegetation	1	2	1	Less than significant.
Explanation	Low lying non-native grasslands dominate the foreground, middle ground, and background. There are distant planted palm trees associated with industrial development.	Existing vegetation in the foreground and middle ground would be removed from the Project site in order to construct the Project. New vegetation is proposed, including a landscaping buffer with trees and shrubs, which would be used as screening. Additionally, fencing would be added to surround retention basin seen in foreground.		
Detail	The post- development views of vegetation from KOP-3 would be more varied, as compared to the pre-development views due to the proposed landscaping surrounding the buildings and incorporated within parking areas. Vegetation variability surrounding the Project site would be improved from pre-construction conditions.			
Water	1	1	0	Less than significant.
Explanation	No water is present on the site or in the vicinity.	The Project would introduce an on-site storm drainage system consisting of inlets, underground piping, and surface		

Sensitive Receptor: Residents and motorists on Airport Drive as they pass the Project site. Pre-development and post-development conditions are depicted in Figure 4.1-5				
		and underground basins.		
Detail	There are no natural water features on the Project site or within the surrounding area. The storm drainage system has not yet been designed but anticipates addition of a surface retention basin to accommodate a 100-year storm event. Final retention basin design would be enclosed and screened by perimeter fencing with earth-tone slats.			
Color	1	1	0	Less than significant.
Explanation	The existing landscape features shades of browns, yellows, and greens across the foreground and middle ground. Cool blues and whites span across the background which are associated with other industrial development.	Buildings would introduce metal and tempered glass, giving cool colors, with occasional muted concrete paneling. Newly paved parking loos would offer striking darker colors of asphalt and earthy tones associated with new vegetation barrier.		
Detail	The pre-construction coloring consists of bright yellows and greens in the foreground and cool blues and whites in the back ground. Note that foreground yellows and greens are seasonal, and would diminish in brightness through the season, turning golden and browns. Post-development views would introduce cool colors in the foreground from metal and tempered glass, giving with occasional muted concrete paneling. Newly paved parking lots would offer striking darker colors contrasted with earthy tones associated with new vegetation barrier. The views of colors would remain somewhat unchanged, where cooler colors would be introduced to the foreground to complement the cool colors from industrial development.			

Sensitive Receptor: Residents and motorists on Airport Drive as they pass the Project site. Pre-development and post-development conditions are depicted in Figure 4.1-5				
Adjacent Scenery	1	1	0	Less than significant.
Explanation	Scenery in the foreground consists mainly of grassland vegetation, with temporary signs and utilities visible adjacent to the roadway. The middle ground features a palm trees associated with industrial buildings, and associated structures.	Scenery in the foreground and middle ground would be changed to feature buildings, parking lots, and vegetation. The background would remain consistent, although most of the view would be blocked by the Project.		
Detail	The Project would display prominently in the middle ground, obstructing the background views from KOP-3. The foreground would be changed as well to accommodate landscaping and parking associated with the Project. The adjacent scenery has little to no influence on the overall visual quality.			
Scarcity	1	1	0	Less than significant.
Explanation	The available views are broad and there are no unique aspects from KOP-3. Similar views exist throughout the region.	Views would be modified by the Project's industrial development in the middle ground.		
Detail	Existing views offered from KOP-3 are typical of the area and are not particularly unusual or unique. Alteration of the landscape to accommodate the Project would not result in visually significant impacts to view scarcity.			
Cultural Modifications	1	1	0	Less than significant.
Explanation	Cultural modifications include roadway, residential apartment buildings, commercial, residential and industrial development, and a local airport.	Project related development includes construction of two industrial warehouse buildings and associated structures.		

Sensitive Receptor: Residents and motorists on Airport Drive as they pass the Project site. Pre-development and post-development conditions are depicted in Figure 4.1-5				
Detail	Existing cultural modifications are particularly prominent in the middle ground. While the foreground would experience modifications with the addition of the industrial warehouse buildings, the proposed development would be consistent with the surrounding cultural modifications, and therefore, would be less than significant.			
Totals	**7**	**8**	**1**	**Less than significant.**

KOP = Key Observation Point

Factors Reducing Visual Impacts

The following attributes of the Project and elements of existing conditions would reduce visual impacts of the Project:

- The Project site is generally flat, reducing the need for extensive grading and visible alteration of landforms.
- The lack of scenic designation of roads in the immediate Project area suggests that viewer sensitivity and expectation for scenic landscapes is reduced compared to places with higher visual quality.
- The facility buildings built as part of the Project would blend in with the colors found in the surrounding landscape.
- A landscape plan including any structural elements and planting materials would be developed for the Project area, in compliance with Kern County Zoning Ordinance, Chapter 19.86 – Landscaping.

Summary

The Project would introduce activities and buildings associated with industrial uses on the visual quality viewed by employees, motorists, and residents. While the MBGP designates surrounding uses for industrial, commercial, and residential uses, the combination of the zoning districts applicable to the Project (M-1 PD H), ensures the zone would be compatible with surrounding uses through development standards. The MBGP also contains policy (Land Use Policy 35) that includes the encouragement of upgrading the visual character through the implementation of landscaping and screening for industrial areas, in which the KOPs captured.

Based on the quantitative and qualitative review of visual quality completed for KOP-1, KOP-2, and KOP-3, as shown in Tables 4.1-5 through 4.1-7, the existing Project site would be considered to have an "average" visual quality using the BLM methodology described above. The impacts associated with the Project's visual modifications would dominate current views, but would not contrast with, or strongly degrade the visual character, in relation to the surrounding zoning, which led to a conclusion that the Project may have a significant impact unless mitigation measures are assigned.

While the Project would dominate current views, the implementation of mitigation measures **Mitigation Measures MM 4.1-1** through **MM 4.1-3** would further reduce visual impacts associated with the Project by ensuring consistency with the colors of the surrounding landscape, use of matte and nonglossy finishes, reducing visibility of Project features, and planting of native vegetation screening as part of an approved landscape planting plan (see Figure 3-6h and Figure 3-6i for draft Landscape Plans in Chapter 3, *Project Description*). The simulations provided in Figure 4.1-3 through Figure 4.1-5, clearly show visual changes resulting from the Project that would be considered a change in the visual environment from existing conditions from each KOP. With MBGP conformance and the implementation of **Mitigation Measures MM 4.1** through **MM 4.1-3**, the visual changes would conform with the surrounding industrial, commercial, residential, and transportation uses, and impacts to existing visual character and scenic quality from public views near the Project site would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measure** (**MM**) **4.1-1** through **MM 4.1-3** would be required.

MM 4.1-1: Prior to the issuance of building permits for the proposed project, the Project proponent/operator shall submit a proposed color scheme and treatment plan, for review and approval by the Kern County Planning and Natural Resources Department, that will ensure all project facilities blend in with the colors found in the surrounding landscape. All color treatments shall result in matte or nonglossy finishes.

MM 4.1-2: Prior to the issuance of building permits, site plans submitted for warehouse buildings located within 1,000 feet of the Boughton Drive and Airport Drive corridors shall include the following aesthetic features:

1. Rooftop screening features, such as a parapet or screening material, to create a visual screen for rooftop mechanical equipment.
2. Reflective metal shall not be used as exterior architectural elements on buildings immediately adjacent to Boughton Drive and Airport Drive.
3. Entry gates to the loading truck court must be positioned to allow a minimum of 50 feet of available stacking depth inside the property line. The stacking depth would increase by 70 feet for every 20 loading bays and beyond 50 loading bays, to the extent feasible.
4. Anti-idling signs must be installed at truck loading sites, the entrance to the development, and at all heavy-duty truck exit driveways directing drivers to the proper truck route.

MM 4.1-3: Prior to the issuance of building permits for any facilities on the Project site, the proponent/operator applicant shall submit to the Kern County Planning and Natural Resources Department for approval a landscape plan that complies with the Kern County Zoning Ordinance requirements in Chapter 19.86 - Landscaping.

The plan shall include:

a. Preparation by a licensed Landscape Architect;

b. California native, drought-tolerant plants;

c. An irrigation plan as required under the Kern County Zoning Ordinance 19.86.070;

d. A vegetation barrier shall be installed along the Boughton Drive and Airport Drive frontages of the Project site. The vegetation barrier shall consist of multiple rows of trees and shrubs, a 10-foot-high berm, a decorative wall, or a combination thereof. Final design shall be submitted for review and approval by the Director of the Planning and Natural Resources Department. The vegetation barrier shall:

    1. Be a minimum of 15 feet high (at full maturity) or a minimum of 3 feet above the decorative wall. The wall shall be between 6 and 8 feet high.
    2. Be a minimum 30-foot-wide perimeter buffer along any visible boundary from the Boughton Drive and Airport Drive;
    3. Achieve porosity between .5 to .9 at full maturity and shall maintain porosity during all seasons.
    4. Consist of multiple types of species to prevent plant mono-cultures. Use of coniferous trees, and/or trees comprised of waxy and/or hairy leaf surfaces with leaf and branch structure that provide increased surface areas is encouraged. Species composition shall include, but not be limited to, the following:

        a. Consist of evergreen, drought tolerant species of low biogenic emissions (e.g. low pollen, etc.), a minimum of 36-inch box size at time of installation and spaced no greater than 40 feet apart.

        b. One (1) tree having a minimum planting height of six (6) feet for every 40 lineal feet of buffer.

        c. Palm trees, deciduous trees, monocarpic and annual plants shall not be allowed to satisfy this requirement.

        d. Evergreen shrubs which reach a minimum height of four (4) to six (6) feet.

        e. Live ground cover consisting of low-height plants, or shrubs, or grass shall be planted in the portion of the landscaped area not occupied by trees or evergreen shrubs.

f. Bare gravel, rock, bark or other similar materials may be used, but are not a substitute for ground cover plantings, and shall be limited to no more than 25 percent of the required landscape area.

g. Consist of species that are native, non-invasive and non-poisonous.

5. Be maintained and consistent throughout all seasons and climatic conditions for the life of the Project. Vegetation maintenance for the vegetation barrier shall include tree and shrub replacement in the event of die-off, disease or damage due to accidents.

6. Maximum height shall be maintained to comply with the H (Airport Approach Height) District, Section 19.76.080 or within the specified maximum height limit for an approved Zone Variance that is active for this project.

7. Designed to preserve safe lines-of-sight and viewshed standards for drivers on the road.

8. Be installed prior to final occupancy.

9. After year 1 of planting, the Project proponent shall submit documentation to the Kern County Planning and Natural Resources Department indicating successful species survival and rate of porosity growth. This shall be achieved through photo documentation and/or reporting of maintenance logs and growth rates to be submitted each spring, preferably after shrubs have begun to leaf out, but, if necessary, could be conducted any time during the summer. Documentation shall be submitted each year for the first five (5) years or until the vegetation reaches maturity, whichever occurs first, in order for Kern County Planning and Natural Resources Department to confirm all growth has successfully reached maturity level.

e. Should perimeter fencing be proposed, fencing materials shall be constructed of any materials commonly used in the construction of fences and walls such as wood, stone, rock, tubular steel, wrought iron, or brick, or other durable materials. Masonry block walls shall be decorative and not bare masonry blocks. Decorative materials can include a façade, colored masonry blocks, or other materials. Fencing proposed around sumps shall be chain-link with view obscuring slats.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.1-1** through **MM 4.1-3**, impacts would be less than significant after mitigation.

Impact 4.1-4: The Project would create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.

Light and glare are defined by the Illuminating Engineering Society (IES) of North America as:

> ***Light*** *- Radiant energy that is capable of exciting the retina and producing a visual sensation in humans, and*
>
> ***Glare*** *- the sensation produced by luminance in the visual field that is sufficiently greater than the luminance to which the eye has adapted to cause annoyance, discomfort, or loss of visual performance and visibility (IES 2024).*

The Project site currently contains no sources of light or glare, and sources of illumination in the immediate surrounding area are limited in number and intensity. Lighting and glare impacts that would result from construction and operations of the Project are described below.

Construction

Lighting

The typical construction activities would occur from 7 a.m. to 8 p.m. Monday through Friday. While most construction activities would primarily occur during daytime hours, additional hours/days may be necessary to facilitate the schedule necessitating construction crews to use minimal illumination in order to perform work safely during construction outside of seasonal daytime hours or during nighttime work. All lighting used for construction would be shielded and directed downward to ensure lighting is focused on the work area only and prevent light spillage onto adjacent properties along Airport Drive. During construction, dawn-to-dusk security lighting may be required for temporary staging and parking areas, construction office trailer entries, and project access points. Per **Mitigation Measure MM 4.1-4**, a lighting plan would be prepared for review and approval by the Kern County Public Works Department to ensure any nighttime lighting and construction work would provide the minimum illumination needed to achieve safety and security objectives only, thereby minimizing adverse impacts to nearby residents along Airport Drive. Kern County Public Works Department inspectors will verify compliance with this mitigation measure during the implementation of the Project during regular site inspections. As a result, construction of the Project would result in less than significant lighting impacts.

Glare

While most construction activities would primarily occur during daytime hours, construction crews may need to use minimal illumination in order to perform work safely during construction outside of seasonal daytime hours or during nighttime work. Increased truck traffic related to transport of construction materials to the Project site would temporarily increase glare conditions during construction. However, this increase to glare would be minimal and temporary. Construction activity would occur on focused areas of the Project site as construction progresses and sources of glare would not be stationary for long periods of time. Therefore, construction of the Project would

not create a new source of substantial glare that would affect daytime views in the area and impacts would be less than significant.

Operations

Lighting

The Project site would be regularly illuminated at night due to the 24-hour, 365 day per year operations at the proposed facility. Permanent lighting at the Project site would be designed to provide the minimum illumination needed to achieve safety and security objectives. Additionally, lighting would be directed downward and shielded to focus illumination on the desired areas only and to minimize light trespass in accordance with applicable County requirements including Chapter 19.81 (Dark Skies Ordinance), as required with implementation of **Mitigation Measures MM 4.1-4.** With the implementation of **Mitigation Measures MM 4.1-4** and compliance with applicable local development standards and regulations, lighting impacts onto adjacent properties and roads during operations would be less than significant.

Glare

Potential new sources of glare include sunlight reflecting off glass surfaces on the proposed building design. The greatest instance of glare occurrence that could affect nearby sensitive receptors, such as the residences to the east across Airport Drive, would be in the morning hours, specifically during sunrise and late morning, when easterly sunlight reflects off of building windows, back onto such residences. With the implementation of **Mitigation Measure MM 4.1-1,** which requires the building to be finished and treated with matte and nonglossy finishes, and **Mitigation Measure MM 4.1-2,** which requires that reflective metal not be used as exterior architectural elements on buildings immediately adjacent to Boughton Drive and Airport Drive, the instances of glare would be minimized to a less than significant level.

The following mitigation measure would be implemented to reduce the level of significance.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.1.4, MM 4.1-2**, and **MM 4.1-4** would be required.

MM 4.1.4 Prior to issuance of building permits, the Project proponent shall demonstrate to Kern County Planning and Natural Resources Staff, through the submittal of a lighting plan, that the Project site will continuously comply with the applicable provisions of the Outdoor Lighting - Dark Skies Ordinance (Chapter 19.81 of the Kern County Zoning Ordinance) and shall be designed to provide the minimum illumination needed to achieve safety and security objectives. All lighting shall be directed downward and shielded to focus illumination on the desired areas only and avoid light trespass onto adjacent properties and roadways. Lenses and bulbs shall not extend below the shields.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.1-1, MM 4.1-2**, and **MM 4.1-4**, impacts would be less than significant after mitigation.

4.1.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

While the Project is located in unincorporated Kern County, it is regulated by the MBGP, which guides development between local jurisdictions for an area of 408 square miles. The geographic scope for cumulative visual and aesthetics impacts consists of a 6-mile radius from the Project area. The Projects considered in the cumulative analysis for this Project are described in Chapter 3*, Project Description*, Table 3-4, *Cumulative Projects*. There are no proposed projects within the 1-mile radius of the Project site. However, there are approximately 29 projects located within a 6-mile buffer and consist of office uses, retail, and other industrial uses, including warehouses, trucking facilities, logistics center, and truck stops. Combined, these have the potential to result in cumulative impacts to aesthetics when considered together with the Project, although obstructions of views would be approximately 1 mile or less due to the scale and nature of the facility and its inability to obstruct anything further than 1 mile.

There is no cumulative impact related to damaging scenic resources within a scenic highway, because there are no officially designated State or County Scenic Highways in the cumulative Project area.

Cumulative development in the area would consist of industrial uses, guided by the Land Use Element of the MBGP. Per the MBGP, cumulative industrial projects would be encouraged to utilize landscaping, such as the Project, to upgrade the visual character of these industrial areas. These design features would provide buffers and screened areas that ensure appropriate scale would be achieved at the pedestrian level for surrounding residential uses. While increased development of industrial uses would alter the landscape from the original form, the MBGP would ensure industrial uses would not clash with surrounding uses. Furthermore, reasonably foreseeable cumulative projects would go through project-level environmental review and would be held to the same standards as the Project. The incorporation of consistent colors of surrounding landscape and vegetation screening as required by **Mitigation Measures MM 4.1-1** through **MM 4.1-3** would further ensure visual quality is consistent with policies in the MBGP for industrial uses.

Impact 4.1-4 (Lighting and Glare) resulting from the Project can be reduced below a level of significance with the implementation of **Mitigation Measures MM 4.1-1**, **MM 4.1-2**, and **MM 4.1-4,** which introduce the requirements for a lighting plan, reduction of glossy or reflective surfaces, and requirement to follow Kern County's Dark Skies Ordinance.

The Project, in combination with other listed projects would be required to conform to the provisions of the MBGP and the respective general plans of neighboring jurisdictions, as needed. Policies within the MBGP considers the impact that industrial development may have on surrounding uses, specifically residential land uses to reduce impacts on light and unattractive buildings. Feasible projects would be required to adhere to these policies in industrial uses determined by the MBGP.

The cumulative industrial and manufacturing projects within Metropolitan Bakersfield area would change vacant lands to industrial and manufacturing uses and would potentially change the overall character; however, the MBGP requires such projects to implement various design features to upgrade the visual character of such uses. In addition to MBGP policies, similar to the Project, other projects would implement landscaped screens and lighting regulations, per **MM 4.1-1** through **MM 4.1-4** as to not clash with existing character. Therefore, with implementation of **Mitigation Measures MM 4.1-1** through **MM 4.1-4** in addition to development standards outlined within the Zoning Ordinance for the M-1 PD District, cumulative impacts would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.1-1** through **MM 4.1-4** would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.1-1** through **MM 4.1-4**, cumulative impacts would be less than significant after mitigation on the visual character of the area. Cumulative impacts would be less than significant on scenic vistas or resources and for light and glare.

Section 4.2

Agricultural and Forestry Resources

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Section 4.2

Agriculture and Forestry Resources

4.2.1 Introduction

This section of the Draft Environmental Impact Report (Draft EIR) describes the affected environment and regulatory setting regarding agriculture and forest resources. It also evaluates the impacts on agriculture and forestry resources that would result from the implementation of the proposed IPG Industrial Project (the Project) and includes mitigation measures that would reduce these impacts, if necessary.

This section is informed by the 2022 Kern County Agricultural Crop Report prepared by the Department of Agriculture and Measurement Standards and the California Department of Conservation (DOC) Farmland Mapping and Monitoring Program (FMMP).

4.2.2 Environmental Setting

Regional Setting

Kern County is California's third largest county, encompassing 8,161 square miles at the southern end of the Central Valley. Kern County has a history of agricultural operations with approximately 1,373 square miles of harvested agricultural land and 2,317 square miles of range land. The 2022 Total Agricultural Product Value produced in Kern County was $7,724,166,300 (**Table 4.2-1**), which is a decrease of 7.4% over the 2021 Agricultural Product Value ($8,341,294,840) (Kern County Department of Agriculture 2022). The top five commodities for 2022 were grapes, citrus, milk, almonds, and pistachios, which make up more than $5 billion (66%), of the Total Agricultural Product Value. The top 20 commodities make up 96% of the Total Value (Kern County Department of Agriculture 2022), as shown in **Table 4.2-1**.

Table 4.2-1: Agricultural Product Values for Kern County in 2022

Product	Total Value
Fruit and Nut Crops	$4,464,472,000
Field Crops and Rangeland	$397,032,000
Vegetable Crops	$1,141,127,000
Nursery Crops	$141,298,000
Industrial and Wood Crops	$34,853,000
Seed Crops	$8,428,300
Livestock and Poultry	$340,526,000
Livestock and Poultry Products	$1,092,651,000
Apiary Products	$103,779,000
TOTAL	**$7,724,166,300**

Source: Kern County Department of Agriculture 2022.

Kern County's agricultural areas face pressure to convert productive farmland to housing, industrial, and commercial development. Kern County's population is growing and, like many agriculturally based jurisdictions, it must balance urbanization with loss of farmland. The most recent data from 2018 to 2020 published by the California DOC Division of Land Resource Protection (DLRP) provides the acres of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and farmland of local importance that have been converted to nonagricultural use. **Table 4.2-2** lists the total number of Important Farmland acres in Kern County that decreased in all agricultural designations, except Unique Farmland and Grazing Land (DOC 2020a).

Table 4.2-2: Agricultural Land Acreage Changes from 2018 to 2020

Agricultural Designation	Total Acres 2018	Total Acres 2020	Acres Lost	Acres Gained	Total Acres Changed	Net Acres Changed
Prime Farmland	573,934	567,066	8,927	2,059	10,986	-6,868
Farmland of Statewide Importance	208,323	207,938	1,880	1,495	3,375	-385
Unique Farmland	91,770	93,710	1,139	3,079	4,218	1,940
Farmland of Local Importance	0	0	0	0	0	0
Important Farmland Subtotal	874,027	868,714	11,946	6,633	18,579	-5,313
Grazing Land	1,854,639	1,857,259	8,366	10,986	19,352	2,620
Agricultural Land Subtotal	2,728,666	2,725,973	20,312	17,619	37,931	-2,693

Source: California DOC 2020b.

According to the Kern Council of Governments (COG) in their *Regional Growth Forecast and Demographic Forecast 2024 to 2050 Growth Forecast Update* report (2024), projections show that Kern County's population will grow at a rate of 0.4%, from 911,607 people in 2024 to 1,020,272 people in 2050 (Kern COG 2024). The anticipated growth in population will likely play a role in the decrease in agricultural land in Kern County. However, it is important to note that the conversion of agricultural land is affected by numerous factors other than population growth and urban development. Actual production depends on commodity prices, water prices and supply, labor, the proximity of processing and distribution facilities, and pest management. Factors such as weather, trade agreements, and labor disputes can also affect decisions regarding what crops are grown and which lands go in and out of production.

Local Setting

The Project site is located on approximately 49.05 acres, comprised of two privately owned parcels, in the central portion of unincorporated Kern County, California. The Project site is approximately 1.7 miles north of the incorporated city of Bakersfield and approximately 3.1 miles east of the incorporated city of Shafter. The unincorporated community of Oildale directly abuts the east side of the Project site. The Project site is approximately 1.4 miles northeast of State Route (SR) 99. SR 99 and Merle Haggard Drive via Airport Drive provide regional access to the Project site. Local access to the Project site is via Airport Drive and Boughton Drive.

The Project site can be described as flat; however, outside of leveled fields and orchards, the area is better described as an uneven plain consisting of extensive alluvial fans, debris flow, and over-bank deposits. The valley floor's vegetation is predominated by modern cultigens and other non-native species, such as Russian thistle (tumbleweed) and grasses. The Project vicinity is characterized by industrial and commercial uses (for example, distribution, storage, and shipping centers), transportation, vacant land, and residential uses to the east of the Project site.

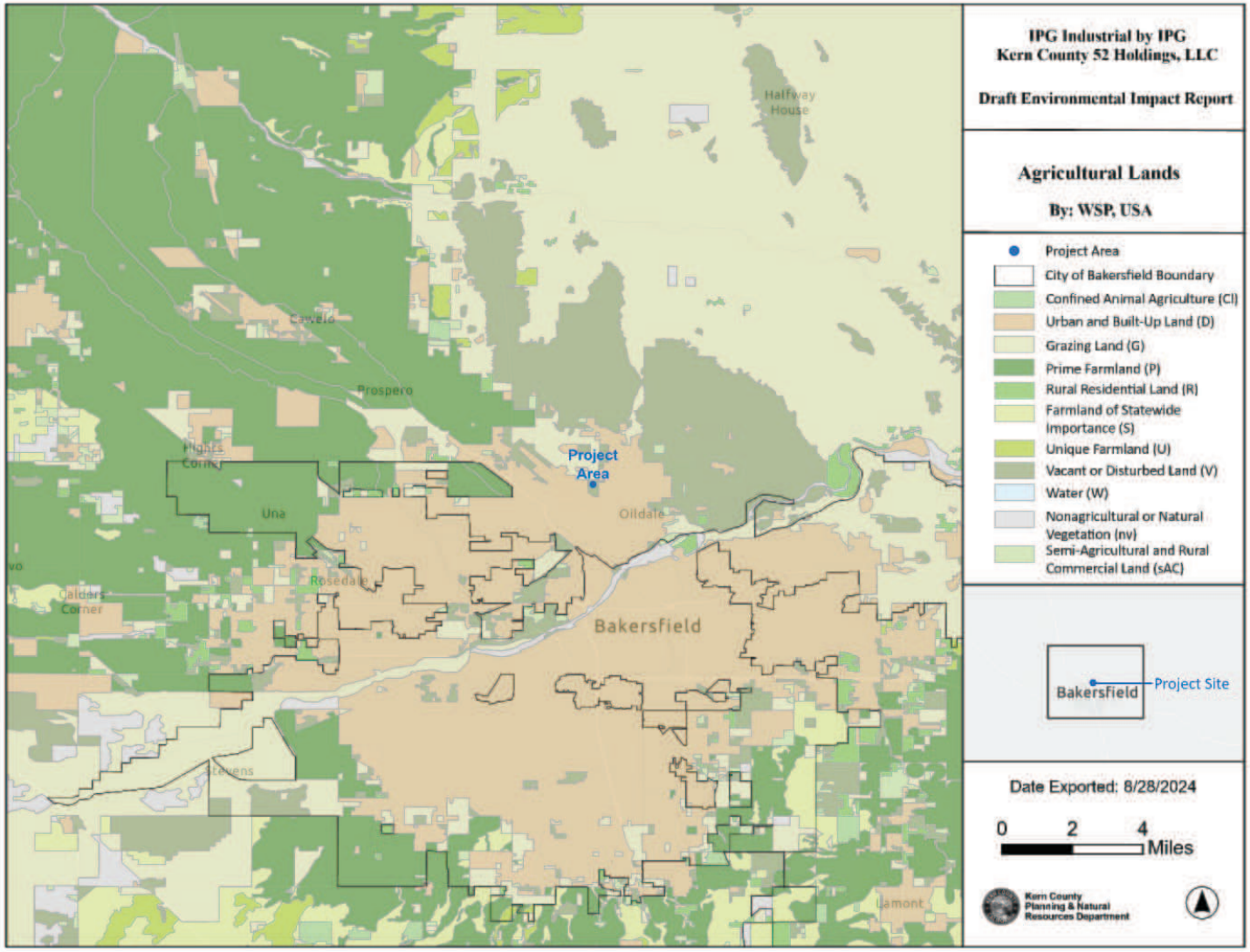
Adopted General Plan Land Use and Zoning

Kern County and the City of Bakersfield have jointly adopted the Metropolitan Bakersfield General Plan (MBGC) for the metropolitan area (City of Bakersfield and Kern County 2007). While the Project is located within unincorporated Kern County, it falls within the administrative boundaries of the MBGP planning document. The land use designation of the Project site is designated as LI (Light Industrial) and zoned as Light Industrial (M-1) – Precise Development (PD) Combining District – Airport Approach Height (H) District (M-1 PD H). The PD and H overlays on the M-1 base district allow for the combining of districts to ensure that development in these designated areas are compatible with surrounding land uses. The proposed Project is compatible with land use designation LI and zoning district M-1 PD H.

Important Farmland, Forest Land, and Williamson Act Contracts

As indicated in Chapter 3, *Project Description,* the Project site is not within an area that is designated by the California DOC as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. No lands within the Project boundary are subject to a Williamson Act Land Use contract. The Project site is not within a Farmland Security Zone contract, nor is the Project site situated on forest or timberland, as illustrated on **Figure 4.2-1**.

Figure 4.2-1 Agricultural Lands



4.2.3 Regulatory Setting

Federal

Farmland Protection Policy Act (7 United States Code Section 4201)

The Farmland Protection Policy Act (FPPA) minimizes federal programs' contributions to the unnecessary and irreversible conversion of farmland to nonagricultural uses. It also directs federal programs to be compatible with state and local policies to protect farmland. Congress passed the Agriculture and Food Act of 1981 (Public Law 97-98) containing the FPPA—Subtitle I of Title XV, Sections 1539-1549. The final rules and regulations were published in the Federal Register on June 17, 1994.

The FPPA minimizes the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It ensures that, to the extent possible, federal programs are administered to be compatible with state, local government, and private programs and policies to protect farmland. Federal agencies develop and review their policies and procedures to implement the FPPA every two years. The FPPA does not authorize the federal government to regulate the use of private or nonfederal land or, in any way affect property owner rights.

Under the FPPA, "farmland" includes Prime Farmland, Unique Farmland, and Farmland of Statewide or Local Importance. Farmland subject to FPPA requirements does not have to be used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency.

State

California Department of Conservation, Division of Land Resource Protection

The California DOC applies the Natural Resources Conservation Service soil classifications to identify agricultural lands. These agricultural designations are used to plan present and future California agricultural land resources. The DOC has a minimum mapping unit of 10 acres—parcels smaller than 10 acres are absorbed into the surrounding classifications.

The following list describes all the categories mapped by the DOC (DOC 2024).

- **Prime Farmland (P):** Farmland with the best combination of physical and chemical features able to sustain long-term production of agricultural crops. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been irrigated for production of irrigated crops at some time during the four years prior to the mapping date.

- **Farmland of Statewide Importance (S):** Farmland similar to prime Farmland that has a good combination of physical and chemical characteristics for the production of agricultural crops. This land has minor shortcomings, such as greater slopes or less ability to store soil moisture than Prime Farmland. Land must have been irrigated for production of irrigated crops at some time during the four years prior to the mapping date.
- **Unique Farmland (U):** Farmland of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.
- **Farmland of Local Importance (L):** Although counties may choose to define Farmland of Local Importance within their jurisdictions, the Board of Supervisors has determined that there will be no Farmland of Local Importance for Kern County (DOC 2018).
- **Grazing Land (G):** Land on which the existing vegetation is suited to the grazing of livestock. This category is used only in California and was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities.
- **Urban and Built-up Land (D):** Land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately six structures to a 10-acre parcel. This land is used for residential, industrial, commercial, construction, institutional, public administration, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.
- **Other Land (X):** Land not included in any other mapping category. Common examples include low-density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry, or aquaculture facilities; strip mines and borrow pits; and waterbodies smaller than 40 acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as other land.

  The Rural Land Mapping Project provides more detail on the distribution of various land uses within the Other land category in eight FMMP counties, encompassing all the San Joaquin Valley counties. The rural land categories include:

  - Rural Residential Land (R): Residential areas of one to five structures per 10 acres (ranchettes).
  - Semi-agricultural and Rural Commercial Land (SAC): Farmsteads, agricultural storage and packing sheds, unpaved parking areas, composting facilities, equine facilities, firewood lots, and campgrounds.
  - Vacant or Disturbed Land (V): Open field areas that do not qualify as an agricultural category, mineral and oil extraction areas, off-road vehicle areas, electrical substations, channelized canals, and rural freeway interchanges.

  - Confined Animal Agriculture (Cl): Poultry facilities, feedlots, dairy facilities, and fish farms; this use may be a component of farmland of local importance in some counties.
  - Nonagricultural or Natural Vegetation (nv): Heavily wooded, rocky/barren areas, riparian and wetland areas, grassland areas that do not qualify as grazing land due to their size of land management restrictions, small waterbodies, and recreational water ski lakes. Constructed wetlands are also included in this category.

- **Water (W):** Perennial waterbodies with an extent of at least 40 acres.

California Land Conservation Act (Williamson Act)

The Land Conservation Act of 1965, also known as the Williamson Act, is promulgated in California Government Code Section 51200-51297.4 and applies only to specific land parcels within California. The Williamson Act enables local governments to enter contracts with private landowners to restrict specific parcels of land to agricultural or compatible uses in return for reduced property tax assessments. Participation in the Williamson Act program depends on county adoption and implementation of the program and is voluntary for landowners.

Under the Williamson Act, a landowner commits the parcel to a 10-year period, during which time no conversion out of agricultural use is permitted. In return, the land is taxed at a rate based on the actual use (such as agricultural production), as opposed to its unrestricted market value. Each year the contract automatically renews unless a notice of nonrenewal or cancellation is filed. However, the application to cancel must be consistent with the criteria of the affected county or city. Nonrenewal or contract cancellation does not change a property's zoning. Participation in the Williamson Act program, which is voluntary for landowners, depends on a county's willingness to adopt and implement the program. The Williamson Act states that a board or council will, by resolution, adopt rules governing the administration of agricultural preserves. The rules of each agricultural preserve specify the allowed uses. Generally, any commercial agricultural use would be permitted within any agricultural preserve. In addition, local governments may identify compatible uses allowed under a permit (DOC 2023).

California Government Code Section 51238 states that, unless otherwise decided by a local board or council, the erection, construction, alteration, or maintenance of electric and communication facilities, as well as other facilities, are determined to be compatible uses within any agricultural preserve. In addition, Section 51238 states that the board of supervisors may impose conditions on lands or land uses to be placed within preserves to permit and encourage compatible uses, in conformity with Section 51238.1. Furthermore, under California Government Code Section 51238.1, a board or council may allow any use that without conditions or mitigations would otherwise be considered incompatible. However, this may occur only if that use meets the following conditions:

- The use would not significantly compromise the long-term agricultural capability of the subject contracted parcel or parcels on other contracted lands in agricultural preserves.

- The use would not significantly displace or impair current or reasonably foreseeable agricultural operations on the subject contracted parcel or parcels on other contracted lands in agricultural preserves. Uses that significantly displace agricultural operations may be deemed compatible if they relate directly to the production of commercial agricultural products on the subject contracted parcel or parcels or neighboring lands, including activities such as harvesting, processing, or shipping.
- The use would not result in the significant removal of adjacent contracted land from agricultural or open-space use.

Kern County has an active Williamson Act Land Use Contract Program with 1,650,556 acres of participating land in Kern County, of which 554,266 acres are designated as Prime Agricultural Farmland.

Farmland Security Zone Act

The Farmland Security Zone Act is similar to the Williamson Act and was passed by the California State Legislature in 1999 to ensure that long-term farmland preservation is part of public policy. Farmland Security Zone Act contracts are sometimes referred to as "Super Williamson Act Contracts." Under the provisions of this act, a landowner already under a Williamson Act contract can apply for Farmland Security Zone Act status by entering into a contract with the County. Farmland Security Zone Act classification automatically renews each year for an additional 20 years. In return for a 35% reduction in the taxable value of land and growing improvements (in addition to Williamson Act tax benefits), the property owner promises not to develop the property into nonagricultural uses.

Public Resources Code Section 21060.1

Public Resources Code Section 21060.1 uses the FMMP to define agricultural land to assess environmental impacts. The FMMP was established in 1982 to assess the location, quality, and quantity of agricultural lands and analyze the conversion of such lands. The FMMP provides an analysis of agricultural land use changes throughout California.

Local

Metropolitan Bakersfield General Plan

The City of Bakersfield is the largest incorporated area in Kern County and the focus of business activity in the county. As such, Kern County and the City of Bakersfield have jointly adopted a general plan to guide land use decisions and future development in the Metropolitan Bakersfield planning area, a planning area comprised of 409 square miles. The Project is subject to goals, policies, and implementation of the MBGP (City of Bakersfield and Kern County 2007). Applicable goals, policies and implementation are provided below.

The MBGP includes two designations for agricultural land:

- R-IA: Intensive agriculture, minimum 20-acre parcel size

- R-EA: Extensive agriculture, minimum 20-acre parcel size (Lands under Williamson Act, minimum 80-acre parcel size)

The policies, goals, and implementation measures in the MBGP for agricultural resources applicable to the Project are provided below.

Chapter II: Land Use Element

Goals

Goal 3: Accommodate new development which is compatible with and complements existing land uses.

Chapter V: Conservation/Soils and Agriculture

Goals

Goal 1: Provide for the planned management, conservation, and wise utilization of agricultural land in the planning area.

Goal 2: Promote soil conservation and minimize development of prime agricultural land as defined by the following criteria:

- Capability Class 1 and/or II irrigated soils
- 80-100 Storie Index rating
- Gross crop return of $200 or more per acre per year
- Annual carrying capacity of 1 animal unit per acre per year

Goal 3: Establish urban development patterns and practices that promote soil conservation and that protect areas of agricultural production of food and fiber crops, and nursery products.

Policies

Policy 1: Determine the extent and location of all prime agricultural land within the study area.

Policy 6: Continue implementing land grading ordinances that reduce soil erosion/siltation commonly associated with land development.

Policy 12: Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction.

Policy 13: Minimize the alteration of natural drainage and require development plans to include necessary construction to stabilize runoff and silt deposition through enforcement of grading and flood protection ordinances.

Kern County Zoning Ordinance

The Kern County Zoning Ordinance establishes basic regulations for land development. The basic intent of the Kern County Zoning Ordinance is to promote and protect public health, safety, and welfare via the orderly regulation of land uses throughout the unincorporated area of the county. The zoning ordinance applies to all property in unincorporated Kern County, except land owned by the United States or any of its agencies. Pursuant to state law, the zoning ordinance must be consistent with the appropriate general plan, in this instance the MBGP. Within the MBGP, the Project site has a Land Use Map Code of LI (Light Industrial), which is consistent with the existing zone classification of M-1 PD H (Light Industrial – Precise Development Combining – Airport Height Approach Combining) District. The base M-1 District contains the PD and H combining districts overlays to ensure that development in these designated areas are compatible with surrounding land uses. Applicability and purpose of each zoning district is discussed further in Section 4.11, *Land Use and Planning* of this EIR.

Williamson Act Standard Uniform Rules

Kern County has adopted a set of Agricultural Preserve Standard Uniform Rules that identify land uses that are considered compatible uses within agricultural preserves established under the Williamson Act. These rules are designed to restrict the uses of land enrolled in a Williamson Act contract to agriculture or other compatible uses. The Agricultural Preserve Standard Uniform Rules identify five classes of agricultural uses, including crop cultivation, grazing operations, commercial wind farms, livestock breeding, dairies, and uses that are incidental to agricultural uses allowed within the agricultural preserves. The Project site does not contain lands under an active Williamson Act contract and, therefore, is not subject to these rules.

4.2.4 Impacts and Mitigation Measures

Methodology

This section of the Draft EIR describes the potential impact of the Project on agriculture and forestry resources. The analysis was conducted based on a qualitative review and analysis of the Kern County Agricultural Crop Report, California DOC DLRP's Important Farmland Map, and Kern County's Williamson Act Map. In addition, the analysis of potential impacts is based on the MBGP's applicable goals and policies related to agricultural resources.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would have a significant impact on agricultural and forestry resources if it would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to non-agricultural use;
- Conflict with existing zoning for agricultural use or a Williamson Act contract;
- Conflict with existing zoning for, or cause rezoning of, forest land or timberland;

- Result in the loss of forest land or conversion of forest land to non-forest use;
- Involve other changes in the existing environment which, because of their location or nature, could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use; and
- Result in the cancellation to an open space contract made pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Contract for any parcel of 100 or more acres.

Project Impacts

Impact 4.2-1: The Project would Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use.

As previously stated in Section 4.2.2, and depicted on **Figure 4.2-1**, the Project site is not within any Prime Farmland, Unique Farmland, or Farmland of Statewide Importance designated areas. The Project site is classified as vacant or disturbed land, nonagricultural or natural vegetation, urban and built-up land, and semi-agricultural and rural commercial land by the DOC.

Neither the Project site or surrounding properties are remotely adjacent to land that is designated Prime, Unique or of Statewide Importance, therefore, no impacts relative to farmland conversion would occur, and no mitigation measures would be required.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

No impact would occur.

Impact 4.2-2: The Project would conflict with existing zoning for agricultural use or Williamson Act Contract.

As stated in Section 4.2.2, the Project site is zoned for industrial uses, and no Williamson Act contracts are present on the site.

Therefore, implementation of the Project would not be in conflict with existing agricultural zoning. No impact to existing agricultural zoning or Williamson Act contracts would occur, and therefore, no mitigation measures are required.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

No impact would occur.

Impact 4.2-3: The Project would conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)) or timberland (as defined in Public Resources Code Section 4526) or timberland zoned Timberland Production (as defined by Government Code Section 51104(g)).

The Project site's land use designation is LI (Light Industrial) and further zoned as Light Industrial (M-1) – Precise Development (PD) Combining District – Airport Approach Height (H) District (M-1 PD H). Per the land use designation and combined zoning district, the Project site is intended to be utilized for light industrial uses, per the MBGP. The Project site does not contain agricultural or forest resources to support timberland, forest land, or production of timber. The Project would not conflict with existing zoning for, or cause rezoning of, forest land or timberland, nor would it conflict with timber production.

Therefore, no impact would occur.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

No impact would occur.

Impact 4.2-4: The Project would result in the loss of forest land or conversion of forest land to non-forest use.

As described in Section 4.2.2, *Environmental Setting*, the Project area is characterized as vacant or disturbed land, nonagricultural or natural vegetation, urban and built-up land, and semi-agricultural and rural commercial land. Due to a lack of forest land on the site, the Project would not result a loss of forest land or conversion of forest land to non-forest use.

Therefore, no impacts would occur.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

No impact would occur.

Impact 4.2-5: The Project would involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forest land to non-forest use.

The Project site is not within an area used for, or that supports farmland or forest land. The Project site is made up of vacant or disturbed land which is zoned and designated for industrial uses. Therefore, Project implementation would not result in permanent changes to the environment that, due to location or nature, would result in conversion of farmland or forest land to nonagricultural use of non-forest use. No impacts would occur.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

No impact would occur.

Impact 4.2-6: The Project would result in the cancellation of an open-space contract made pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Contract for any parcel of 100 or more acres (Section 15206(b)(3)) Public Resources Code.

The Project site is not subject to an open-space contract made pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Act Contract. Therefore, the Project would not result in cancellation of any of the specified contracts, and no impact would occur.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

No impact would occur.

4.2.5 Cumulative Setting Impacts and Mitigation Measures

Cumulative Setting

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects located in the vicinity of the Project site. The projects considered in the cumulative analysis for this Project are described in Chapter 3*, Project Description*, **Table 3-3**: Cumulative Projects List. The geographic scope for cumulative agricultural and forestry impacts consists of Kern County.

Because the Project and other surrounding industrial projects do not consist of any forested areas or Kern County's agricultural zones, no impacts would occur, and no cumulatively considerable impacts to agricultural and forest land resources would result.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

No impact would occur.

Section 4.3

Air Quality

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Section 4.3
Air Quality

4.3.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding air quality. It also evaluates the short- and long-term air quality impacts associated with the development of the proposed IPG Industrial Project (Project) site, and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the May 23, 2024, Airport Drive Warehouse Air Quality Impact Analysis and Construction and Operational Health Risk Assessment prepared by Urban Crossroads, Inc. (Appendix B.1) The report was prepared in accordance with the 2006 Kern County Planning Department's Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports and the 2015 San Joaquin Valley Air Pollution Control District (SJVAPCD) (SJVAPCD 2015) Guidance for Assessing and Mitigating Air Quality Impacts. Other supporting SJVAPCD documents are included in Appendix B.4.

4.3.2 Environmental Setting

The California Air Resources Board (CARB) has divided California into regional air basins according to topographic drainage features. The Project area is located within Kern County's portion of the San Joaquin Valley Air Basin (SJVAB or Basin). Kern County is included among the eight counties that comprise the SJVAPCD. The SJVAPCD acts as the regulatory agency for air pollution control in the Basin and is the local agency empowered to regulate air pollutant emissions for the Project area. The Project site is approximately 1.7 miles north of the incorporated City of Bakersfield and approximately 3.1 miles east of the incorporated City of Shafter. The unincorporated community of Oildale directly abuts the east side of the Project site. The Project site is situated approximately 1.4 miles northeast of State Route (SR) 99.

Topography and Meteorology

Air pollution, especially the dispersion of air pollutants, is directly related to a region's topographic features. Air quality is a function of the rate and location of pollutant emissions and the meteorological conditions and topographic features that influence pollutant movement and dispersal. Atmospheric conditions such as wind speed, wind direction, atmospheric stability, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants, which affects ambient air quality.

The Project site is located on approximately 49.05 acres, comprised of two privately owned parcels, in the central portion of unincorporated Kern County, California. The Project site is located on the southwest corner of the intersection of Airport Drive and Boughton Drive in unincorporated Kern County. The site is bounded to the north by Boughton Drive and vacant/undeveloped land; to the

south by Skyway Drive and commercial buildings that provide services related to aircrafts; to the east by Airport Drive, residential area, and a storage provider business; and to the west by Hanger Way and Meadows Field Airport.

The SJVAB has an inland Mediterranean climate with warm, dry summers and relatively cool nights and cool winters with sparse rainfall. The most significant weather pattern within the San Joaquin Valley is the semi-permanent subtropical high-pressure cell, referred to as the "Pacific High." During the summer, the Pacific High is positioned near the coast of northern California and redirects storms originating from the ocean to the north, resulting in essentially rainless summer months. During the winter, the Pacific High moves southerly allowing storms to pass through the San Joaquin Valley, resulting in most precipitation during December through April. During the summer, the predominant surface winds travel from the northwest and enter the Valley through the Carquinez strait to flow towards the Tehachapi Mountains. This northwesterly wind flow is interrupted in early fall by the emergence of southeasterly winds which become progressively more prevalent as winter approaches. Wind speeds are generally highest during the spring and lightest in fall and winter. The cool air flowing through the Carquinez Strait is warmed as it travels southerly through the Valley. Once reaching the southern end of the Valley, the average high temperature during the summer is nearly 100 degrees Fahrenheit (°F) with relatively low humidity, causing large temperature variations throughout the day. Temperatures during the summer often drop into the upper 60s. In winter, the average high temperatures reach the mid-50s and the average low drops to the mid-30s. Snow and thunderstorms are infrequent.

Additionally, another high-pressure cell, known as the "Great Basin High" develops east of the Sierra Nevada Mountain Range during winter. When this cell is weak, a layer of cool, damp air becomes trapped in the basin, and extensive fog results. During inversions, a warm dry air mass sits over cooler air near the ground, essentially trapping the air mass below and adversely affecting regional air quality. Surface-based inversions, while shallow and typically short-lived, are present most mornings. Elevated inversions, while less frequent than ground-based inversions, are typically longer lasting and create more severe air stagnation problems. The winter season characteristically has the poorest conditions for vertical mixing of the entire year.

The distinctive climate of the Project area and the SJVAB is determined by its terrain and geographical location. The SJVAB is surrounded by mountains that restrict air movement and limit the dispersion of pollutants out of the basin. Wind patterns across this region are characterized by light northerly and northeasterly winds, with an average speed of seven miles per hour. In the summer, winds from the north flow south and southeasterly through the Valley, through the Tehachapi Pass and into the Southeast Desert Air Basin. In the late fall and winter, cold winds from the south flow northerly and northwesterly into the Valley. Wind speed and direction determine the dispersion of air pollutants (Urban Crossroads 2024).

Sensitive Receptors

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Land uses that can be considered sensitive receptors include residential communities, schools, playgrounds, childcare centers, athletic facilities, long-term healthcare facilities, rehabilitation centers, convalescent centers, and retirement homes. Sensitive individuals with compromised immune systems, such as children and the elderly, may be exposed to emissions from the construction and operation of the Project. Worker receptors refer to employees and locations where people work. Impacts on sensitive receptors are of particular concern because they are the people most vulnerable to the effects of air pollution.

Existing Air Quality

The SJVAPCD, CARB, National Park Service, and Santa Rosa Rancheria in Lemoore operate an extensive network of air monitoring stations in the San Joaquin Valley. The monitoring station network provides air quality monitoring data, including real-time meteorological data and ambient pollutant levels, as well as historical data. The network in the SJVAB consists of 38 monitoring stations, 11 of which are in western Kern County within the Project area (Appendix B.1).

Relative to the Project site, the nearest long-term air quality monitoring site for ozone (O_3) and particulate matter of 10 microns or less (PM_{10}) was obtained from the SJVAPCD Oildale-Manor Street monitoring station, located approximately 1.43 miles east of the Project site. Since data for $PM_{2.5}$ was unavailable, the next nearest long-term air quality monitoring site was obtained from the SJVAPCD Bakersfield-Golden State Highway monitoring station, located approximately 3.20 miles southeast of the Project site. Since data for nitrogen dioxide (NO_2) was unavailable, the next nearest long-term air quality monitoring site was obtained from the SJVAPCD Bakersfield-Westwind monitoring station, located approximately 3.48 miles south of the Project site.

Data from the Bakersfield-Golden State Highway and Bakersfield-Westwind monitoring stations were utilized only in instances where data was not available from the Oildale-Manor Street monitoring station.

The most recent three years of data available is shown in **Table 4.3-1**and identifies the number of days ambient air quality standards were exceeded for the study area, which is considered to be representative of the local air quality at the Project site. Data for O_3, NO_2, PM_{10}, and particulate matter of 2.5 microns or less ($PM_{2.5}$) was obtained using the CARB iADAM: Air Quality and Data Statistics and the Air Quality and Meteorological Information System. Data for sulfur dioxide (SO_2) has been omitted as attainment is regularly met and few monitoring stations measure SO_2 concentrations. It should be noted that the table below is provided for informational purposes.

Table 4.3-1: Existing Air Quality Monitoring Data in Project Area

Pollutant	Standard	Year		
		2020	2021	2022
Ozone				
Maximum Federal 1-Hour Concentration (ppm)		0.109	0.107	0.106
Maximum Federal 8-Hour Concentration (ppm)		0.096	0.095	0.090
Number of Days Exceeding Federal 1-Hour Standard	> 0.09 ppm	0	0	0
Number of Days Exceeding State 1-Hour Standard		3	6	4
Number of Days Exceeding Federal 8-Hour Standard	> 0.070 ppm	23	43	51
Number of Days Exceeding State 8-Hour Standard	> 0.075 ppm	24	46	54
Nitrogen Dioxide				
Maximum Federal 1-Hour Concentration	> 0.100 ppm	--	0.068	0.068
Maximum State 1-Hour Concentration	> 0.180 ppm	--	0.067	0.067
Annual Federal Standard Design Value		--	23	22
Annual State Standard Design Value		--	--	22
Number of Days Exceeding Federal 1-Hour Standard	> 0.100 ppm	0	0	0
Number of Days Exceeding State 1-Hour Standard	> 0.18 ppm	0	0	0
Particulate Matter of 10 Microns or Less				
Maximum Federal 24-Hour Concentration (µg/m^3)	> 150 µg/m^3	517.2	421.4	149.4
Annual Federal Arithmetic Mean (µg/m^3)		57.3	50.0	44.9
Number of Days Exceeding Federal 24-Hour Standard	> 150 µg/m^3	17	2	0
Particulate Matter of 2.5 Microns or Less				
Maximum Federal 24-Hour Concentration (µg/m^3)	> 35 µg/m^3	150.2	78.5	58.6
Maximum State 24-Hour Concentration (µg/m^3)		150.2	78.5	58.6
Annual Federal Arithmetic Mean (µg/m^3)	>12 µg/m^3	19.4	17.8	16.6
Annual State Arithmetic Mean (µg/m^3)	>12 µg/m^3	--	--	--
Number of Samples Exceeding Federal 24-Hour Standard	> 35 µg/m^3	34	46	36

Source: Urban Crossroads 2024.

Notes: California Air Resource Board iADAM: Air Quality Data Statistics and Air Quality and Data Statistics and the Air Quality and Meteorological Information System.

-- = data not available

µg/m^3 = microgram per cubic meter

ppm = parts per million

Ambient Air Quality Standards

National and State Ambient Air Quality Standards

Regulation of air pollution is achieved through both federal and state ambient air quality standards and permitted emission limits for individual sources of air pollutants. As required by the federal Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) has identified criteria pollutants and has established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. NAAQS have been established for O_3, carbon monoxide (CO), NO_2, SO_2, particulate matter (specifically PM_{10} and $PM_{2.5}$), and lead. These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria.

To protect human health and the environment, the EPA has set "primary" and "secondary" ambient standards for each of the criteria pollutants. Primary thresholds were set to protect human health, particularly sensitive receptors, such as children, the elderly, and individuals suffering from chronic lung conditions, such as asthma and emphysema. Secondary standards were set to protect the natural environment and prevent further deterioration of animals, crops, vegetation, and buildings.

Regional and Local Standards

NAAQS establish the level for an air pollutant above which detrimental effects to public health or welfare may result. NAAQS are defined as the maximum acceptable concentrations that, depending on the pollutant, may not be equaled or exceeded more than once per year or in some cases as a percentile of observations. California has generally adopted more stringent ambient air quality standards for the criteria air pollutants (i.e., California Ambient Air Quality Standards [CAAQS]). California has also established CAAQS for sulfates, hydrogen sulfide, and vinyl chloride; however, air emissions of these pollutants are not expected to occur under the Project and, thus, these pollutants are not addressed further in this Draft EIR.

Table 4.3-2 presents both sets of ambient air quality standards (e.g., national and State). If a pollutant concentration in an area is lower than the established standard, the area is classified as being in "attainment" for that pollutant. If the pollutant concentration meets or exceeds the standard (depending on the specific standard for the individual pollutants), the area is classified as a "nonattainment" area. If there are not enough data available to determine whether the standard is exceeded in an area, the area is designated "unclassified."

Table 4.3-2: National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [b, e]	National Standards [a, e]	
			Primary[c]	Secondary[d]
Ozone (O_3)	1-Hour	0.09 ppm (180 µg/m^3)	---[f]	---
	8-Hour	0.070 ppm (137 µg/m^3)	0.070 ppm (147 µg/m^3)	Same as Primary Standard
Carbon monoxide (CO)	1-Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	---
	8-Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	---
Nitrogen dioxide (NO_2)	1-Hour	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3)	---
	Annual Mean	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary Standard
Sulfur dioxide (SO_2)[g]	1-Hour	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3)	---
	3-Hour	---	---	0.5 ppm (1,300 µg/m^3)
	24-Hour	0.04 ppm (105 µg/m^3)	---	---
Respirable Particulate Matter (PM_{10})[h]	24-Hour	50 µg/m^3	150 µg/m^3	Same as Primary Standard

Pollutant	Averaging Time	California Standards [b, e]	National Standards [a, e]	
			Primary[c]	Secondary[d]
	Annual Mean	20 µg/m^3	---	---
Fine Particulate Matter ($PM_{2.5}$)[h]	24-Hour	---	35 µg/m^3	Same as Primary Standard
	Annual Mean	12 µg/m^3	9.0 µg/m^3	15 µg/m^3
Lead (Pb)	30-day Average	1.5 µg/m^3		
	Rolling 3-month Average		0.15 µg/m^3	Same as Primary Standard
Hydrogen sulfide (H_2S)	1-Hour	0.03 ppm (42 µg/m^3)	No Federal Standards	
Sulfates (SO_4^{2-})	24-Hour	25 µg/m^3		
Visibility reducing particles	8-Hour	See Note (i)		
Vinyl chloride[j]	24-Hour	0.01 ppm (26 µg/m^3)		

Sources: CARB 2016; EPA 2024;

Notes:

[a] National Ambient Air Quality Standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth-highest 8-hour concentration in a year, averaged over three years, is equal to or less than the standard. For particulate matter less than 10 microns (PM_{10}), the 24-hour standard is not to be exceeded more than once per year on average over three years. The 24-hour standard is attained when the three-year average of the weighted annual mean at each monitor within an area does not exceed 150 µg/m^3. For particulate matter less than 2.5 microns ($PM_{2.5}$), the 24-hour standard is attained when 98% of the daily concentrations, averaged over three years, do not exceed 35 µg/m^3. The annual standard is attained when the three-year average of the weighted annual mean at single or multiple community-oriented monitors does not exceed 12 µg/m^3.

[b] California Ambient Air Quality Standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (SO_2; 1- and 24-hour), nitrogen dioxide (NO_2), PM_{10} and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded.

[c] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[d] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse impacts of a pollutant

[e] Concentration expressed first in units in which it was promulgated. Parts per million (ppm) in this table refers to ppm by volume or micromoles of pollutant per mole of gas.

[f] The federal 1-hour ozone standard was revoked for most areas of the United States, including all of California on June 15, 2005.

[g] Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in that same rulemaking.

[h] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m^3 to 12 µg/m^3. Existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m^{3}also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over three years.

[i] In 1989, the California Air Resources Board converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

[j] The California Air Resources Board has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health impacts determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Key:

ppb = parts per billion

ppm = parts per million

µg/m^3 = micrograms per cubic meter

mg/m^3 = milligrams per cubic meter

Air Quality Attainment Planning

Currently, the NAAQS and CAAQS are exceeded in most parts of the SJVAB. For the NAAQS, the Project region within the SJVAB is in nonattainment for O_3 (8-hour) and $PM_{2.5}$. For the CAAQS, the Project region within the SJVAB is in nonattainment for O_3 (1-hour and 8-hour), PM_{10}, and $PM_{2.5}$. In response, the SJVAPCD has adopted a series of Air Quality Attainment Plans (AQAPs) to meet the state and federal ambient air quality standards (SJVAPCD 2024a). AQAPs are updated regularly to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy.

The SJVAPCD's attainment status with the federal and State standards, for each pollutant, is summarized in **Table 4.3-3.**

Table 4.3-3: Attainment Status for the San Joaquin Valley Air Pollution Control District

Pollutant	Designation/Classification	
	Federal	State
Ozone – 1-hour	Revoked [a]	Nonattainment/Severe
Ozone – 8-hour	Nonattainment/Extreme[b]	Nonattainment
PM_{10}	Attainment[c]	Nonattainment
$PM_{2.5}$	Nonattainment[d]	Nonattainment
Carbon monoxide (CO)	Attainment/Unclassified	Attainment/Unclassified
Nitrogen dioxide (NO_2)	Attainment/Unclassified	Attainment
Sulfur dioxide (SO_2)	Attainment/Unclassified	Attainment
Lead (Pb)	No Designation/Classification	Attainment
Hydrogen sulfide (H_2S)	No Federal Standard	Unclassified
Sulfates (SO_4^{2-})	No Federal Standard	Attainment
Visibility reducing particulate	No Federal Standard	Unclassified
Vinyl Chloride	No Federal Standard	Attainment

Source: SJVAPCD 2004a

Notes:

[a] Even though the U.S. Environmental Protection Agency (EPA), revoked the federal 1-hour ozone standard, including associated designations and classifications in 2005, the EPA had previously classified the San Joaquin Valley Air Basin (SJVAB) as extreme nonattainment for this standard. The EPA approved the 2004 Extreme Ozone Attainment Demonstration Plan on March 8, 2010. Many applicable requirements for extreme 1-hour ozone nonattainment areas continue to apply to the SJVAB.

[b] Though the San Joaquin Valley was initially classified as serious nonattainment for the 1997 8-hour ozone standard, the EPA approved reclassification to extreme nonattainment in the Federal Register on May 5, 2010.

[c] On September 25, 2008, the EPA redesignated the San Joaquin Valley to attainment for the PM_{10} standard and approved the PM_{10} Maintenance Plan.

[d] The San Joaquin Valley is designated nonattainment for the 1997 and 2006 $PM_{2.5}$ standard.

Key:

PM_{10} = particulate matter less than 10 microns

$PM_{2.5}$ = particulate matter less than 2.5 microns

Criteria Air Pollutants

For the protection of public health and welfare, the federal CAA requires that the EPA establish NAAQS for various pollutants. These pollutants are referred to as "criteria" pollutants because the EPA publishes criteria documents to justify the choice of standards. These standards define the maximum amount of an air pollutant that can be present in ambient air. An ambient air quality standard is generally specified as a concentration averaged over a specific time period, such as 1 hour, 8 hours, 24 hours, or 1 year. The different averaging times and concentrations are meant to protect against different exposure effects. Standards established for the protection of human health are referred to as primary standards; whereas, standards established for the prevention of environmental and property damage are called secondary standards. The FCAA allows states to adopt additional or more health-protective standards. The air quality regulatory framework and ambient air quality standards are discussed in greater detail later in this report.

The following provides a summary discussion of the primary and secondary criteria air pollutants of primary concern. In general, primary pollutants are directly emitted into the atmosphere, and secondary pollutants are formed by chemical reactions in the atmosphere.

The following is a description of criteria air pollutants, typical sources, health effects, and current conditions.

Ozone

Ozone occurs in two layers of the atmosphere. The layer surrounding the earth's surface is the troposphere. At ground level, tropospheric, or "bad," ozone is an air pollutant that damages human health, vegetation, and many common materials. Ozone is a key ingredient of urban smog. The troposphere extends to a level approximately 10 miles above ground level, where it meets the second layer, the stratosphere. The stratospheric, or "good," ozone layer extends upward from approximately 10 to 30 miles and protects life on earth from the sun's harmful ultraviolet rays.

"Bad" ozone is what is known as a photochemical pollutant, which needs the combination of reactive organic gases (ROG) and oxides of nitrogen (NO_X), in the presence of sunlight to form. ROG and NO_X are emitted from various sources throughout Kern County. Significant ozone formation generally requires an adequate amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight. To reduce ozone concentrations, it is necessary to control the emissions of these ozone precursors.

Ozone is a regional air pollutant, which is generated over a large area and transported and spread by the wind. As the primary constituent of smog, ozone is the most complex, difficult to control, and pervasive of the criteria pollutants. Unlike other pollutants, it is not emitted directly into the air by specific sources but is created by sunlight acting on other air pollutants (the precursors), specifically NO_X and ROG. Sources of precursor gases number in the thousands and include common sources such as consumer products, gasoline vapors, chemical solvents, and combustion byproducts of various fuels. Originating from gas stations, motor vehicles, large industrial facilities, and small businesses such as bakeries and dry cleaners, the ozone-forming chemical reactions often take place in another location, catalyzed by sunlight and heat. Thus, high ozone concentrations can

form over large regions when emissions from motor vehicles and stationary sources are carried hundreds of miles from their origins.

Reactive Organic Gases and Volatile Organic Compounds

Hydrocarbons are organic gases that are formed solely of hydrogen and carbon. There are several subsets of organic gases including ROGs and volatile organic compounds (VOCs), which include all hydrocarbons, except those exempted by CARB. Therefore, ROGs are a set of organic gases based on state rules and regulations. VOCs are similar to ROGs in that they include all organic gases, except those exempted by federal law. Both VOCs and ROGs are emitted from the incomplete combustion of hydrocarbons or other carbon-based fuels. Combustion engine exhaust, oil refineries, and oil-fueled power plants are the primary sources of hydrocarbons. Another source of hydrocarbons is evaporation from petroleum fuels, solvents, dry cleaning solutions, and paint.

Carbon Monoxide

Mobile and stationary sources emit CO as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. CO is an odorless, colorless, poisonous gas that is highly reactive. CO is a byproduct of motor vehicle exhaust, which contributes more than 66% of all CO emissions nationwide. In cities, automobile exhaust can cause as much as 95% of all CO emissions. These emissions can result in high concentrations of CO, particularly in local areas with heavy traffic congestion. Other sources of CO emissions include industrial processes and fuel combustion in sources such as boilers and incinerators. Despite an overall downward trend in concentrations and emissions of CO, some metropolitan areas still experience high levels of CO. High CO concentrations develop primarily during winter when periods of light winds combine with the formation of ground level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

Oxides of Nitrogen

NO_X are a family of highly reactive gases that are a primary precursor to the formation of ground level ozone and react in the atmosphere to form acid rain. NO_X is emitted from solvents and combustion processes in which fuel is burned at high temperatures, principally motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. In terms of NO_X emissions, the two principal species of NO_X are nitric oxide (NO) and nitrogen dioxide (NO_2), with the vast majority (95%) of the NO_X emissions being comprised of NO. NO is converted to NO_2 by several processes, the two most important of these are: (1) the reaction of NO with ozone; and (2) the photochemical reaction of NO with hydrocarbons. A brownish gas, NO_X is a strong oxidizing agent that reacts in the air to form corrosive nitric acid as well as toxic organic nitrates.

Sulfur Dioxide

Sulfates are the fully oxidized ionic form of sulfur. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates takes place comparatively rapidly and completely in urban areas of California because of regional meteorological features.

SO_2 is a colorless, irritating gas with a "rotten egg" smell that is formed primarily by the combustion of sulfur-containing fossil fuels. Historically, SO_2 was a pollutant of concern in Kern County, but with the successful implementation of regulations, levels have been reduced significantly.

Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter (PM) pollution consists of very small liquid and solid particles floating in the air. Some particles are large and dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. PM is a mixture of materials that can include smoke, soot, dust, salt, acids, and metals. PM also forms when gases emitted from motor vehicles and industrial sources undergo chemical reactions in the atmosphere. PM or airborne dusts are the small particles that remain suspended in the air for long periods of time. Particulates of concern are those that are 10 microns or less in diameter (PM_{10}) and 2.5 microns or less in diameter ($PM_{2.5}$). Thus, $PM_{2.5}$ is a subset of PM_{10}. PM_{10} and $PM_{2.5}$ are small enough to be inhaled, pass through the respiratory system and lodge in the lungs, possibly leading to adverse health effects.

The composition of PM_{10} and $PM_{2.5}$ can vary greatly with time, location, the sources of the material and meteorological conditions. Dust, sand, salt spray, metallic and mineral particles, pollen, smoke, mist, and acid fumes are the main components of PM_{10} and $PM_{2.5}$. In addition to those listed previously, secondary particles can also be formed as precipitates from photochemical reactions of gaseous SO_2 and NO_X in the atmosphere to create sulfates (SO_4) and nitrates (NO_3), respectively. Secondary particles are of greatest concern during the winter months when low inversion layers tend to trap the precursors of secondary particulates.

In the western United States, there are sources of PM_{10} in both urban and rural areas. PM_{10} and $PM_{2.5}$ are emitted from stationary and mobile sources, including diesel trucks and other motor vehicles; power plants; industrial processes; wood-burning stoves and fireplaces; wildfires; dust from roads, construction, landfills, and agriculture; and fugitive windblown dust. Because particles originate from a variety of sources, their chemical and physical compositions vary widely.

Lead

Lead is a metal that is a natural constituent of air, water, and the biosphere. Lead is neither created nor destroyed in the environment, so it essentially persists forever. Historically, lead was used to increase the octane rating in automobile fuel. However, because gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels and that use has been mostly phased out, the ambient concentrations of lead have dropped dramatically.

Other Pollutants

Sulfates

Sulfates (SO_4^{2-}) are particulate product that comes from the combustion of sulfur-containing fossil fuels. When sulfur monoxide or SO_2 is exposed to oxygen, it precipitates out into sulfates (SO_3 or SO_4).

Sulfates are the fully oxidized ionic form of sulfur. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates takes place comparatively rapidly and completely in urban areas of California because of regional meteorological features.

Hydrogen Sulfide

Hydrogen sulfide (H_2S) is associated with geothermal activity, oil and gas production, refining, sewage treatment plants, and confined animal feeding operations. H_2S in the atmosphere would likely oxidize into SO2 that can lead to acid rain. At low concentrations H_2S, which has a characteristic "rotten egg" smell, may cause irritation to the eyes, mucous membranes and respiratory system, dizziness and headaches. In high concentrations (800 parts per million [ppm] can cause death) hydrogen sulfide is extremely hazardous, especially in enclosed spaces. Occupational Safety and Health Administration (OSHA) has the primary responsibility for regulating workplace exposure to H_2S.

Vinyl Chloride

Vinyl chloride monomer is a sweet-smelling, colorless gas at ambient temperature. Landfills, publicly owned treatment works, and polyvinyl chloride (PVC) production are the major identified sources of vinyl chloride emissions in California. PVC can be fabricated into several products, such as PVC pipes, pipe fittings, and plastics.

Toxic Air Contaminants

Hazardous air pollutants (HAPs) is a term used by the federal CAA that includes a variety of pollutants generated or emitted by industrial production activities. Called toxic air contaminants (TACs) under California law (see Health and Safety Code §§ 39650 et seq.), 10 pollutants have been identified through ambient air quality data as posing the most substantial health risk in California. Direct exposure to all of these pollutants has been shown to cause cancer, birth defects, damage to the brain and nervous system, and respiratory disorders. CARB provides emission inventories for TACs for only the larger air basins in the state. Emissions from the 10 TACs in the SJVAB 2023 Annual Report are presented in **Table 4.3-4.** This covers eight counties, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and the San Joaquin Valley Air Basin portion of Kern.

Table 4.3-4: 2023 Toxics Emissions Summary for the Eight Counties (tons per year)

Toxic Air Contaminant	Emissions (tons/year)
Acetaldehyde	3,512
Diesel particulate matter	2,520
Formaldehyde	2,318
Benzene	1,020
Perchloroethylene	448
1,3-Butadiene	269
Methylene chloride	247
Polyaromatic hydrocarbons	238
Manganese	217
Acrolein	153
p-Dichlorobenzene	130
Styrene	96
Trichloroethylene	46
Chromium	34
Lead	28
Nickel	18
Acrylonitrile	7
Vinyl Chloride	7
Arsenic	5
Cadmium	3
Mercury	2
Chloroform	2
Ethylene Oxide	0
Ethylene Dichloride	0
Beryllium	0
Carbon Tetrachloride	0
Dioxins/Benzofurans	0
Chromium, Hexavalent	0

Source: SJVAPCD 2024.

Sources include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. TACs do not have ambient air quality standards. Since no safe levels of TACs can be determined, there are no air quality standards for TACs. Instead, TAC impacts are evaluated by calculating the health risks associated with a given exposure. The requirements of the Air Toxic "Hot Spots" Information and Assessment Act apply to facilities that use, produce, or emit toxic chemicals. Facilities subject to the toxic emission inventory requirements of the Act must prepare and submit toxic emission inventory plans and reports to the ARB and periodically update those reports. While TACs do result in potential health risks for those exposed, the Project would not emit TACs except Diesel Particulate Matter (DPM), which, therefore, is the only TAC described further in this analysis.

Diesel Particulate Matter

DPM is emitted from both mobile and stationary sources. In California, on-road diesel-fueled engines contribute approximately 24% of the Statewide total, with an additional 71% attributed to other mobile sources such as construction and mining equipment, agricultural equipment, and transport refrigeration units. Stationary sources contribute about 5% of total DPM.

Health Effects and Risks of Criteria Pollutants

Ozone

While ozone in the upper atmosphere protects the earth from ultraviolet rays, high concentrations of ground-level ozone can adversely affect the human respiratory system. Many respiratory ailments, as well as cardiovascular diseases, are aggravated by exposure to high ozone levels.

Ozone is a powerful oxidant—it can be compared to household bleach, which can kill living cells (such as germs or human skin cells) upon contact. Ozone can damage the respiratory tract, causing inflammation and irritation, and it can induce symptoms such as coughing, chest tightness, shortness of breath, and worsening of asthmatic symptoms. Ozone in sufficient doses increases the permeability of lung cells, rendering them more susceptible to toxins and microorganisms. Exposure to ozone levels above the current ambient air quality standard leads to lung inflammation, lung tissue damage, and a reduction in the amount of air inhaled into the lungs. Health effects include potential increased susceptibility to respiratory infections and reduced ability to exercise. Health effects are more severe in people with asthma and other respiratory ailments. People who work or play outdoors are at a greater risk for harmful health effects from ozone. Children and adolescents are also at greater risk because they are more likely than adults to spend time engaged in vigorous activities. Research indicates that children under 12 years of age spend nearly twice as much time outdoors daily than adults. Teenagers spend at least twice as much time as adults in active sports and outdoor activities. Also, children inhale more air per pound of body weight than adults, and they breathe more rapidly than adults. Children are less likely than adults to notice their own symptoms and avoid harmful exposures. Elevated ozone concentrations also reduce crop and timber yields, damage native plants, and damage materials such as rubber, paints, fabric, and plastics (ARB and American Lung Association of California 2007).

Reactive Organic Gases and Volatile Organic Compounds

The primary health effects of hydrocarbons result from the formation of ozone and its related health effects (see the ozone health effects discussion above). High levels of hydrocarbons in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen through displacement. There are no separate federal or CAAQS for ROG. Carcinogenic forms of ROG are considered TACs. An example is benzene, which is a carcinogen. The health effects of individual ROGs are described under the “Toxic Air Contaminants” heading below.

Carbon Monoxide

When inhaled, CO enters the bloodstream and binds more readily to hemoglobin, the oxygen-carrying protein in blood, than oxygen, thereby reducing the oxygen-carrying capacity of blood and reducing oxygen delivery to organs and tissues. The health threat from CO is most serious for those who suffer from cardiovascular disease. Healthy individuals are also affected but only at higher levels of exposure. Exposure to CO can cause chest pain in heart patients, headaches, and reduced mental alertness. At high concentrations, CO can cause heart difficulties in people with chronic diseases and can impair mental abilities. Exposure to elevated CO levels is associated with visual impairment, reduced work capacity, reduced manual dexterity, poor learning ability, difficulty performing complex tasks, and, with prolonged enclosed exposure, death.

The adverse health effects associated with exposure to ambient and indoor concentrations of CO are related to the concentration of carboxyhemoglobin in the blood. Exposure to elevated concentrations of CO weaken the heart's contractions and lowers the amount of oxygen carried by the blood. Health effects observed may include an early onset of cardiovascular disease; behavioral impairment; decreased exercise performance of young, healthy men; reduced birth weight; sudden infant death syndrome; and increased daily mortality rate (Fierro et al. 2001).

Oxides of Nitrogen

NO_X is an ozone precursor that combines with ROG to form ozone. See the ozone section above for a discussion of the health effects of ozone. Direct inhalation of NO_X can cause a wide range of health effects. Health effects of NO_X include lung irritation, lung damage, and lowered resistance to respiratory infections such as influenza. Short-term exposures (e.g., less than 3 hours) to low levels of NO_2 may lead to changes in airway responsiveness and lung function in individuals with pre-existing respiratory illnesses. These exposures may also increase respiratory illnesses in children. Long-term exposures to NO_2 may lead to increased susceptibility to respiratory infection and may cause irreversible lung damage. Other health effects associated with NO_2 are an increase in the incidence of chronic bronchitis and lung irritation. Chronic exposure to NO_2 may lead to eye and mucus membrane aggravation, along with pulmonary dysfunction. Clinical studies of human subjects suggest that NO_2 exposure to levels near the current standard may worsen the effect of allergens in allergic asthmatics, especially in children. Epidemiological studies have also shown associations between NO_2 concentrations and daily mortality from respiratory and cardiovascular causes as well as hospital admissions for respiratory conditions.

NO_X contributes to a wide range of environmental effects both directly and indirectly when combined with other precursors in acid rain and ozone. NO_X can cause fading of textile dyes and additives, deterioration of cotton and nylon, and corrosion of metals due to the production of particulate nitrates. Airborne NO_X can also impair visibility. Increased nitrogen inputs to terrestrial and wetland systems can lead to changes in plant species composition and diversity. Similarly, direct nitrogen inputs to aquatic ecosystems such as those found in estuarine and coastal waters can lead to eutrophication (a condition that promotes excessive algae growth, which can lead to a severe depletion of dissolved oxygen and increased levels of toxins harmful to aquatic life). Nitrogen, alone or in acid rain, also can acidify soils and surface waters. Acidification of soils causes the loss of essential plant nutrients and increased levels of soluble aluminum, which is toxic to plants.

Acidification of surface waters creates conditions of low pH and levels of aluminum that are toxic to fish and other aquatic organisms. NO_X also contributes to visibility impairment (CAPCOA 2019).

Sulfur Dioxide

High concentrations of SO_2 can result in temporary breathing impairment for asthmatic children and adults who are active outdoors. Health effects from exposure to emissions of SO_2 include aggravation of lung diseases, especially bronchitis, and constricting of breathing passages, especially in asthmatics and people involved in moderate to heavy exercise. Short-term exposures of individuals to elevated SO_2 levels during moderate activity may result in health effects including breathing difficulties that can be accompanied by symptoms such as wheezing, chest tightness, or shortness of breath. Other health effects that have been associated with longer-term exposures to high concentrations of SO_2, in conjunction with high levels of particulate matter, include aggravation of existing cardiovascular disease, respiratory illness, and alterations in the lungs' defenses. SO_2 also is a major precursor to particulate matter that is $PM_{2.5}$, which is a significant health concern and a main contributor to poor visibility.

SO_2 not only has a bad odor but can irritate the respiratory system. Exposure to high concentrations for short periods can constrict the bronchi and increase mucous flow, making breathing difficult. SO_2 can also irritate the lung and throat at concentrations greater than 6 ppm in many people; impair the respiratory system's defenses against foreign particles and bacteria when exposed to concentrations less than 6 ppm for longer periods; and enhance the harmful effects of ozone (combinations of the two gases at concentrations occasionally found in the ambient air appear to increase airway resistance to breathing).

SO_2 tends to have more toxic effects when acidic pollutants, liquid or solid aerosols, and particulates are also present. Effects are more pronounced among "mouth breathers" (e.g., people who are exercising or who have head colds). These effects include:

- Health problems, such as episodes of bronchitis requiring hospitalization associated with lower- level acid concentrations.
- Self-reported respiratory conditions, such as chronic cough and difficult breathing, associated with acid aerosol concentrations (individuals with asthma are especially susceptible to these effects. The elderly and those with chronic respiratory conditions may also be affected at lower concentrations than the general population).
- Increased respiratory tract infections associated with longer-term, lower-level exposures to SO_2 and acid aerosols.
- Subjective symptoms, such as headaches and nausea, in the absence of pathological abnormalities due to long-term exposure.

SO_2 easily injures many plant species and varieties, both native and cultivated. Some of the most sensitive plants include various commercially valuable pines, legumes, red and black oaks, white ash, alfalfa, and blackberry. The effects include:

- Visible injury to the most sensitive plants at exposures as low as 0.12 ppm for 8 hours.
- Visible injury to many other plant types of intermediate sensitivity at exposures of 0.30 ppm for eight hours.
- Positive benefits from low levels in a few species growing on sulfur-deficient soils.
- Increases in SO_2 concentrations accelerate the corrosion of metals, probably through the formation of acids. SO_2 is a major precursor to acidic deposition. Sulfur oxides may also damage stone and masonry, paint, various fibers, paper, leather, and electrical components.

Increased SO_2 also contributes to impaired visibility. Particulate sulfate, much of which is derived from SO_2 emissions, is a major component of the complex total suspended particulate mixture.

Particulate Matter (PM_{10} and $PM_{2.5}$)

The size of particles is directly linked to their potential for causing health problems. PM_{10} and $PM_{2.5}$ particles are small enough—about one-seventh the thickness of a human hair or smaller—to be inhaled and lodged in the deepest parts of the lung where they evade the respiratory system's natural defenses and can be trapped in the nose, throat, and upper respiratory tract. Health effects from exposure to PM_{10} and $PM_{2.5}$ begin as the body reacts to these foreign particles. Acute and chronic health effects associated with high particulate levels include the aggravation of chronic respiratory diseases; heart and lung disease; and coughing, bronchitis, and respiratory illnesses in children. Recent mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air. PM_{10} and $PM_{2.5}$ can aggravate respiratory disease and cause lung damage, cancer, and premature death. Sensitive populations, including children, the elderly, exercising adults, and those suffering from chronic lung disease such as asthma or bronchitis, are especially vulnerable to the effect of PM_{10}. Of greatest concern are recent studies that link PM_{10} exposure to the premature death of people who already have heart and lung disease, especially the elderly. Acidic PM_{10} can also damage man-made materials and is a major cause of reduced visibility in many parts of the United States. Non-health-related effects include reduced visibility and soiling of buildings.

Premature deaths linked to particulate matter are now at levels comparable to deaths from traffic accidents and secondhand smoke. One of the most dangerous pollutants, fine particulate matter (e.g., from diesel exhaust) not only bypasses the body's defense mechanisms and becomes embedded in the deepest recesses of the lung but also can disrupt cellular processes. Population-based studies in hundreds of cities in the United States and around the world have demonstrated a strong link between elevated particulate levels and premature deaths, hospital admissions, emergency room visits, and asthma attacks. Long-term studies of children's health conducted in California have demonstrated that particulate pollution may significantly reduce lung function growth in children (CARB and American Lung Association of California 2007).

A noteworthy study provides evidence that exposure to particulate air pollution is associated with lung cancer. This study found that residents who live in an area that is severely affected by particulate air pollution are at risk of developing lung cancer at a rate comparable to nonsmokers

exposed to secondhand smoke. This study also found approximately 16% excess risk of dying from lung cancer due to fine particulate air pollution (Dockery and Pope 2006).

Another study shows that individuals with existing cardiac disease can be in a potentially life-threatening situation when exposed to high levels of fine air pollution. Fine particles can penetrate the lungs and cause the heart to beat irregularly, or can cause inflammation, which could lead to a heart attack (Peters et al. 2001).

Attaining the California particulate matter standards would annually prevent about 6,500 premature deaths, or 3% of all deaths. These premature deaths shorten lives by an average of 14 years. This is roughly equivalent to the same number of deaths (4,200 to 7,400) linked to secondhand smoke in 2000. In comparison, motor vehicle crashes caused 3,200 deaths, and 2,000 deaths resulted from homicide. Attaining the California particulate matter and ozone standards would annually prevent 4,000 hospital admissions for respiratory disease, 3,000 hospital admissions for cardiovascular disease, and 2,000 asthma-related emergency room visits. Exposure to DPM causes about 250 excess cancer cases per year in California.

Lead

Exposure to lead occurs mainly through inhalation of air and ingestion of lead in food, water, soil, or dust. It accumulates in the blood, bones, and soft tissues and can adversely affect the kidneys, liver, nervous system, and other organs. Excessive exposure to lead may cause neurological impairments such as seizures, mental retardation, and behavioral disorders. Even at low doses, lead exposure is associated with damage to the nervous systems of fetuses and young children, resulting in learning deficits and lowered IQ. Recent studies also show that lead may be a factor in high blood pressure and subsequent heart disease. Lead can also be deposited on the leaves of plants, presenting a hazard to grazing animals and humans through ingestion (EPA 2022).

This highly toxic metal has been used for many years in everyday products and has been found to cause a range of health effects, from behavioral problems and learning disabilities, to seizures and death. Effects on the nervous systems of children are one of the primary health risk concerns from lead. In high concentrations, children can even suffer irreversible brain damage and death. Children six years old and under are most at risk because their bodies are growing quickly.

If not detected early, children with high levels of lead in their bodies can suffer from:

- Damage to the brain and nervous system
- Behavior and learning problems (such as hyperactivity)
- Slowed growth
- Hearing problems
- Headaches

Lead is also harmful to adults. Adults can suffer from:

- Difficulties during pregnancy
- Other reproductive problems (in both men and women)
- High blood pressure
- Digestive problems
- Nerve disorders
- Memory and concentration problems
- Muscle and joint pain

Since the 1980s, lead has been phased out in gasoline, reduced in drinking water, reduced in industrial air pollution, and banned or limited in consumer products.

Health Effects of Other Pollutants

Sulfates

ARB's sulfates standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels above the standard include a decrease in oxygen intake, aggravation of asthmatic symptoms, and an increased risk of cardiopulmonary disease. When acidic pollutants and particulates are also present, SO_2 tends to have an even more toxic effect. In addition to particulates, sulfates (SO_3 and SO_4) are also precursors to acid rain. SO_X and NO_X are the leading precursors to acid rain. Acid rain can lead to corrosion of man-made structures and cause acidification of water bodies. Sulfates are particularly effective in degrading visibility and, because they are usually acidic, can harm ecosystems and damage materials and property (CARB 2022).

The following is a general description of the source and health effects of other pollutants of concern, including other pollutants of H_2S, vinyl chloride, visibility-reducing particles, TACs, DPM, airborne fungus (Valley Fever), and asbestos.

Sulfates

Exposure to low concentrations of H_2S may irritate the eyes, nose, or throat. It may also cause difficulty in breathing for some asthmatics. Exposure to higher concentrations (above 100 ppm) can cause olfactory fatigue, respiratory paralysis, and death. Brief exposures to high concentrations of H_2S (greater than 500 ppm) can cause a loss of consciousness. In most cases, the person appears to regain consciousness without any other effects. However, in many individuals, there may be permanent or long-term effects such as headaches, poor attention span, poor memory, and poor motor function. No health effects have been found in humans exposed to typical environmental concentrations of H_2S (0.00011–0.00033 ppm). Deaths due to breathing in large amounts of H_2S have been reported in a variety of different work settings, including sewers, animal processing plants, waste dumps, sludge plants, oil and gas well drilling sites, and tanks and cesspools.

Vinyl Chloride

In humans, epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of liver angiosarcoma, which is a rare cancer, and have suggested a relationship between exposure cancers of the lung and brain. There are currently no adopted ambient air standards for vinyl chloride.

Short-term exposure to vinyl chloride has been linked with the following acute health effects: Acute exposure of humans to high levels of vinyl chloride via inhalation in humans has resulted in effects on the central nervous system, such as dizziness, drowsiness, headaches, and giddiness.

- Vinyl chloride is reported to be slightly irritating to the eyes and respiratory tract in humans. Acute exposure to extremely high levels of vinyl chloride has caused loss of consciousness; irritation to the lungs and kidneys; inhibition of blood clotting in humans; and cardiac arrhythmias in animals.
- Tests involving acute exposure of mice to vinyl chloride have shown high acute toxicity from inhalation exposure to the substance.

Long-term exposure to vinyl chloride concentrations has been linked with the following chronic health effects:

- Liver damage may result in humans from chronic exposure to vinyl chloride, through both inhalation and oral exposure.
- A small percentage of individuals occupationally exposed to high levels of vinyl chloride in air have developed a set of symptoms termed “vinyl chloride disease,” which is characterized by Raynaud’s phenomenon (fingers blanch and numbness and discomfort are experienced upon exposure to the cold), changes in the bones at the end of the fingers, joint and muscle pain, and scleroderma-like skin changes (thickening of the skin, decreased elasticity, and slight edema).
- Central nervous system effects (including dizziness, drowsiness, fatigue, headache, visual and/or hearing disturbances, memory loss, and sleep disturbances) as well as peripheral nervous system symptoms (peripheral neuropathy, tingling, numbness, weakness, and pain in fingers) have also been reported in workers exposed to vinyl chloride.

Several reproductive/developmental health effects from vinyl chloride exposure have been identified:

- Several case reports suggest that male sexual performance may be affected by vinyl chloride. However, these studies are limited by a lack of quantitative exposure information and possible co-occurring exposure to other chemicals.
- Several epidemiological studies have reported an association between vinyl chloride exposure in pregnant women and an increased incidence of birth defects, while other studies have not reported similar findings.

- Epidemiological studies have suggested an association between men occupationally exposed to vinyl chloride and miscarriages during their wives' pregnancies, although other studies have not supported these findings.
- Long-term exposure to vinyl chloride has also been identified as a cancer risk. Inhaled vinyl chloride has been shown to increase the risk of a rare form of liver cancer (angiosarcoma of the liver) in humans. Animal studies have shown that vinyl chloride, via inhalation, increases the incidence of angiosarcoma of the liver and cancer of the liver.

Diesel Exhaust

Diesel exhaust and many individual substances contained in it (including arsenic, benzene, formaldehyde, and nickel) have the potential to contribute to mutations in cells that can lead to cancer. Long-term exposure to diesel exhaust particles poses the highest cancer risk of any TAC evaluated by the California Office of Environmental Health Hazard Assessment (OEHHA). ARB estimates that approximately 70% of the cancer risk that the average Californian faces from breathing TACs stems from diesel exhaust particles (ARB 2000).

In its comprehensive assessment of diesel exhaust, OEHHA analyzed more than 30 studies of people who worked around diesel equipment, including truck drivers, railroad workers, and equipment operators. The studies showed these workers were more likely to develop lung cancer than workers who were not exposed to diesel emissions. These studies provide strong evidence that long-term occupational exposure to diesel exhaust increases the risk of lung cancer. Using information from OEHHA's assessment, ARB estimates that diesel-particle levels measured in California's air in 2000 could cause 540 "excess" cancers (beyond what would occur if there were no diesel particles in the air) in a population of one million people over a 70-year lifetime. Other researchers and scientific organizations, including the National Institute for Occupational Safety and Health, have calculated similar cancer risks from diesel exhaust as those calculated by OEHHA and ARB.

Exposure to diesel exhaust can have immediate health effects. Diesel exhaust can irritate the eyes, nose, throat, and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. In studies with human volunteers, diesel exhaust particles made people with allergies more susceptible to the materials to which they are allergic, such as dust and pollen. Exposure to diesel exhaust also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks (OEHHA 2002).

Other Health Effects

Visibility-Reducing Particles

Visibility-reducing particles are a measure of visibility. The ARB does not yet have a measurement method that is accurate or precise enough to designate areas in the state as being in attainment or nonattainment. Visibility-reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. Except for Lake County (which is designated to be in

attainment), California's attainment status with respect to visibility-reducing particles is currently designated as unclassified.

Airborne Fungus (Valley Fever)

Coccidioidomycosis, commonly referred to as San Joaquin Valley Fever or Valley Fever, is one of the most studied and oldest known fungal infections. Valley Fever most commonly affects people who live in hot dry areas with alkaline soil and varies with the season. This disease, which affects both humans and animals, is caused by inhalation of arthroconidia (spores) of the fungus *Coccidioides immitis* (CI). CI spores are found in the top few inches of soil and the existence of the fungus in most soil areas is temporary. The cocci fungus lives as a saprophyte in dry, alkaline soil. When weather and moisture conditions are favorable, the fungus "blooms" and forms many tiny spores that lie dormant in the soil until they are stirred up by wind, vehicles, excavation, or other ground-moving activities and become airborne. Agricultural workers, construction workers, and other people who work outdoors and who are exposed to wind and dust are more likely to contract Valley Fever. Children and adults whose hobbies or sports activities expose them to wind and dust are also more likely to contract Valley Fever. After the fungal spores have settled in the lungs, they change into a multicellular structure called a spherule. Fungal growth in the lungs occurs as the spherule grows and bursts, releasing endospores, which then develop into more spherules.

Approximately 60% of Valley Fever cases are mild and display flu-like symptoms or no symptoms at all. Of those who are exposed and seek medical treatment, the most common symptoms include fatigue, cough, loss of appetite, rash, headache, and joint aches. In some cases, painful red bumps may develop on the skin. One important fact to mention is that these symptoms are not unique to Valley Fever and may be caused by other illnesses as well. Identifying and confirming this disease require specific laboratory tests such as: (1) microscopic identification of the fungal spherules in infected tissue, sputum or body fluid sample; (2) growing a culture of CI from a tissue specimen, sputum, or body fluid; (3) detection of antibodies (serological tests specifically for Valley Fever) against the fungus in blood serum or other body fluids; and (4) administering the Valley Fever Skin Test (called coccidioidin or spherulin), which indicate prior exposure to the fungus (VFCE). **Table 4.3-5** presents the various infection classifications and normal diagnostic spread of Valley Fever cases.

Table 4.3-5: Range of Valley Fever Cases

Infection Classification	Percent of Total Diagnosed Cases
Asymptomatic infections	60
Infections that resolve spontaneously (with lifelong immunity)	35
Chronic disease or disease disseminated throughout the body	Up to 5
Meningeal infection (affecting brain and/or spinal cord and requiring lifetime treatment)	0.15–0.75

Source: Hector 2005

Factors that affect the susceptibility to coccidioidal dissemination are race, sex, pregnancy, age and immunosuppression. According to data gathered by Kern County Public Health Services Department, Hispanic and Latino Americans are 3.4 times more likely than whites to develop

coccidioidal dissemination, African Americans are 13.7 times more likely, and Filipinos are 175.5 times more likely. Regarding the number of deaths attributed to the disease, compared to whites, the number of Hispanic/Latino is five times greater, African Americans, 23.3 times greater and Filipinos, 191.4 times greater. In addition, residents new to the San Joaquin Valley are at a higher risk of infection due primarily to low immunity to this particular fungus (KCPHS 2014).

Valley Fever is not contagious; therefore, it cannot be passed on from person to person. Most of those who are infected would recover without treatment within six months and would have life-long immunity to the fungal spores. In severe cases, especially in those patients with rapid and extensive primary illness, those who are at risk for dissemination of disease, and those who have disseminated disease, antifungal drug therapy is used. The type of medication used, and the duration of drug therapy are determined by the severity of the disease and response to the therapy. The medications used include ketoconazole, itraconazole, and fluconazole in chronic, mild to moderate disease, and amphotericin B, given intravenously or inserted into the spinal fluid, for rapidly progressive disease. Although these treatments are often helpful, evidence of disease may persist, and years of treatment may be required (VFCE).

Asbestos

Asbestos is a term used for several types of naturally occurring fibrous minerals found in many parts of California. The three most common types of asbestos are chrysotile, amosite, and crocidolite. Chrysotile, also known as white asbestos, is the most common type of asbestos found in buildings. Chrysotile makes up approximately 90 to 95% of all asbestos contained in buildings in the United States. In addition, naturally occurring asbestos can be released from serpentinite and ultramafic rocks when the rock is broken or crushed. At the point of release, the asbestos fibers may become airborne, causing air quality and human health hazards. These rocks have been commonly used for unpaved gravel roads, landscaping, fill projects, and other improvement projects in some localities. Asbestos may be released to the atmosphere due to vehicular traffic on unpaved roads, during grading for development projects, and at quarry operations. Serpentinite and/or ultramafic rocks are known to be present in 44 of California's 58 counties. These rocks are particularly abundant in the counties associated with the Sierra Nevada foothills, the Klamath Mountains, and Coast Ranges. According to information provided by the California Department of Conservation, Division of Mines and Geology, the Project site is not in an area where naturally occurring asbestos is likely to be present (California DOC 2000).

Coronavirus Disease 2019

Coronavirus Disease 2019 (COVID-19) is a new disease, caused by a novel (or new) human coronavirus that has not previously been seen in humans. The first known case of COVID-19 was confirmed in the United States on January 20, 2020 (Holshue et al. 2020). There are many types of human coronaviruses, including some that commonly cause mild upper respiratory tract illnesses. COVID-19 is a respiratory illness that can spread from person to person. According to the Centers for Disease Control (CDC), older adults and people who have severe underlying medical conditions like heart or lung disease or diabetes seem to be at higher risk for developing more serious complications from COVID-19 illness. Symptoms may appear 2 to 14 days after the exposure to the virus and may include, but are not limited to: fever or chills, cough, shortness of breath or

difficulty breathing, fatigue, muscle or body aches, headache, loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, and diarrhea.

According to the CDC, COVID-19 is believed to spread between people who are in close contact with one another (within about 6 feet) through respiratory droplets produced when an infected person coughs, sneezes, or talks.COVID-19 research and causality is still in the beginning stages. A nationwide study by Harvard University found a linkage between long-term exposure to $PM_{2.5}$ (averaged from 2000 to 2016) as air pollution and statistically significant increased risk of COVID-19 death in the United States (Harvard 2020).

Odors

Typically, odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from the psychological (e.g., irritation, anger, or anxiety) to the physiological (e.g., circulatory and respiratory effects, nausea, vomiting, headache). The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. People may have different reactions to the same odor and an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast food restaurant). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word strong to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

Neither the state nor the federal governments have adopted rules or regulations for the control of odor sources. The SJVAPCD does not have an individual rule or regulation that specifically addresses odors; however, odors would be subject to the SJVAPCD's Rule 4102, Nuisance. Any actions related to odors would be based on citizen complaints to local governments and the SJVAPCD.

4.3.3 Regulatory Setting

In California, air quality is regulated by several agencies, including the EPA, CARB, and local air districts such as the SJVAPCD. Each agency develops rules and/or regulations to attain the goals or directives imposed upon them through legislation. Although the EPA regulations may not be superseded, some State and local regulations may be more stringent than federal regulations. The Project site is within the SJVAB, which is under the jurisdiction of the SJVAPCD. The SJVAPCD has developed CEQA guidance for assessing air quality impacts. In addition, Kern County has its own CEQA Guidelines for assessing air quality impacts.

Federal

United States Environmental Protection Agency

The principal air quality regulatory mechanism on the federal level is the CAA and, in particular, the 1990 amendments to the CAA, and the NAAQS that it establishes. These standards identify levels of air quality for "criteria" pollutants that are considered the maximum levels of ambient (background) air pollutants considered safe, with an adequate margin of safety, to protect public health and welfare. The criteria pollutants include ozone, CO, NO_2 (which is a form of NO_X), SO_2 (which is a form of SO_X), PM_{10}, $PM_{2.5}$, and lead. The EPA also has regulatory and enforcement jurisdiction over emission sources beyond state waters (outer continental shelf), and those that are under the exclusive authority of the federal government, such as aircraft, locomotives, and interstate trucking. The EPA's primary role at the state level is to oversee the state air quality programs. The EPA sets federal vehicle and stationary source emission standards and oversees approval of all State Implementation Plans (SIP), as well as providing research and guidance in air pollution programs. The SIP is a State-level document that identifies all air pollution control programs within California that are designed to meet the NAAQS.

Toxic Substances Control Act

The Toxic Substances Control Act first authorized the EPA to regulate asbestos in schools, public, and commercial buildings under Title II of the law, which is also known as the Asbestos Hazard Emergency Response Act (AHERA). AHERA requires local education agencies to inspect their schools for asbestos-containing building materials (ACBMs) and to prepare management plans to reduce the hazards posed by asbestos hazard. The Act also established a program for the training and accreditation of individuals performing certain types of asbestos work.

National Emission Standards for Hazardous Air Pollutants

Pursuant to the FCAA of 1970, the EPA established the National Emission Standards for Hazardous Air Pollutants (NESHAPs). These are technology-based source-specific regulations that limit allowable emissions of HAPs. Among these sources are ACBMs. NESHAPs include requirements pertaining to the inspection, notification, handling, and disposal of ACBMs associated with the demolition and renovation of structures.

State

California Air Resources Board

CARB, a department of the California Environmental Protection Agency, oversees air quality planning and control throughout California by administering the SIP. Its primary responsibility lies in ensuring implementation of the 1989 California Clean Air Act, responding to the federal CAA requirements, and regulating emissions from motor vehicles sold in California. It also sets fuel specifications to further reduce vehicular emissions.

CARB established the CAAQS for all pollutants for which the federal government has NAAQS and, in addition, establishes standards for SO_4, visibility, H_2S, and vinyl chloride (C_2H_3Cl). However, at this time, H_2S and C_2H_3Cl are not measured at any monitoring stations in the SJVAB because they are not considered to be a regional air quality problem. Generally, the CAAQS are more stringent than the NAAQS.

CARB also has on-road and off-road engine emission reduction programs that indirectly affect the Project's emissions through the phasing in of cleaner on-road and off-road equipment engines. Additionally, CARB has a Portable Equipment Registration Program that allows owners or operators of portable engines and associated equipment to register their units under a statewide portable program to operate their equipment that must meet specified program emission requirements throughout California without having to obtain individual permits from local air districts.

The State has also enacted an Airborne Toxic Control Measure (ATCM) for the reduction of DPM and criteria pollutant emissions from in-use, off-road, diesel-fueled vehicles (California Code of Regulations [CCR] Title 13, Article 4.8, Chapter 9, Section 2449). This regulation provides target emission rates for PM and NO_X emissions from owners of fleets of diesel-fueled off-road vehicles and applies to equipment fleets of three specific sizes and the target emission rates are reduced over time (CARB 2007).

Title V and Extreme Designation

Title V of the CAA, as amended in 1990, creates an operating permit program for certain defined sources. In general, owner/operators of defined industrial or commercial sources that emit more than 25 tons per year of NO_X and ROG must process a Title V permit. In "Extreme Designation" areas, the definition of a major source which requires Title V permitting, changes from 25 tons per year to 10 tons per year. This change results in more businesses complying with Title V permitting requirements under the Extreme nonattainment designation.

Title V does not impose any new air pollution standards, require the installation of any new controls on the affected facilities, or require reductions in emissions. Title V does enhance public and EPA participation in the permitting process and requires additional record keeping and reporting by businesses, which results in significant administrative requirements.

California Code of Regulations

The CCR is the official compilation and publication of regulations adopted, amended, or repealed by the state agencies pursuant to the Administrative Procedure Act. The CCR includes regulations that pertain to air quality emissions. Specifically, Section 2485 in Title 13 of the CCR states that the idling of all diesel-fueled commercial vehicles (weighing over 10,000 pounds) during construction shall be limited to five minutes at any location. In addition, Section 93115 in Title 17 of the CCR states that operations of any stationary, diesel-fueled, compression-ignition engines shall meet specified fuel and fuel additive requirements and emissions standards.

CCR, Title 24, Part 11: California Green Building Standards Code (CALGreen) is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went into effect on August 1, 2009, and is administered by the California Building Standards Commission.

CALGreen is updated regularly, with the most recent approved update consisting of the 2022 California Green Building Code Standards that became effective on January 1, 2023. The California Energy Commission anticipates the 2022 energy code will provide $1.5 billion in consumer benefits and reduce greenhouse gas (GHG) emissions by 10 million metric tons. The Project would be required to comply with the California Green Building Standards Code (CALGreen) in place at the time plan check submittals are made. These require, among other items:

NONRESIDENTIAL MANDATORY MEASURES

- Short-term bicycle parking. If the new project or an additional alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5% of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack (5.106.4.1.1).
- Long-term bicycle parking. For new buildings with tenant spaces that have 10 or more tenant-occupants, provide secure bicycle parking for 5% of the tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility (5.106.4.1.2).
- EV charging stations. New construction shall facilitate the future installation of EV supply equipment. The compliance requires empty raceways for future conduit and documentation that the electrical system has adequate capacity for the future load. The number of spaces to be provided for is contained in Table 5.106. 5.3.3 (5.106.5.3). Additionally, Table 5.106.5.4.1 specifies requirements for the installation of raceway conduit and panel power requirements for medium- and heavy-duty EV supply equipment for warehouses, grocery stores, and retail stores.
- Outdoor light pollution reduction. Outdoor lighting systems shall be designed to meet the backlight, uplight and glare ratings per Table 5.106.8 (5.106.8).
- Construction waste management. Recycle and/or salvage for reuse a minimum of 65% of the nonhazardous construction and demolition waste in accordance with Section 5.408.1.1. 5.405.1.2, or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent (5.408.1).

- Excavated soil and land clearing debris. 100% of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed (5.408.3).
- Recycling by Occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage, and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive (5.410.1).
- Water conserving plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:
  - Water Closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush (5.303.3.1).
  - Urinals. The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush (5.303.3.2.1). The effective flush volume of floor- mounted or other urinals shall not exceed 0.5 gallons per flush (5.303.3.2.2).
  - Showerheads. Single showerheads shall have a minimum flow rate of not more than 1.8 gallons per minute and 80 psi (5.303.3.3.1). When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi (5.303.3.3.2).
  - Faucets and fountains. Nonresidential lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi (5.303.3.4.1). Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute of 60 psi (5.303.3.4.2). Wash fountains shall have a maximum flow rate of not more than 1.8 gallons per minute (5.303.3.4.3). Metering faucets shall not deliver more than 0.20 gallons per cycle (5.303.3.4.4). Metering faucets for wash fountains shall have a maximum flow rate not more than 0.20 gallons per cycle (5.303.3.4.5).
- Outdoor potable water uses in landscaped areas. Nonresidential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient Landscape Ordinance (MWELO), whichever is more stringent (5.304.1).
- Water meters. Separate submeters or metering devices shall be installed for new buildings or additions in excess of 50,000 sf or for excess consumption where any tenant within a new building or within an addition that is projected to consume more than 1,000 gallons per day (GPD) (5.303.1.1 and 5.303.1.2).
  - Outdoor water uses in rehabilitated landscape projects equal or greater than 2,500 sf. Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 sf requiring a building or landscape permit (5.304.3).

- Commissioning. For new buildings 10,000 sf and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements (5.410.2).

California Air Resources Board On-Road and Off-Road Vehicle Rules

In 2004, CARB adopted an ATCM to limit heavy-duty diesel motor vehicle idling to reduce public exposure to diesel PM and other TACs (Title 13 California Code of Regulations [CCR], Section 2485). The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than 5 minutes at any given time.

In 2008 CARB approved the Truck and Bus regulation to reduce NOx, PM_{10}, and $PM_{2.5}$ emissions from existing diesel vehicles operating in California (13 CCR, Section 2025). The requirements were amended to apply to nearly all diesel-fueled trucks and buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. For the largest trucks in the fleet, those with a GVWR greater than 26,000 pounds, there are two methods to comply with the requirements. The first method is for the fleet owner to retrofit or replace engines, starting with the oldest engine model year, to meet 2010 engine standards, or better. This is phased over 8 years, starting in 2015 and would be fully implemented by 2023, meaning that all trucks operating in the state subject to this option would meet or exceed the 2010 engine emission standards for NOx, PM_{10}, and $PM_{2.5}$ by 2023. The second method, if chosen, required fleet owners, starting in 2012, to retrofit a portion of their fleet with diesel particulate filters achieving at least 85% removal efficiency, with installation of diesel particulate filters) for their entire fleet by January 1, 2016. However, diesel particulate filters do not typically lower NOx emissions. Thus, fleet owners choosing the second option had until 2020 to comply with the 2010 engine emission standards for their trucks and buses.

In addition to limiting exhaust from idling trucks, CARB also promulgated emission standards for off-road diesel construction equipment of greater than 25 horsepower such as bulldozers, loaders, backhoes and forklifts, as well as many other self-propelled off-road diesel vehicles. The regulation adopted by the CARB on July 26, 2007, aims to reduce emissions by the installation of diesel soot filters and encouraging the retirement, replacement, or repower of older, dirtier engines with newer emission-controlled models (13 CCR, Section 2449). Implementation is staggered based on fleet size (which is the total of all off-road horsepower under common ownership or control), with the largest fleets to begin compliance in 2014, medium fleets in 2017, and small fleets in 2019. Each fleet must demonstrate compliance through one of two methods. The first option is to calculate and maintain fleet average emissions targets, which encourages the retirement or repowering of older equipment and rewards the introduction of newer cleaner units into the fleet. The second option is to meet the Best Available Control Technology (BACT) requirements by turning over or installing Verified Diesel Emission Control Strategies) on a certain percentage of its total fleet horsepower. The compliance schedule requires that BACT turn overs or retrofits (Verified Diesel Emission Control Strategies installation) be fully implemented by 2023 in all equipment for large and medium fleets and by 2028 for small fleets.

Toxic Air Contaminants

The California Air Toxics Program was established in 1983, when the California Legislature adopted Assembly Bill (AB) 1807 to establish a two-step process of risk identification and risk management to address potential health effects from exposure to toxic substances in the air. In the risk identification step, CARB and OEHHA determine if a substance should be formally identified, or "listed", as a TAC in California. inception of the program, a number of such substances have been listed (https://ww2.arb.ca.gov/resources/documents/carb-identified-toxicair-contaminants). In 1993, the California Legislature amended the program to identify the 189 federal HAPs as TACs.

In the risk management step, CARB reviews emission sources of an identified TAC to determine whether regulatory action is needed to reduce risk. Based on the results of that review, CARB has promulgated a number of ATCMs, both for mobile and stationary sources. As discussed above, in 2004, CARB adopted an ATCM to limit heavy-duty diesel motor vehicle idling to reduce public exposure to diesel particulate matter and other TACs. The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than five minutes at any given time.

In addition to limiting exhaust from idling trucks, as discussed above, CARB promulgated emission standards for off-road diesel construction equipment such as bulldozers, loaders, backhoes, and forklifts, as well as many other self-propelled off-road diesel vehicles. The regulation, adopted by CARB on July 26, 2007, aims to reduce emissions by the installation of diesel particulate filters and encouraging the replacement of older, dirtier engines with newer emission-controlled models. Reduction over time will occur as implementation is staggered based on fleet size, with the largest operators beginning compliance in 2014 with full implementation by 2023 for large and medium fleets and 2028 for small fleets.

The AB 1807 program is supplemented by the AB 2588 Air Toxics "Hot Spots" program, which was established by the California Legislature in 1987. Under this program, facilities are required to report their air toxics emissions, assess health risks, and notify nearby residents and workers of significant risks if present. In 1992, the AB 2588 program was amended by Senate Bill (SB) 1731 to require facilities that pose a significant health risk to the community to reduce their risk through implementation of a risk management plan.

California State Implementation Plan

The CAA (and its subsequent amendments) requires each state to prepare an air quality control plan referred to as the SIP. The SIP is a living document that is periodically modified to reflect the latest emissions inventories, plans, and rules and regulations of air basins as reported by the agencies with jurisdiction over them. The CAA Amendments dictate that states containing areas violating the NAAQS revise their SIPs to include extra control measures to reduce air pollution. The SIP includes strategies and control measures to attain the NAAQS by deadlines established by the CAA. The EPA has the responsibility to review all State Implementation Plans to determine if they conform to the requirements of the CAA. State law makes CARB the lead agency for all purposes related to the SIP. Local air districts and other agencies prepare SIP elements and submit them to

CARB for review and approval. CARB then forwards SIP revisions to the EPA for approval and publication in the Federal Register.

Local

Metropolitan Bakersfield General Plan (MBGP) (Unincorporated Planning Area)

The policies, goals, and implementation measures in the Metropolitan Bakersfield General Plan (MBGP) for air quality applicable to the Project are provided below. The MBGP identifies the federal, State, and local statutes, ordinances, or policies that govern the conservation of air quality that must be considered by Kern County during the decision-making process for any project that could impact air quality. The MBGP contains additional policies, goals, and implementation measures that are more general in nature and are not specific to development such as the Project. Therefore, although they are not listed below, all policies, goals, and implementation measures in the MBGP are incorporated by reference.

Chapter 5. Conservation/Air Quality

Goal

Goal 1. Promote air quality that is compatible with health, well-being, and enjoyment of life by controlling point sources and minimizing vehicular trips to reduce air pollutants.

Goal 2. Continue working toward attainment of Federal, State and Local standards as enforced by the San Joaquin Valley Unified Air Pollution Control District.

Goal 3. Reduce the amount of vehicular emissions in the Planning Area.

Policies

Policy 1. **Comply with and promote San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) control measures regarding Reactive Organic Gases (ROG). Such measures are focused on: (a) steam driven well vents, (b) Pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test signs, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance.**

Policy 2. **Encourage land uses and land use practices which do not contribute significantly to air quality degradation.**

Policy 3. Require dust abatement measures during significant grading and construction operations.

Policy 5. Consider the location of sensitive receptors such as schools, hospitals, and housing developments when locating industrial uses to minimize the impact of industrial sources of air pollution.

Policy 7. Participate in regional air quality studies and comprehensive programs for air pollution reduction.

Policy 10. Implement the Transportation System Management Program (July 1984) for Metropolitan Bakersfield to improve traffic flow, reduce vehicle trips and increase street capacity.

Policy 11. Improve the capacity of the existing road system through improved signalization, more right turn lanes and traffic control systems.

Policy 12. Encourage the use of mass transit, carpooling and other transportation options to reduce vehicle miles traveled.

Policy 13. Consider establishing priority parking areas for carpoolers in projects with relatively large numbers of employees to reduce vehicle miles traveled and improve air quality.

Policy 14. Establish Park and ride facilities to encourage carpooling and the use of mass transit.

Policy 15. Promote the use of bicycles by providing attractive bicycle paths and requiring provision of storage facilities in commercial and industrial projects.

Policy 18. Encourage walking for short distance trips through the creation of pedestrian friendly sidewalks and street crossings.

Policy 19. Promote a pattern of land uses which locates residential uses in close proximity to employment and commercial services to minimize vehicular travel (I-1).

Policy 22. Require the provision of secure, convenient bike storage racks at shopping centers, office buildings, and other places of employment in the Bakersfield Metropolitan area.

Policy 23. Encourage the provision of shower and locker facilities by employers, for employees who bicycle or jog to work.

Policy 25. Require design of parking structures and ramps to provide adequate off-street storage for entering vehicles to minimize on-street congestion and to avoid internal backup and idling of vehicles.

Policy 29. Encourage the use of alternative fuel and low or zero-carbon emission vehicles.

In 2006, Kern County Planning Department issued its own *Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports*. The document provides specific guidance for County-prepared EIRs, including air quality issues to be considered, analytical approaches and resources, and a cumulative impact analysis methodology. In general, Kern County defers to SJVAPCD on issues related to assessing air quality impacts (e.g., modeling, odors, risk assessment). In addition, Kern County recommends an assessment of visibility impacts for all industrial projects and any other projects that have components that could generate dust or emissions related to visibility. Kern County also recommends including a list of projects located within a 1-mile and 6-mile radius of the Project boundary.

San Joaquin Valley Air Pollution Control District

State law assigns much of the authority to regulate stationary, indirect, and area sources to local air pollution control and air quality management districts. The SJVAPCD has primary responsibility for regulating stationary sources of air pollution situated within its jurisdictional boundaries. To this end, the SJVAPCD implements air quality programs required by State and federal mandates, enforces rules and regulations based on air pollution laws, and educates businesses and residents about their role in protecting air quality. The SJVAPCD is responsible for regulating stationary, indirect, and area sources of air pollution in the SJVAB. The eight counties that comprise the SJVAPCD are divided into three regions: the Northern Region (Merced, San Joaquin, and Stanislaus counties), Central Region (Madera, Fresno, and Kings Counties), and Southern Region (Tulare County and San Joaquin Valley portion of Kern County).

The SJVAPCD has developed the following plans to attain and maintain the State and federal standards:

- The 2018 Plan for the 1997, 2006, and 2012 $PM_{2.5}$ Standard.
- The 2016 Plan for the 2008 8-hr Ozone Standard.
- The 2013 Plan for the Revoked 1-hour Ozone Standard.
- The 2004 Revisions to the Carbon Monoxide Maintenance Plan.

SJVAPCD Rules and Regulations

The SJVAPCD rules and regulations that may apply during or at buildout of the Project include, but are not limited to the following:

- **Rule 2010 (Permits Required).** Requires any person constructing, altering, replacing, or operating any source operation which emits, may emit, or may reduce emissions to obtain an Authority to Construct (ATC) or a Permit to Operate (PTO).
- **Rule 2092 (Standards for Permits to Operate).** Defines the conditions that must be met for an APCO to issue a PTO.
- **Rule 2201 (New and Modified Stationary Source Review Rule).** Provides for the review of new and modified Stationary Sources of air pollution and to provide mechanisms including emission offsets by which Authorities to Construct such sources may be granted, without interfering with the attainment or maintenance of Ambient Air Quality Standards; and ensure that no net increase in emissions above specified thresholds from new and modified Stationary Sources of all nonattainment pollutants and their precursors occur.
- **Rule 4001 (New Source Performance Standards).** Applies to all new sources of air pollution and modifications of existing sources of air pollution within the source categories for which EPA has adopted standards. Section 4.0, Requirements, of Rule 4001 lists all of the provisions of 40 CFR Part 60 that are incorporated into the NSPS.

- **Rule 4102 (Nuisance).** Applies to any source operation that emits or may emit air contaminants or other materials. In the event that the Project or construction of the Project creates a public nuisance, it could be in violation and be subject to SJVAPCD enforcement action.
- **Rule 4201 (Particulate Matter Concentration).** Sets a standard maximum of 0.1 grain per cubic foot of gas at dry standard conditions for PM emissions. This rule applies to any source operation that emits dust, fumes, or total suspended PM.
- **Rule 4202 (Particulate Matter – Emission Rate).** Establishes allowable emissions rates for PM. This rule requires any source operation that may emit PM emissions to meet the standards set forth in the table "Allowable Emission Rate Base on Process Weight Rate."
- **Rule 4601–Architectural Coatings.** Limits volatile organic compound emissions from architectural coatings.
- **Rule 4641–Cutback, Slow Cure, and Emulsified Asphalt Paving and Maintenance Operations.** Limits VOC emissions by restricting the application and manufacturing of certain types of asphalt for paving and maintenance operations.
- **Rule 4702–Internal Combustion Engines.** This rule applies to any internal combustion engine rated at 25 brake horsepower or greater. Emergency generators cannot be used to reduce the demand for electrical power when normal electrical power line service has not failed, to produce power for the utility electrical distribution system, or in conjunction with a voluntary utility demand reduction program or interruptible power contract. The rule limits emergency generators to 100 hours of operation for non-emergency usage, which is less stringent than the Airborne Toxic control Measures (ATCM) for emergency standby stationary engines under 17 California Code of Regulations Section 93115. Therefore, compliance with the ATCM ensures compliance with the 100-hour requirement.
- **Rule 4703– Stationary Gas Turbines.** This rule limits the emissions of nitrogen oxides (NO_X), emissions from stationary gas turbine systems and with ratings equal to or greater than 0.3 megawatt (MW) or a maximum heat input rating of more than 3,000,000 Btu per hour which are subject to District permitting requirements.

Regulation VIII–Fugitive PM10 Prohibitions

Rules 8011–8081 are designed to reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition, road construction, bulk materials storage, use of paved and unpaved roads, and carryout and trackout. Among the Regulation VIII rules applicable to the Project are the following:

- **Rule 8011 (General Requirements).** The purpose of this rule is to reduce ambient concentration of fine particulate matter (PM_{10}) by requiring actions to prevent, reduce or mitigate anthropogenic (human-caused) fugitive dust emissions.
- **Rule 8021 (Construction, Demolition Excavation, Extraction, and Other Earthmoving Activities).** Limits fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities and applies to any construction,

demolition, excavation, extraction, and other earthmoving activities, including, but not limited to, land clearing, grubbing, scraping, travel on site, and travel on access roads to and from the site.

- **Rule 8031(Bulk Materials).** Limits fugitive dust emissions from the outdoor handling, storage, and transport of bulk materials.
- **Rule 8041 (Carryout and Trackout**). Prevents or limits fugitive dust emissions from carryout and trackout and applies to all sites that are subject to any of the following rules where carryout or trackout has occurred or may occur on paved public roads or the paved shoulders of a paved public road.
- **Rule 8051 (Open Areas).** Limits fugitive dust emissions from open areas and applies to any open area having 0.5 acre or more within urban areas, or 3.0 acres or more within rural areas; and contains at least 1,000 square feet of disturbed surface area.
- **Rule 8061 (Paved and Unpaved Roads).** Limits fugitive dust emissions from paved and unpaved roads by implementing control measures and design criteria.
- **Rule 8071 (Unpaved Vehicle/Equipment Traffic Areas).** Limits fugitive dust emissions from unpaved vehicle and equipment traffic areas.
- **Rule 9410–Employer Based Trip Reduction.** The purpose of Rule 9410 is to reduce emissions of ozone precursors (NO_X and VOC) and particulate matter from mobile sources. The rule applies to employers with at least 100 eligible employees at a worksite and requires employers to establish an Employer Trip Reduction Implementation Plan (eTRIP) to encourage employees to reduce single-occupancy vehicle trips, thus reducing pollutant emissions associated with work commutes. Rule 9410 (Employer Based Trip Reduction) satisfies a federally enforceable commitment in District SIPs (the 2007 Ozone Plan and the 2008 $PM_{2.5}$ Plan) and is designed to share the air pollution cleanup burden traditionally targeted at stationary sources. The rule applies to apply to worksites with over 100 employees in incorporated cities with a population of at least 10,000 people OR worksites where at least 50 percent of all employees work at least 2,040 hours per year.
- **Rule 9510 (Indirect Source Review)**. Indirect sources are land uses that attract or generate motor vehicles trips. Indirect source emissions contain many pollutants, principally PM_{10}, ROG, and NO_X. The San Joaquin Valley Air Pollution Control District (SJVAPCD) first implemented this requirement in the adopted 2003 PM_{10} Plan to develop and implement an Indirect Source Rule (ISR) by July 2004, with implementation to begin in 2005. Senate Bill 709 (SB 709) as required the SJVAPCD to adopt by regulation a schedule of fees to be assessed on areawide and indirect sources of emissions. After public hearings, the Air District adopted Rule 9510 on December 15, 2005, and it became effective in 2006. This rule was amended on December 21, 2017, and the amendments came into effect on March 21, 2018.

The purpose of Rule 9510 is to reduce emissions of NO_X and PM_{10} from new development projects. The District determined that reducing one precursor NO_X, would reduce the cumulative impact on ozone form new development to less than significant levels. Sufficient ROG was obtained from

other control measures to enable the District to predict attainment without additional ROG controls. The rule applies to development projects that seek to gain discretionary approval for projects that, upon full buildout, will include any one of the following: 50 residential units; 2,000 square feet of commercial space; 25,000 square feet of light industrial space; 20,000 square feet of medical or recreational space; 39,000 square feet of general office space; 100,000 square feet of heavy industrial space; 9,000 square feet of educational space; 10,000 square feet of government space; or 9,000 square feet of any land use not identified above. Several sources are exempt from the rule, including transportation projects, transit projects, reconstruction projects that result from a natural disaster, and development projects whose primary source of emissions are subject to district Rules 2201 and 2010, which address stationary sources. Any development project that has a mitigated baseline of less than 2 tons per year for each NO_X and PM_{10} is exempted from the mitigation requirements of the rule as well as Oil and Gas activities (which involve development projects on facilities whose primary functions are subject to Rule 2201 [New and Modified Stationary Source Review Rule] or Rule 2010 [Permits Required]). Developers are encouraged to reduce as much air pollution as possible through on-site mitigation or incorporating air-friendly designs and practices into the Project. Some examples include bike paths and sidewalks, traditional street design; medium- to high-density residential developments; locating near bus stops and bike paths; locating near different land use zones, such as commercial; and increasing energy efficiency. If these practices do not completely meet the required reductions, then under the rule, new development projects are required to mitigate the remainder of their emissions by contributing to a mitigation fund that would be used to pay for the most cost-effective projects to reduce emissions. Examples of such projects include the retirement and crushing of gross polluting cars, replacement of older diesel engines, and diesel-powered vehicles and programs that would encourage the replacement of gas-powered lawnmowers with electric lawnmowers.

The ISR requires developers to reduce 20% of construction-exhaust NO_X, 45% of construction-exhaust PM_{10}, 33% of operational NO_X over 10 years, and 50% of operational PM_{10} over 10 years. The District estimates that the potential reductions from this program in 2010 at 11.5 tons per day, or 4,197.5 tons per year, of PM_{10} and 4.1 tons per day, or 1,496.5 tons per year, of NO_X.

Indirect Source Mitigation Fee

Indirect sources are land uses that attract or generate motor vehicles trips. Indirect source emissions contain many pollutants, principally PM10, ROG, and NOX. The SJVAPCD included a requirement in the adopted 2003 PM_{10} Plan to develop and implement an ISR rule by July 2004, with implementation to begin in 2005. The ISR rule went into effect in March 2006. SB 709 required the SJVAPCD to adopt by regulation a schedule of fees to be assessed on area-wide and indirect sources of emissions. After public hearings, the SJVAPCD adopted Rule 9510 on December 15, 2005.

The purpose of Rule 9510 is to reduce emissions of NO_X and PM_{10} from new development projects. Developers are encouraged to reduce as much air pollution as possible through on-site mitigation or the incorporation of air-friendly designs and practices into the Project. Some examples include bike paths and sidewalks; traditional street design; medium- to high-density residential developments; locating near bus stops and bike paths; locating near different land use zones; and

increasing energy efficiency. If these practices do not completely meet the required reductions (under the rule), new development projects are required to mitigate the remainder of their emissions by contributing to a mitigation fund that would be used to pay for the most cost-effective projects to reduce emissions. Examples include projects to retire or crush polluting cars, replace older diesel engines, and replace gas-powered lawnmowers with electric lawnmowers.

The ISR requires developers to reduce 20% of construction exhaust NO_X, 45% of construction exhaust PM_{10}; 33% of operational NO_X over 10 years; and 50% of operational PM_{10} over 10 years.

Naturally Occurring Asbestos

Asbestos Dust Mitigation Plan

Asbestos Dust Mitigation Plan is required for grading/construction projects that involve the disturbance of asbestos-containing soil in areas greater than 1 acre. Please note, that this is different from the SJVAPCD's Dust Control Plan that is implemented as part of Regulation VIII.

Rule 4002: NESHAPS Asbestos Regulation

This rule requires that the subject facilities be inspected for asbestos prior to remodeling. Regulated asbestos-containing materials must be removed prior to remodeling work. Furthermore, a demolition permit release is required prior to obtaining a building department demolition permit.

Emission Reduction Agreements

The implementation, as mitigation, of a Development Mitigation Agreement (DMA) or Voluntary Emission Reduction Agreement (VERA) to reduce criteria pollutants of NO_X, ROGs, and PM net incremental emissions generated by a project has been incorporated into development projects in Kern County since 2008. They are not a "voluntary" agreement with the SJVAPCD but are mandated by enforceable mitigation measures and are, therefore, called DMAs. The emission reductions required by a DMA are implemented within the SJVAB in quantities sufficient to fully mitigate the Project's air quality impacts such that development of the Project could be considered to result in no net increase in the designated criteria pollutant emissions over the criteria pollutant emissions that would otherwise exist without the development of the Project, all to be verified by the SJVAPCD. Thus, the DMA results in greater reductions than would otherwise occur under the District's Indirect Source Review (ISR), since the ISR does not require ROG reductions and the ISR only requires a percentage of reductions rather than full reductions of NO_X and PM resulting from project construction and operations. When adopting the ISR and the subsequent VERA/DMA programs, the District acknowledges that as ROG is a precursor to ozone, the reductions are not required in the ISR. In the VERA/DMA, the reductions are achieved by increasing the NO_X and PM tonnage for project levels (Appendix B.4). As the actual amount of ROG reductions achieved from NO_X and PM reductions is not absolutely certain, project emissions are still considered significant and unavoidable; however, all feasible and reasonable mitigation has been required to reduce criteria pollutants as close to "no net increase" as scientifically possible. This approach has been found legally sufficient by court rulings in the following cases: *California Building Industry Assn. v. San Joaquin Valley APCD,* Fresno County Case No. 06 CECG 02100 DS13; *National Association of Home Builders v. San Joaquin Valley Air Pollution Control District*; Federal District

Court, Eastern District of California, Case No. 1:07-CV-00820-LJO-DLB; and *Center for Biological Diversity et al. v Kern County*, Fifth Appellate District, Case No. F061908.

4.3.4 Impacts and Mitigation Measures

This section describes the impact analysis relating to air quality for the Project. It describes the methods used to determine the impacts of the Project and lists the thresholds used to conclude whether an impact would be significant. Additionally, the Project has been evaluated to determine if it will result in a cumulatively considerable net increase of a criteria pollutant for which the SJVAB is non-attainment under an applicable federal or state ambient air quality standard. The significance of these potential impacts is described in the following section.

Methodology

Methodologies used to conduct the evaluation of air quality impacts for the Project, including guidelines for preparing environmental documents were developed considering the CEQA significance criteria developed by the local air quality district in the Project area, which is the SJVAPCD, approved CEQA air quality checklists, and considering other federal criteria. The findings in the *Airport Drive Warehouse Air Quality Impact Analysis*, were prepared for the Project (Appendix B.1), in accordance with the Kern County Planning Department's *Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports* and SJVAPCD's *2015 Guidance for Assessing and Mitigation Air Quality Impacts* documents, were used to assess the Project's impacts related to air quality.

Air Quality Plan Consistency

As a component of the cumulative impact analysis, the Kern County Planning Department's Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports states that the following should be included in the consistency determination for existing air quality plans:

- Discuss the Project in relation to the Kern County Council of Governments conformity and traffic analysis zones.
- Quantify the emissions from similar projects in the Ozone Attainment Plan for the applicable basin. Discuss the Ozone Attainment Plan for the applicable air district, development, and relation to the regional basin, Triennial Plan, and SIP.

Pollutant Emissions Modeling

Impacts were quantitatively assessed using the following:

- Construction equipment horsepower, load factors, and emission factors from the *California Emissions Estimator Model* (CalEEMod) model, version 2022.1.1.21.

- Vehicle emission factors, as incorporated from EMFAC 2021 (EMFAC is short for emission factor) into the CalEEMod model, version 2022.1.1.21.
- Fugitive dust emission factors for grading and paved road travel were calculated using the CalEEMod model. This analysis assumes that earthwork activities are expected to balance, and no import or export of soils would be required. Particulate matter control for construction earth moving activities is based on water a watering schedule, three times a day for construction dust control.

Refer to Appendix B.1 for details on the equipment fleet, hours of operation, vehicle miles traveled and other assumptions used in the CalEEMod model for emission calculations.

Existing Site Emissions

As previously discussed, the Project site is currently vacant. Thus, there are no existing site emissions.

Short-term Construction-Generated Emissions

Short-term construction emissions associated with the Project include emissions associated with site preparation, grading, building construction, paving, the operation of off-road equipment, on-road worker vehicle trips, and vehicle travel on paved and unpaved surfaces and fugitive dust from material handling activities. Emissions associated with haul-truck trips were not included as earthwork activities are expected to balance, and no import or export of soils will be required.

Construction Modeling Assumptions

Construction equipment information was provided by the Project applicant and supplemented with default CalEEMod equipment lists for the Project's land use type and development intensity for each phase. Construction emissions were estimated under the assumption that construction commenced in January 2024. The dates entered into the CalEEMod program represent worst-case emissions as construction equipment technology and emissions improve over time; therefore, all estimated emission totals are conservative and reflect a reasonable and legally sufficient estimate of potential impacts. All construction equipment assumed activity levels of up to a total of 8 hours per day for each piece of equipment. Additionally, vendor trips were assumed for site prep, grading, and paving phases based on the length of the phase.

The Project construction was modeled in CalEEMod assuming 738,500 square feet of Unrefrigerated Warehouse-No Rail space and 184,600 square feet of Refrigerated Warehouse-No Rail land space. Additionally, the User Defined Industrial land use was used to separately model emissions that would occur as a result of Project truck trips. Passenger vehicle truck trips, as well as all other emission sources, were modeled under the Unrefrigerated Warehouse-No Rail and Refrigerated Warehouse-No Rail land uses.

Long-Term Operational Emissions Assumptions

CalEEMod, version 2022.1.1.21 was used to estimate emissions of criteria pollutants (i.e., NOx, ROG, PM_{10}, $PM_{2.5}$, SOx, and CO) associated with long-term operation of the Project. During long-term operation of the Project, emissions would be associated with onsite energy use, motor vehicle operations, and onsite equipment operations. To a lesser extent, emissions would also be generated by on-site area sources including the occasional application of architectural coatings, landscape maintenance, and use of consumer products. Onsite emissions associated with area sources were based on default parameters recommended in CalEEMod. Electrical energy source emissions were excluded from the evaluation due to the location of electrical generating facilities for the Project area being either outside the region (state) or offset through the use of pollution credits (RECLAIM) for generation within the SJVAB. Electricity and natural gas usage associated with the Project were calculated by CalEEMod using default parameters.

Mobile Source Emissions

The Project-related emissions were calculated primarily from 1,430 daily vehicle trips generated by the Project, including employee trips to and from the site and truck trips associated with the proposed land use. Trip characteristics, outlined in the *Airport Drive Warehouse Traffic Impact Analysis* (Appendix B.1) were utilized for this analysis.

To determine emissions from passenger car vehicles, CalEEMod defaults were utilized for trip length and trip purpose for the proposed uses. For the proposed industrial uses, it is important to note that although the *Airport Drive Warehouse Traffic Impact Analysis* does not breakdown passenger cars by type, this analysis assumes that passenger cars include light-duty-auto vehicle, light-duty-truck, medium-duty-vehicle, and motorcycle vehicle types. To account for emissions generated by passenger cars, the fleet mix provided in **Table 4.3-6** was used for this analysis.

Table 4.3-6: Passenger Car Fleet Mix

Land Use	Percent of Vehicle Type				
	LDA	**LDT1**	**LDT2**	**MDV**	**MCY**
High Cube Transload Warehouse	48.64%	4.22%	23.22%	21.60%	2.31%
High Cube Cold Storage Warehouse					

Note: The Project-specific passenger car fleet mix used in this analysis is based on a proportional split utilizing the default CalEEMod percentages assigned to LDA, LDT1, LDT2, and MDV vehicle types.
Key: LDA = ;LDT1 and LDT2 = Light-Duty-Trucks; LDV = Light-Duty-Auto Vehicle; MCY = Motorcycles; MDV = Medium-Duty-Vehicles

Vehicle trip lengths for off-site truck trips were based on an average travel distance of 65 miles/one-way trip and an assumption of 100% primary trips. This truck trip length was calculated based on survey data derived from Fresno Council of Government's Report for San Joaquin Valley I-5/SR-99 Good Movement Corridor Study, prepared by Cambridge Systematics, Inc. June 30, 2017, to account for truck travel that would occur within the San Joaquin Valley Air Basin. Passenger vehicle trip lengths are based on CalEEMod model defaults. To account for emissions generated by trucks, the fleet mix provided in **Table 4.3-7** was used for this analysis.

Table 4.3-7: Truck Fleet Mix

Land Use	% Vehicle Type			
	LHDT1	LHDT2	MHDT	HHDT
High Cube Transload Warehouse	13.52%	4.27%	16.44%	65.77%
High Cube Cold Storage Warehouse				

Note: Project-specific truck fleet mix is based on the number of trips generated by each truck type (LHDT1, LHDT2, MHDT, and HHDT) relative to the total number of truck trips. The truck fleet mix is based on the mix of 2-, 3-, and 4-axle trucks presented in the Project traffic study.

Key: LDA = LDT12 and LDT23 = Light-Duty-Trucks; LDV = Light-Duty-Auto Vehicle; MCY = Motorcycles; MDV = Medium-Duty-Vehicles

Vehicles traveling on paved roads would be a source of fugitive emissions due to the generation of road dust inclusive of brake and tire wear particulates. The emissions estimate for travel on paved roads were calculated using CalEEMod.

Stationary Source Emissions

The Project was conservatively assumed to include the installation of two 300 horsepower diesel-powered emergency generators/fire pumps. The emergency generators/fire pumps were estimated to operate for up to 1 hour per day, one day per week for up to 50 hours per year for maintenance and testing purposes. Emissions associated with the two stationary emergency diesel-powered emergency generators/fire pumps were calculated using CalEEMod.

On-Site Cargo Handling Equipment Source Emissions

It is common for industrial buildings to require the operation of cargo handling equipment in the building's truck court areas. Onsite modeled operational equipment includes up to two 175 horsepower, natural gas-powered cargo handling equipment – port tractor operating 4 hours a day or 365 days of the year. Emissions attributed to cargo handling equipment represent a worst-case scenario as the Project expects the equipment to be electric. Based on Table II-3, Port and Rail Cargo Handling Equipment Demographics by Type, from CARB's Technology Assessment: Mobile Cargo Handling Equipment document, a single piece of equipment could operate up to 2 hours per day (Total Average Annual Activity divided by Total Number Pieces of Equipment). As such, the analysis conservatively assumes that the tractor/loader/backhoe would operate up to 4 hours per day.

Transport Refrigeration Unit Emissions

In order to account for the possibility of refrigerated uses, trucks associated with the cold-storage land use are assumed to also have Transport Refrigeration Units (TRUs). Therefore, for modeling purposes, 51 one-way truck trips have the potential to include TRUs. TRUs are accounted for during on-site and off-site travel. The TRU calculations are based on the EMFAC Offroad Emissions, developed by CARB. EMFAC does not provide emission rates per hour or mile as with the on-road emission model and only provides emission inventories. Emission results are produced in tons per day while all activity, fuel consumption and horsepower hours were reported at annual levels. The emission inventory is based on specific assumptions including the average horsepower rating of specific types of equipment and the hours of operation annually. These assumptions are not always consistent with assumptions used in the modeling of project level emissions. Therefore, the emissions inventory was converted into emission rates to accurately calculate emissions from TRU operation associated with project level details. This was accomplished by converting the annual horsepower hours to daily operational characteristics and converting the daily emission levels into hourly emission rates based on the total emission of each criteria pollutant by equipment type and the average daily hours of operation.

Microturbine Emissions

The Project was assumed to include two natural gas-powered microturbines rated to provide 1,000 kilowatts of electrical output each. Other than operation for maintenance and testing purposes (up to 50 hours per year each), the microturbines would be operated for emergency use only. Emissions were calculated based on emission factors obtained from the EPA's AP-42, Chapter 3.1.

Health Risk Assessment

The SJVAPCD guidelines state that if a Project is expected to generate/attract heavy-duty diesel trucks, which emit DPM, preparation of a mobile source HRA is recommended. This document serves to meet the SJVAPCD's recommendation for preparation of an HRA. The mobile source HRA has been prepared in accordance with the relevant documentation available including SJVAPCD's *Guidance for Assessing and Mitigating Air Quality Impacts* and *Guidance for Air Dispersion Modeling*.

A Health Risk Assessment (HRA) associated with construction emissions was prepared and follows the methodologies prescribed in the California EPA/OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines – *Guidance Manual for Preparation of Health Risk Assessments* (OEHHA 2015), which was adopted in 2015 replacing the previous 2003 guidance manual. Similarly, an HRA associated with operational emissions was also performed for operational DPM emissions using the American Meteorological Society/EPA regulatory dispersion model (AERMOD), Version 23132. HRA assumptions and results are provided in Appendix B.1.

This HRA is based on applicable guidelines to produce conservative estimates of human health risk posed by exposure to DPM. The conservative nature of this analysis is due primarily to the following factors:

- The ARB-adopted diesel exhaust unit risk factor (URF) of 300 in 1 million per microgram per cubic meter ($\mu g/m^3$) is based upon the upper 95th percentile of estimated risk for each of the epidemiological studies utilized to develop the URF. Using the 95th percentile URF represents a very conservative (health-protective) risk posed by DPM because it represents breathing rates that are high for the human body.
- The emissions derived assume that every truck accessing the Project site will idle for 15 minutes under the unmitigated scenario, an overestimation of actual idling times and thus conservative. The CARB's anti-idling requirements impose a 5-minute maximum idling time and therefore the analysis conservatively overestimates DPM emissions from idling by a factor of 3.

The SJVAPCD has established an incidence rate of 20 persons per million as the maximum acceptable incremental cancer risk due to DPM exposure from a project. The approach to estimating cancer risk from long-term inhalation exposure to carcinogens requires calculating a range of potential doses and multiplying by cancer potency factors in units of inverse dose to obtain a range of cancer risks. For cancer risk, the risk for each age group is calculated using the appropriate breathing rates, age sensitivity factors, exposure duration, and cancer risks calculated for individual age groups are summed to estimate cancer risk based on assumed exposure durations.

Non-carcinogenic risk is expressed as a hazard index, which is quantified by comparing the exposure to the reference level via a ratio (i.e., the exposure divided by the appropriate chronic or acute value). Exposures below the reference level (a hazard index of 1.0) are not likely to be associated with any adverse health effects and are considered to be less than significant.

Ambient Air Quality Analysis

Based on thresholds established in SJVAPCD's GAMAQI (SJVAPCD 2015), project-related impacts on air quality may be significant when on-site emissions from construction or operational activities exceed the screening threshold of 100 pounds per day. Should Project on-site construction or operational emissions exceed this threshold, it is recommended that an ambient air quality analysis be performed. Because on-site emissions generated as a result of construction or operation of the Project would not exceed this screening threshold, the Project would not cause or contribute to a violation of the CAAQS, and preparation of an ambient air quality analysis is not required.

Carbon Monoxide Hotspots

Heavy traffic congestion can contribute to high levels of CO. Individuals exposed to these CO "hot spots" may have a greater likelihood of developing adverse health effects. The potential for the Project to result in localized CO impacts at intersections resulting from addition of its traffic volumes is assessed based on Kern County's suggested criteria.

Visibility Impacts

The County guidance states that potential impacts to visibility should be evaluated for all industrial projects and any other projects, such as mining projects, which have components that could generate dust or emissions related to visibility. Based on the Kern County guidelines, a visibility

analysis is not required since the Project is not a large industrial stationary source or mining project, and it would not have long-term operational components that could generate substantial dust or emission plumes related to visibility.

Valley Fever Exposure

While there are no specific thresholds for the evaluation of potential *Coccidioides immitis* (Valley Fever) exposure, the potential for workers or area residents contracting Valley Fever as a result of the Project is evaluated based on the anticipated earth-moving activities and considers measures such as the development and implementation of a dust control plan to help control the release of the *Coccidioides immitis* fungus during construction activities.

Asbestos

There are no quantitative thresholds related to receptor exposure to asbestos.

Coronavirus Disease 2019

There are no definitive quantitative thresholds related to receptor exposure to COVID-19, and the relationship to exposure to $PM_{2.5}$.

Thresholds of Significance

Kern County

The Kern County CEQA Implementation Document and Kern County Environmental Checklist includes items taken from previous versions of *CEQA Guidelines* Appendix G. However, Appendix G was updated in 2018, resulting in minor changes to the checklist items. The analysis herein is based on the updated *CEQA Guidelines*, which differ slightly from the Kern County CEQA Implementation Document and Kern County Environmental Checklist.

The current *CEQA Guidelines* state that a project could have a significant adverse effect on air quality if it would:

a) Conflict with or obstruct implementation of the applicable air quality plan.

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard.

Specifically, would implementation of the project exceed any of the following adopted thresholds:

i. SJVAPCD:

Operational and Area Sources:

- 10 tons per year for ROG
- 10 tons per year for NO_X
- 15 tons per year for PM_{10}

Stationary Sources as Determined by District Rules

- Severe Nonattainment: 25 tons per year
- Extreme Nonattainment: 10 tons per year

a) Expose sensitive receptors to substantial pollutant concentrations.

b) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

San Joaquin Valley Air Pollution Control District

The SJVAPCD adopted thresholds of significance in the 2015 *Guidance for Assessing and Mitigating Air Quality Impacts* (GAMAQI; SJVAPCD 2015). Section 8.4.2 of the GAMAQI provides that project-related impacts on air quality may be significant when on-site emission increases from construction activities or operational activities exceed the 100 pounds per day screening level of any criteria pollutant after implementation of all enforceable mitigation measures. Under such circumstances, the SJVAPCD recommends that an ambient air quality analysis be performed to determine if emission increases from a project will cause or contribute to a violation of the ambient air quality standards based on the significance thresholds as follows:

- Construction and Operational (permitted and non-permitted equipment and activities) emissions.
  - 10 tons per year for ROG
  - 10 tons per year for NO_X
  - 100 tons per year for CO
  - 27 tons per year for SO_X
  - 15 tons per year for PM_{10}
  - 15 tons per year for $PM_{2.5}$

SJVAPCD's 2015 Guidance for Assessing and Mitigation Air Quality Impacts provides thresholds for analysis of health risk impacts from project operation, both permitted and non-permitted sources combined. The following are the significance thresholds for toxic air contaminants:

- Carcinogens: Maximally exposed individual risk equals or exceeds 20 in 1 million.
- Non-Carcinogens, Acute: Hazard Index equals or exceeds one for the maximally exposed individual.
- Non-Carcinogens, Chronic: Hazard Index equals or exceeds one for the maximally exposed individual.

Project Impacts

Impact 4.3-1: The project would conflict with or obstruct implementation of the applicable air quality plan.

In general, a project would not interfere with the applicable air quality plan if it were consistent with growth assumptions used to form the applicable air quality plan and if the Project implements all reasonably available and feasible air quality control measures. The consistency with the Air Quality Management Plan (AQMP) is discussed below for construction and operation.

Air quality impacts are controlled through policies and provisions of the SJVAPCD, the MBGP, and the Kern County Code of Building Regulations. The California Clean Air Act requires air pollution control districts with severe or extreme air quality problems to provide for a 5% reduction in nonattainment emissions per year. The Attainment Plans prepared for the SJVAPCD comply with this requirement. The CARB reviewers approve or amend the document and forward the plan to the EPA for final review and approval within the SIP.

Required Evaluation Guidelines

CEQA *Guidelines* and the CAA (Sections 176 and 316) contain specific references regarding the need to evaluate consistencies between the Project and the applicable AQAP for the projects. To accomplish this, the ARB has developed a three-step approach to determine project conformity with the applicable AQAP:

1. *Determination that an AQAP is being implemented in the area where the project is being proposed*.

The Project is in Kern County, within the jurisdiction of the SJVAPCD. The SJVAPCD has implemented the current AQAP, as approved by CARB.

2. *The project must be consistent with the growth assumptions of the applicable AQAP*.

The unincorporated MBGP designates the Project site for Light Industrial land uses. The Industrial Development category refers to a variety of industrial uses, including those that are more specialized in nature and require special consideration in terms of use of the property as well as impacts on adjacent properties, according to the MBGP. The Project Applicant proposes land uses that are consistent with development anticipated under the site's existing General Plan land use designation and zoning. Therefore, the Project would conform to local land use plans, and the Project is considered to be consistent with the growth assumptions of the applicable AQAP.

3. *The project must contain in its design all reasonably available and feasible air quality control measures*.

The Project would be required to comply with all applicable SJVAPCD Rules and Regulations, including, but not limited to, Rule 4102 (Nuisance) and Regulation VIII (Fugitive PM10 Prohibitions). **Mitigation Measure MM 4.1-3** (see *Section 4.1, Aesthetics,* for full mitigation measure text) would require the installation of a vegetative barrier along Airport Drive and Boughton Drive project frontage, which can contribute to Emission Reductions that are calculable

through tools developed by CARB for the California Natural Resources Agency (CRNA) Urban Greening Grant Program under the California Climate Investments Program (SJVAPCD 2022). In addition, **Mitigation Measure MM 4.3-1** would require the Project to comply with any and all applicable SJVAPCD rules and regulations including Rule 9510 (ISR Rule), which requires projects to reduce NOx emissions by 20% and Rule 8021 (Construction, Demolition, Excavation, Extraction, and other earth-moving activities), which requires the control of dust emissions during earth moving activities, such as grading. **Mitigation Measure MM 4.3-2** would require preparation of a Dust Control Plan and **Mitigation Measure MM 4.3-3** would require the IPG Kern County 52 Holdings, LLC (Project proponent) and its contractors to comply with various measures that would result in all vehicles and construction equipment meeting CARB engine emission standards. **Mitigation Measure MM 4.3-4** would require a reduced demand on gas-powered landscape maintenance equipment and require all landscaping along major and arterial roadways be designed with native drought-resistant species (plants, trees, and bushes). **Mitigation Measure MM 4.3-5** would require the Project owner/operator to enter into a DMA with the SJVAPCD. Implementation of these measure will reduce emissions during construction and operation of the Project.

The Project does include two stationary emergency fire pump sources, and two natural gas-powered microturbines. Both emission sources are assumed to operate for emergency purposes only with maintenance and testing of up to 50 hours per year each making them exempt from emission requirements in the SJVAPCD's 2022 Ozone Plan. Additionally, permitting for the fire pumps and microturbines would not require SJVAPCD permits under Rule 4702 and Rule 4703, respectively but would require Emission Control Plans be submitted to the district (SJVAPCD 2004b).

The Project's proposed land use designation for the subject site is consistent with the land use designation discussed in the General Plan and is thus consistent with the growth assumptions of the applicable AQAP. Furthermore, the Project would be required to comply with all applicable SJVAPCD Rules and Regulations and would implement operational mitigation designed to reduce emissions. As such, the Project is considered to be consistent with the AQAP.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.1-3** (See *Section 4.1, Aesthetics,* for full mitigation text) **MM 4.3-1** through **MM 4.3-5** would be required.

MM 4.3-1 The project shall continuously comply with applicable rules and regulations set forth by the San Joaquin Valley Air Pollution Control District.

MM 4.3-2 Prior to issuance of grading permits, the project proponent shall provide to the Kern County Planning and Natural Resources Department a site-specific Dust Control Plan approved by the San Joaquin Valley Air Pollution Control District (SJVAPCD). The Dust Control Plan shall include name(s), address(es), and phone number(s) of person(s) responsible for the preparation, submission, and implementation of the plan; a description and location of operation(s); and a listing of all fugitive dust emission sources. The site-specific Dust Control Plan shall take

into consideration grading and construction schedule, seasonal winds, site-specific wind patterns, and soil conditions to ensure adequate measures are implemented to manage fugitive dust. The following shall be included where applicable and feasible and is not to be considered all-inclusive; and any other measures to reduce fugitive dust emissions not listed shall be encouraged:

a. Land Preparation, Excavation and/or Demolition. The following dust control measures shall be implemented:

    1. Identify a comprehensive grading schedule for the entire project site. When feasible, grading activities shall be phased and minimized to those areas necessary for project access and installation of project features.

    2. All onsite unpaved roads and offsite unpaved access roads shall be stabilized using water or chemical soil stabilizers that can be determined to be as efficient as or more efficient for fugitive dust control than California Air Resources Board approved soil stabilizers, and that shall not increase any other environmental impacts including loss of vegetation.

    3. All soil excavated or graded shall be sufficiently watered to prevent excessive dust. Watering shall occur as needed with complete coverage of disturbed soil areas. Watering shall take place a minimum of twice daily on unpaved/untreated roads and on disturbed soil areas with active operations.

    4. All clearing, grading, earth moving, and excavation activities shall cease during periods of winds greater than 20 miles per hour (averaged over one hour), if disturbed material is easily windblown, or when dust plumes of 20 percent or greater opacity impact public roads, occupied structures, or neighboring property.

    5. Stockpiles of dirt or other fine loose material shall be stabilized by watering or other appropriate method to prevent windblown fugitive dust.

    6. Where acceptable to the Kern County Fire Department, weed control shall be accomplished by mowing instead of disking, thereby, leaving the ground undisturbed and with a mulch covering.

b. Site Construction. After clearing, grading, earth moving and/or excavating is completed within any portion of the project sites, the following dust control practices shall be implemented:

    1. Once initial leveling has ceased, all temporality open and inactive soil areas within the construction site shall be (1) seeded and watered until plant growth is evident, (2) treated with a dust palliative, or (3) watered twice daily until soil has sufficiently crusted to prevent fugitive dust emissions.

2. Dependent on specific site conditions (season and wind conditions), revegetation shall occur in those areas so planned as soon as practical after installation of the solar panels. A native seed mix of grass and flowers shall also be added to the spread topsoil to enhance regrowth.
3. All active disturbed soil areas shall be sufficiently watered at least twice daily or have dust palliatives applied to prevent excessive dust.

c. Vehicular Activities. During all phases of construction, the following vehicular control measures shall be implemented:

1. On-site vehicle speed shall be limited to 15 miles per hour on unpaved roads.
2. All areas with vehicle traffic shall be paved, treated with dust palliatives or watered a minimum of twice daily.
3. Streets adjacent to the project sites shall be kept clean, and project-related accumulated silt shall be removed.
4. Access to the project sites shall be by means of an apron into the project sites from adjoining surfaced roadways. The aprons shall be surfaced or treated with dust palliatives. If operating on soils that cling to the wheels of vehicles, a grizzly, wheel washer, or other such device shall be used on the road exiting the project sites, immediately prior to the pavement, in order to remove most of the soil material from vehicle tires.
5. Track-out debris onto public paved roads shall not extend 50 feet or more from an active operation and track-out shall be removed or isolated such as behind a locked gate at the conclusion of each workday, except on agricultural fields where speeds are limited to 15 mph.
6. All hauling materials should be moist while being loaded into dump trucks.
7. Drop heights when loaders dump soil into trucks shall not exceed 5 feet above the truck.
8. Soil loads should be kept below 6 inches or the freeboard of the truck.
9. All haul trucks hauling fine material (soil, sand, other loose material) off-site on public roads shall be either sufficiently watered or securely covered to prevent excessive dust.
10. Gate seals should be tight on dump trucks.

MM 4.3-3 The project proponent and/or its contractors shall continuously implement the following measures during construction and operation of the project to control emissions from the on-site equipment:

a. All equipment shall be maintained in accordance with the manufacturer's specifications.

b. All equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than five (5) minutes.

c. Construction equipment shall not operate longer than eight (8) cumulative hours per day without prior written authorization provided by the Kern County Planning and Natural Resources Department.

d. All construction vehicles shall be equipped with proper emissions control equipment and kept in good and proper running order to substantially reduce NOx emissions.

e. On-road and off-road diesel equipment shall use diesel particulate filters (or the equivalent) if permitted under manufacturer's guidelines.

f. All on-site off-road equipment and on-road vehicles shall meet the recent California Air Resources Board engine emission standards or alternatively fueled equipment, such as compressed natural gas, liquified natural gas, or electric, as appropriate.

g. Tier 4 engines shall be used on all equipment when available.

MM 4.3-4 To reduce demand for gas-powered landscape maintenance equipment, all required landscaping along major and arterial roadways will be designed with native drought-resistant species (plants, trees, and bushes).

MM 4.3-5 Prior to the issuance of grading permits, the Owner/Operator shall enter into a Developer Mitigation Agreement (DMA) (synonymous with a Voluntary Emissions Reduction Agreement) with the San Joaquin Valley Air Pollution Control District. The DMA is to fully mitigate construction and operations criteria air emissions of project implementation for project vehicle and other mobile source emissions. The Owner/Operator shall pay fees to fully mitigate project emissions of NOx (oxides of nitrogen), ROG (reactive organic gases), PM_{10} (particulate matter of 10 microns or less in diameter), and $PM_{2.5}$ (particulate matter of 2.5 microns or less in diameter) (collectively referred to as "designated criteria emissions") to avoid any net increase in these pollutants. The air quality mitigation fee shall be paid prior to the approval of any construction or grading approval or payment plan as designated by the San Joaquin Valley Air Pollution Control District.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.1-3** (See *Section 4.1, Aesthetics,* for full mitigation text) and **MM 4.3-1** through **MM 4.3-5**, impacts would be less than significant after mitigation.

Impact 4.3-2: The project would result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard. Specifically, implementation of the project would exceed any of the following adopted thresholds:

a. SJVAPCD

a. Operational and Area Sources:
10 tons per year for ROG
10 tons per year for NO_X
15 tons per year for PM_{10}

b. Stationary Sources as Determined by District Rules
Severe Nonattainment: 25 tons per year
Extreme Nonattainment: 10 tons per year

San Joaquin Valley Air Pollution Control District

The SJVAPCD adopted thresholds of significance in the 2015 Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI) (SJVAPCD 2015). Section 8.4.2 of the GAMAQI provides that project-related impacts on air quality may be significant when on-site emission increases from construction activities or operational activities exceed the 100 pounds per day screening level of any criteria pollutant after implementation of all enforceable mitigation measures. Under such circumstances, the SJVAPCD recommends that an ambient air quality analysis be performed to determine whether emission increases from a project will cause or contribute to a violation of the CAAQS based on the significance thresholds as follows:

- Construction and Operational (permitted and non-permitted equipment and activities) emissions;
  - 10 tons per year for ROG
  - 10 tons per year for NO_X
  - 100 tons per year for CO
  - 27 tons per year for SO_X
  - 15 tons per year for PM_{10}

- 15 tons per year for $PM_{2.5}$

Regional Emissions

Air pollutant emissions have regional effects and localized effects. This analysis assesses the regional effects of the Project's criteria pollutant emissions in comparison to SJVAPCD thresholds of significance for short-term construction activities and long-term operation of the Project.

The primary pollutants of concern during project construction and operation are ROG, NOx, PM_{10}, and $PM_{2.5}$. Ozone is a secondary pollutant that can be formed miles from the source of emissions, through reactions of ROG and NO_x emissions in the presence of sunlight. Emissions of ROG and NOx are termed ozone precursors. The SJVAB often exceeds the State and national ozone standards. Therefore, if the Project emits a substantial quantity of ozone precursors, the Project may contribute to an exceedance of the ozone standard. The SJVAB also exceeds air quality standards for PM_{10} and $PM_{2.5}$; therefore, substantial project emissions may contribute to an exceedance for these pollutants.

The Project does not contain sources that would produce substantial quantities of SO_2 emissions during construction and operation.

Construction Emissions

For purposes of analysis, construction of the Project was expected to commence in January 2024 and last through December 2025. The construction schedule utilized in the analysis represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as time passes and the analysis year increases due to emission regulations becoming more stringent. The proposed construction schedule and equipment assignments are presented in Appendix B.1.

Table 4.3-8 shows that criteria pollutant emissions would not exceed any of the SJVAPCD's regional thresholds of significance during the unmitigated construction of the Project. It should be noted that unmitigated construction emissions incorporate the basic dust control measures required under SJVAPCD Rule 8201, which necessitates that vehicle speeds on unpaved roads and surfaces be reduced to no more than 15 miles per hour and exposed construction areas are watered during earthmoving activities.

Table 4.3-8: Unmitigated Construction Air Pollutant Emissions Summary

Year	Emissions (tons/year)					
	VOC	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
2024	0.48	3.90	4.30	0.01	0.64	0.31
2025	2.67	2.20	4.25	0.01	0.54	0.18
Maximum Annual Emissions	**2.67**	**3.90**	**4.30**	**0.01**	**0.64**	**0.31**
SJVAPCD Regional Threshold	10	10	100	27	15	15
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod construction-source (unmitigated) emissions are presented in Appendix B.1.

Operational Emissions

Emissions from the operation of the facility would mainly be attributed to area sources of emissions at the Project site and from mobile sources (i.e., vehicles) associated with the operation of the warehouse. Direct energy-related emissions from the facility associated with natural gas usage were calculated by CalEEMod using default parameters. Additionally, two 300-horsepower diesel-powered emergency generators/fire pumps were also assumed. The emergency generators/fire pumps were estimated to operate for up to 1 hour per day, one day per week for up to 50 hours per year for maintenance and testing purposes. Emissions associated with the two stationary emergency diesel-powered emergency generators/fire pumps were calculated using CalEEMod.

Sources of air pollutants related to the industrial operations inside of the warehouse include two electric cargo handling port tractors (conservatively assumed to be operating on natural gas), each rated at 175 horsepower, two natural gas-powered emergency microturbines (operation for maintenance and testing only, up to 50 hours per year each) and TRUs. Source details are provided in Appendix B.1.

The warehouse operations would generate both employee and visitor passenger vehicle trips and truck trips which are mobile sources of both criteria pollutant and TAC emissions. CARB regulations limit on-site idling to less than 5 minutes per occurrence (emissions assume a conservative 15-minute idle). Signs would be posted at the facility to facilitate compliance with the regulation. Signs also directing truck traffic into and out of the facility would ensure smooth traffic flow and avoid wasteful queueing and idling.

The Project-related emissions derive primarily from 1,430 vehicle trips generated by the Project, including employee trips to and from the site and truck trips associated with the proposed uses. Trip characteristics available from the Proposed Airport Drive Warehouse Traffic Impact Analysis (Appendix B.1) were utilized in this analysis. Vehicle trip lengths for off-site truck trips were based on an average travel distance of 65 miles/one-way trip and an assumption of 100% primary trips. This truck trip length was calculated based on survey data derived from Fresno Council of Government's Report for San Joaquin Valley I-5/SR-99 Good Movement Corridor Study, prepared by Cambridge Systematics, Inc. June 30, 2017, to account for truck travel that would occur within the San Joaquin Valley Air Basin. Passenger vehicle trip lengths are based on CalEEMod model defaults.

As shown in **Table 4.3-9**, the Project is expected to have long-term air quality impacts. Operation-related emissions, as calculated by CalEEMod, would be less than the SJVAPCD significant threshold levels for CO, PM_{10}, $PM_{2.5}$, ROG, and SO_x, but would exceed the threshold for NO_x, prior to mitigation. However, ROG, NO_x, PM_{10}, and $PM_{2.5}$ emissions will be mitigated by the implementation of a VERA through **Mitigation Measure MM 4.3-5** and SJVAPCD Rule 9510 (Indirect Source Review).

Table 4.3-9: Unmitigated Operational Emissions Summary

Year	Emissions (ton/year)					
	VOC	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
Mobile Source	0.76	10.33	6.34	0.10	3.79	1.12
Area Source	4.44	0.03	3.61	0.00	0.01	0.00
Energy Source	0.01	0.23	0.19	0.00	0.02	0.02
Emergency Fire Pumps	0.02	0.07	0.06	0.00	0.00	0.00
On-site Cargo Equipment	0.04	0.14	6.00	0.00	0.01	0.01
TRU Source	2.77	2.93	0.35	0.00	0.10	0.09
Microturbines	<0.005	0.18	0.05	0.54	<0.005	<0.005
Project Maximum Annual Emissions	**8.04**	**13.91**	**16.60**	**0.64**	**3.93**	**1.24**
SJVAPCD Regional Threshold	10	10	100	27	15	15
Threshold Exceeded?	**No**	**Yes**	**No**	**No**	**No**	**No**

Source: CalEEMod operational-source emissions are presented in Appendix B.1

Under the ISR, developers are encouraged to reduce as much air pollution as possible through on-site mitigation or incorporating air-friendly designs and practices into the Project. Examples include bike paths and sidewalks, traditional street design; locating near bus stops and bike paths; locating near different land use zones, such as commercial; and increasing energy efficiency. If these practices do not completely meet the required reductions, then under the rule, new development projects are required to mitigate the remainder of their emissions by contributing to a mitigation fund that would be used to pay for the most cost-effective projects to reduce emissions. Examples of such projects include the retirement and crushing of gross polluting cars, replacement of older diesel engines, and diesel-powered vehicles and programs that would encourage the replacement of gas-powered lawnmowers with electric lawnmowers.

It should be noted that overly conservative assumptions were used in the AQIA, such as 15-minute idle times (CARB ATCM 13 CCR § 2485 limits idling time to 5 minutes), natural gas-powered cargo equipment operating for twice CARB's recommended operation time, and dual diesel-powered back-up fire pumps and microturbines. Actual operational emissions with 5-minute idle times and electric cargo equipment are assumed to be below thresholds. While CARB does limit idling to 5 minutes, the AQIA uses 15 minutes which assumes 5-minute idle time for each of the following three steps that a truck completes while on-site: (1) Checking-into the site, (2) unhook trailer, and (3) leaving the site.

As shown in **Table 4.3-10**, a 33.3% reduction of the Project's operational NOx emissions through the implementation of on-site emission reduction measures or off-site fees reduces emissions below the SJVAPCD's regional significance threshold for NOx.

Table 4.3-10: Mitigated Operational Emissions Summary

Year	Emissions (ton/year)					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Mobile Source	0.76	6.89	6.34	0.10	3.79	1.12
Area Source	4.44	0.02	3.61	0.00	0.01	0.00
Energy Source	0.01	0.15	0.19	0.00	0.02	0.02
Emergency Fire Pumps	0.02	0.05	0.06	0.00	0.00	0.00
On-site Cargo Equipment	0.04	0.09	6.00	0.00	0.01	0.01
TRU Source	2.77	1.95	0.35	0.00	0.10	0.09
Microturbines	<0.005	0.12	0.05	0.54	<0.005	<0.005
Project Maximum Annual Emissions	**8.04**	**9.28**	**16.60**	**0.64**	**3.93**	**1.24**
SJVAPCD Regional Threshold	10	10	100	27	15	15
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

Source: CalEEMod operational-source emissions are presented in Appendix B.1

Localized Impact

Emissions occurring at or near the Project site have the potential to create a localized impact also referred to as an air pollutant hotspot. Localized emissions are considered significant if when combined with background emissions, they would result in exceedance of any health-based air quality standard. In locations that already exceed standards for these pollutants, significance is based on a significant impact level (SIL) that represents the amount that is considered a cumulatively considerable contribution to an existing violation of an air quality standard.

The SJVAPCD's GAMAQI includes screening thresholds for identifying projects that need detailed analysis for localized impacts. Projects with on-site emission increases from construction activities or operational activities that exceed the 100 pounds per day screening level of any criteria pollutant after compliance with Rule 9510 and implementation of all enforceable mitigation measures would require preparation of an AAQA. The criteria pollutants of concern for localized impact in the SJVAB are PM_{10}, $PM_{2.5}$, NO_2, and CO. CO violations require heavy traffic volumes and extreme traffic congestion that would not occur at or near the Project site; therefore, operational CO emission hotspots are highly unlikely.

Analyses of average daily emissions for both construction and operation phases were conducted to determine whether emissions would exceed the localized SJVAPCD 100 pounds per day screening threshold for any pollutant of concern. The daily on-site emissions were calculated from annual totals for both construction and operation. This approach follows the recommended SJVAPCD Guidance for evaluating projects for ambient air quality analysis applicability (Appendix B.4). The emissions were determined from the sum of all on-site emissions (including sources operating within ¼ mile of the site boundary) and divided by the number of active construction days (261 days per year) and operation (365 days).

The results of the localized analysis are presented in **Table 4.3-11** and **Table 4.3-12** for construction and operations, respectively. Details of the calculations are included in Appendix B.2.

Table 4.3-11: Localized Daily Air Pollutant Emissions During Construction

Year	Emissions (pound/day)				
	ROG	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**
2024	3.68	29.89	32.95	4.90	2.38
2025	20.46	16.86	32.57	4.14	1.38
Average Daily Emissions (lbs/day)	**20.46**	**29.89**	**32.95**	**4.90**	**2.38**
Screening threshold (lbs/day)	100	100	100	100	100
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**

Notes:
Operational Emissions include cars and trucks from project operations on-site and off-site within 0.25-mile of the site boundary.
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
ROG = reactive organic gases
Source: Urban Crossroads 2024.

Table 4.3-12: Localized Daily Air Pollutant Emissions During Operations

Emission Source	Emissions (pound/day)				
	ROG	**NOx**	**CO**	**PM10**	**PM2.5**
Mobile Emissions	4.16	37.75	34.74	20.77	6.14
Area Source Emissions	24.33	0.11	19.78	0.05	0.00
Energy Source Emissions	0.05	0.82	1.04	0.11	0.11
Emergency Fire Pumps	0.11	0.27	0.33	0.00	0.00
On-site Cargo Equipment Emissions	0.22	0.49	32.88	0.05	0.05
TRU Source Emissions	15.18	16.05	1.92	0.55	0.49
Microturbines Emissions	0.01	1.00	0.26	0.02	0.02
Average Daily Emissions (lbs/day)	**44.06**	**56.51**	**90.94**	**21.55**	**6.82**
Screening threshold (lbs/day)	100	100	100	100	100
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**

Notes:
Operational Emissions include cars and trucks from project operations on-site and off-site within 0.25-mile of the site boundary.
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
ROG = reactive organic gases
Source: Urban Crossroads 2024.

The Project would not exceed SJVAPCD screening thresholds for requiring additional ambient air quality modeling. Both the Project's localized criteria pollutant impacts from construction and operation are less than significant.

Based on the non-attainment status of the air basin, regional health risks associated with air quality impacts, and the requirement under CEQA that all reasonable and feasible mitigation be required, **Mitigation Measure MM 4.3-5** requires the execution of a Developer Mitigation Agreement (DMA) with the SJVAPCD for mitigation of criteria pollutants. The implementation, as mitigation, of a DMA to reduce criteria pollutants of NO_X, ROGs, and PM net incremental emissions generated by a project has been incorporated into development projects in Kern County since 2008.

This is the same instrument and pathway the air district calls a Voluntary Emission Reduction Agreement (VERA). Once applied as mitigation they are not a "voluntary" agreement with the SJVAPCD but is mandated by enforceable mitigation measures as a DMA. The emission reductions required by a DMA are normally implemented within the SJVAB in quantities sufficient to fully mitigate the Project's air quality impacts such that the development of the Project could be considered to result in no net increase in the designated criteria pollutant emissions over the criteria pollutant emissions that would otherwise exist without the development of the Project, all to be verified by the SJVAPCD. The mandated emission reductions will be achieved by a menu of options that range from paying a calculated mitigation fee for use in doing emission reduction projects through a grant-type program to applicants in a pre-determined area. The executed DMA will require the payment of a calculated mitigation fee per ton to the SJVAPCD. The agreement also includes an additional administrative fee of 4% collected for the SJVAPCD. Expenditure of the mitigation funds is then done for certified air quality reduction projects through the SJVAPCD. The final determination of air quality reductions achieved shall be under the determination of the SJVAPCD.

As implemented, the DMA results in greater reductions than would otherwise occur under the District's ISR, since the ISR does not require ROG reductions and the ISR only requires a percentage of reductions rather than full reductions of NO_X and PM resulting from project construction and operations. When adopting the ISR and the subsequent VERA/DMA programs, the District acknowledges that as ROG is a precursor to ozone, reductions are not required in the VERA/DMA. Instead, the reductions are achieved by increasing the NO_X and PM tonnage for project levels; see SJVAPCD (2005); this and other key SJVAPCD documents are included in Appendix B.3. As the actual amount of ROG reductions achieved from NO_X and PM_{10} reductions is not certain, Project emissions are still considered significant and unavoidable; however, all feasible and reasonable mitigation has been required to reduce criteria pollutants as close to "no net increase" as scientifically possible. This approach has been found legally sufficient by court rulings in the following cases; *California Building Industry Assn. v. San Joaquin Valley APCD*, Fresno County Case No. 06 CECG 02100 DS13; *National Association of Home Builders v. San Joaquin Valley Air Pollution Control District*, Federal District Court, Eastern District of California, Case No. 1:07-CV-00820-LJO-DLB; and *Center for Biological Diversity et al. v. Kern County*, Fifth Appellate District, Case No. F061908.

However, potential cumulative impacts on air quality could occur from the construction and operation of the Project in combination with regional growth projections in the same air basin. It is speculative to determine how exceeding the regional thresholds would affect the number of days the region is in nonattainment since mass emissions are not correlated with concentrations of emissions or how many additional individuals in the air basin would be affected by the health

impacts mentioned. The SJVAPCD is the primary agency responsible for ensuring the health and welfare of sensitive individuals to elevated concentrations of air quality in the SJVAB at the present time and it has not provided methodology to assess the specific correlation between mass emissions generated and the effect on public health and welfare. Therefore, it is the Lead Agency's determination that cumulative impacts for criteria pollutants are considered significant and unavoidable.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-5** would be required.

Level of Significance after Mitigation

Despite implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-5**, impacts would remain significant and unavoidable after mitigation.

Impact 4.3-3: The project would expose sensitive receptors to substantial pollutant concentrations:

Sensitive receptors are particularly sensitive to air pollution because they are persons that are ill, elderly, or have lungs that are not fully developed. Locations where such persons reside, spend considerable amount of time, or engage in strenuous activities are also referred to as sensitive receptors. Typical sensitive receptors include inhabitants of long-term healthcare facilities, rehabilitation centers, convalescent centers, retirement homes, residences, schools, playgrounds, childcare centers, and athletic facilities.

The Project consists of two multi-tenant warehouse buildings with a total area of 923,130 square feet on 49.05 acres. As such, the potential impact of Project-generated air pollutant emissions at sensitive receptors has also been considered. Sensitive receptors can include uses such as long-term healthcare facilities, rehabilitation centers, and retirement homes. Residences, schools, playgrounds, childcare centers, and athletic facilities can also be considered sensitive receptors.

Receptors in the Project study area are described below. All distances are measured from the Project site's boundary to the outdoor living areas (e.g., backyards) or at the building façade, whichever is closer to the Project site. The selection of receptor locations is based on Federal Highway Administration guidelines and is consistent with additional guidance provided by Caltrans and the Federal Transit Administration. Distance is measured in a straight line from the Project boundary to each receptor location.

R1 **Location R1** represents the existing residence at 855 Greenwood Meadow Lane, approximately 667 feet northeast of the Project site. Receptor R1 is placed in the private outdoor living areas (backyard) facing the Project site.

R2 **Location R2** represents the existing residence at 3117 Alhambra Meadow Court, approximately 173 feet northeast of the Project site. Receptor R2 is placed in the private outdoor living areas (backyard) facing the Project site.

R3 **Location R3** represents the existing residence at 720 Meadow Grove Court, approximately 809 feet east of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receptor R3 is placed at the building façade.

R4 **Location R4** represents the Park Meadows Apartment community residence at 840 Park Meadows Avenue, approximately 102 feet east of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receptor R4 is placed at the building façade.

R5 **Location R5** represents the existing residence at 2101 Wingland Drive, approximately 910 feet southeast of the Project site. Receptor R5 is placed in the private outdoor living areas (backyard) facing the Project site.

R6 **Location R6** represents the Priceless Car Rental at 2813 Hanger Way Suite A, approximately 109 feet west of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receptor R6 is placed at the building façade.

R7 **Location R7** represents the Wingland Elementary School at 701 Douglas Street, approximately 1,115 feet southeast of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receptor R7 is placed at the building façade.

As detailed in the sensitive receptor discussion, the closest residential receptor (R4) is located approximately 102 feet east of the Project site in the Park Meadows Apartment community residence at 840 Park Meadows Avenue. The closest sensitive receptor (R7), Wingland Elementary School, is approximately 1,115 feet southeast of the Project site. The closest worker receptor (R6), the Priceless Car Rental at 2813 Hanger Way, is located approximately 109 feet west of the Project site. **Figure 4.3-1** depicts the location of the sensitive receptors relative to the Project site over an aerial image.

Figure 4.3-1: Sensitive Receptor Locations

Toxic Air Contaminants

The primary TAC of concern for this project would be DPM emitted within the Project site from the construction and operation phases of the Project. The emissions of potential DPM associated with construction activities are expected to be low and would be transient, temporary, and occur in varying locations within the Project site. A screening HRA was performed for construction DPM emissions using the AERMOD dispersion model, along with equations from the Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015), to estimate the Project's cancer and non-cancer chronic health risks. The Project's non-cancer acute health risks were not estimated because OEHHA has not established an acute reference exposure level for DPM and there are no acute non-cancer risk values associated with DPM.

Construction and Operation

Construction of on-site facilities and off-site improvements would generate short-term DPM air quality impacts, which were evaluated in the HRA. Detailed assumptions and calculations are included in the project-specific Health Risk Assessment Data (Appendix B.1). The HRA evaluated cancer and non-cancer chronic health risks from construction. DPM is the primary TAC associated with construction, and it does not have an acute Reference Exposure Level (REL); therefore, the acute hazard index was not quantified for construction impacts.

Exposure to TACs during the construction period was assumed to start with a fetus in the third trimester and continue for the 24 months of construction. Breathing rates and age sensitivity factors from the OEHHA guidance were assumed for the age bin from third-trimester fetus to two years of age.

Operation of the Project once construction is completed would also generate TAC emissions, as described above. Because cancer risk accumulates over time, the HRA evaluated cancer risk from the Project's operations with exposure starting at the end of construction.

The cancer risk at Maximally Exposed Individual Resident, Maximally Exposed Individual Worker, and Maximally Impacted Sensitive Receptor are provided in **Table 4.3-13.** As illustrated therein, the construction phase of the Project (estimated to span 1.95 years) would not result in increased cancer risk or hazard index in excess of SJVAPCD's significance thresholds. Overall, impacts associated with the Project's potential to expose sensitive receptors to substantial TACs due to the Project-generated construction emissions would be less than significant.

Table 4.3-13: Estimated Unmitigated Health Risk during Construction and Operation

Risk	Value	SJVAPCD Threshold	Exceeds SJVAPCD Threshold (Y/N)?	Receptor Coordinates (UTM NAD 83 Zone 11)	
				Easting (meters)	Northing (meters)
Cancer MEIR Risk (in a	16.54	20 in 1 million	N	314928.0	3922941.1
Cancer Sensitive Risk (in a	0.64	20 in 1 million	N	315155.7	3922199.3
Cancer MEIW Risk (in a	2.04	20 in 1 million	N	314482.5	3922988.5

Risk	Value	SJVAPCD Threshold	Exceeds SJVAPCD Threshold (Y/N)?	Receptor Coordinates (UTM NAD 83 Zone 11)	
				Easting (meters)	Northing (meters)
Chronic MEIR HI	0.02	1.0	N	314928.0	3922941.1
Chronic Sensitive HI	≤0.01	1.0	N	315155.7	3922199.3
Chronic MEIW HI	0.01	1.0	N	314482.5	3922988.5

Notes:
NAD = North American Datum
UTM = Universal Transverse Mercator
HI = Hazard Index
MEIR = Maximally Exposed Individual Resident
MEIW = Maximally Exposed Individual Worker
SJVAPCD = San Joaquin Valley Air Pollution Control District

Criteria Air Pollutants

Sierra Club vs. County of Fresno (December 24, 2018)

In *Sierra Club v. County of Fresno* (S219783) (Sierra Club) the Supreme Court held that CEQA requires environmental impact reports to either (i) make a "reasonable effort" to substantively connect the estimated amount of a given air pollutant a project will produce and the health effects associated with that pollutant, or (ii) explain why such an analysis is infeasible (6 Cal.5th at 1165-66). However, the Court also clarified that CEQA "does not mandate" that EIRs include "an in-depth risk assessment" that provides "a detailed comprehensive analysis . . . to evaluate and predict the dispersion of hazardous substances in the environment and the potential for exposure of human populations and to assess and quantify both the individual and population-wide health risks associated with those levels of exposure." *Id*. at 1665. However, correlating the Project's criteria air pollutant to specific health impacts, particularly with respect to O_3 is not possible because there is no feasible or established scientific method to perform such analysis. This conclusion is supported by both the SJVAPCD and the South Coast Air Quality Management District (SCAQMD) who have determined that this type of analysis is speculative and infeasible and there are no unique issues for the SJVAPCD that would make this analysis invalid.

Writing as amicus curiae in Sierra Club, the SJVAPCD explained that "[t]he health impact of a particular criteria pollutant is analyzed on a regional and not a facility level based on how close the area is to complying with (attaining) the NAAQS. Accordingly, while the type of individual facility/health impact analysis that the Court of Appeal has required is a customary practice for TACs, it is not feasible to conduct a similar analysis for criteria air pollutants because currently available computer modeling tools are not equipped for this task" (SJVAPCD 2015).

Instead, the SJVAPCD explained that it assesses a project's potential to exceed NAAQS by evaluating the Project's compliance with district thresholds of significance, which are measured in mass emissions (SJVAPCD 2015). As explained by SJVAPCD, its thresholds are based on factual, scientific data and have been set at a level that ensures that NAAQS will not be exceeded, taking into consideration all cumulative emission sources (SJVAPCD 2015). The SJVAPCD explained that attempting to connect criteria pollutant emissions to localized health impacts will "not yield

reliable information because currently available modeling tools are not well suited for this task" (SJVAPCD 2015). Available models are only equipped to model the impact of all emissions sources on an air basin-wide or regional basis, not on a project-level basis, and "[r]unning the photochemical grid model used for predicting ozone attainment with emissions solely from one project would thus not be likely to yield valid information given the relative scale involved" (SJVAPCD 2015).

This inability to "accurately ascertain local increases in concentration" of mass emissions and then to further link emissions with health effects is particularly true for O_3 and its precursors NO_X, ROG, and VOC; O_3 is not directly emitted into the air but is instead formed as ozone precursors undergo complex chemical reactions through sunlight exposure (SJVAPCD 2015). Given the complex nature of this process, and the fact that O_3 can be transported by wind over long distances, "a specific tonnage amount of NO_X or VOCs emitted in a particular area does not equate to a particular concentration of ozone in that area" (SJVAPCD 2015). For this reason, the photochemical analysis for O_3 is done on a regional scale and it is inappropriate to analyze O_3 impacts at a local or project-level basis because a localized analysis would at most be speculative and, at worst, be misleading. Speculative analysis is not required by CEQA (CEQA Guidelines Section 15145; *Laurel Heights Improvement Association v. Regents of the University of California* 1988).

The SJVAPCD also explained that the disconnect between the tonnage of precursor pollutants and the concentration of O_3 or particulate matter formed in a particular area is especially important to understand in considering potential health effects because it is the concentration, not the tonnage, that causes health effects (SJVAPCD 2015). The SJVAPCD explained that even if a model were developed that could accurately assess local increases in concentrations of pollutants like O_3 and particulates, it would still be "impossible, using today's models, to correlate that increase in concentration to a specific health impact" (SJVAPCD 2015). The SJVAPCD stated that even a project with criteria pollutant emissions above its CEQA thresholds does not necessarily cause localized human health impacts as, even with relatively high levels of emissions, the SJVAPCD cannot determine "whether and to what extent emissions from an individual project directly impact human health in a particular area" (SJVAPCD 2015). The SJVAPCD explained that this is particularly true for development projects like the Project, where most of the criteria pollutants derive from mobile and area sources and not stationary sources. The SCAQMD also, as amicus curiae in Sierra Club, made similar points, reiterating that "an agency should not be required to perform analyses that do not produce reliable or meaningful results" (SCAQMD 2015). SCAQMD agrees that it is very difficult to quantify health impacts with regard to O_3, opining that the only possible means of successfully doing so is for a project so large that emissions would essentially amount to all regional increases (SCAQMD 2015). With regard to particulate matter, the SCAQMD noted that while the ARB has created a methodology to predict expected mortality from large amounts of $PM_{2.5}$, the primary author of the methodology has reported that it "may yield unreliable results due to various uncertainties" and ARB staff has been directed by its Governing Board to reassess and improve it, which factor "also counsels against setting any hard-and-fast rule" about conducting this type of analysis (SCAQMD 2015).

Ambient Air Quality Standards

The EPA and ARB have established NAAQS at levels above which concentrations could be harmful to human health and welfare, with an adequate margin of safety. Further, California air districts, like the SJVAPCD, have established emission-based thresholds that provide project-level estimates of criteria air pollutant quantities that air basins can accommodate without affecting the attainment dates for the NAAQS. Accordingly, elevated levels of criteria air pollutants as a result of a project's emissions could cause adverse health effects associated with these pollutants. The project site is located in the Kern County portion of the SJVAB, which is designated as an attainment area for O_3 (1- hour), PM_{10} and $PM_{2.5}$ and nonattainment for O_3 (8-hour) under the NAAQS, and nonattainment for O_3, PM_{10}, and $PM_{2.5}$ under the CAAQS.

Project Health Effects of Criteria Air Pollutants

Regarding health effects of criteria air pollutants, the Project's potential to result in regional health effects associated with ROG, NOx, $PM_{10,}$ and $PM_{2.5}$ on specific vulnerable populations cannot be calculated given existing scientific constraints. A scientific method to calculate the exact number of individuals in a vulnerable population that will get sick has not been developed; therefore, it is assumed localized health effects associated with NOx, PM_{10}, and $PM_{2.5}$ emissions from project implementation could occur. The Project is the construction and operation of a new warehouse that would require dust-generating construction activities such as site preparation, mowing, paving, and grading, over a large area. Blowing dust could occur and result in the dispersal of criteria air pollutants such as $PM_{2.5}$ and potentially contribute to the transmission of respiratory diseases like COVID-19. While COVID-19 is thought to spread mainly through close contact from person to person, the CDC is still learning how the virus spreads and the severity of the illness it causes (CDC 2020b). A nationwide study by Harvard University found a linkage between long-term exposure to $PM_{2.5}$ as air pollution and statistically significant increased risk of COVID-19 death in the United States (Harvard 2020). While construction dust suppression measures would be implemented in **Mitigation Measures MM 4.3-1** through **MM 4.3-10**, exposure to dust during construction could still occur which could increase the health susceptibility and increase the severity of the disease. In addition to the implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-10**, the Project would implement **Mitigation Measure MM 4.3-8**, which requires the implementation of a COVID-19 Health and Safety Plan in accordance with the Kern County Public Health Services Department and Kern County Health Officer mandates.

Therefore, implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-10** would be required to reduce the Project's regional and localized health effects associated with criteria air pollutants and COVID-19; however, the exact reduction from implementation of these mitigation measures cannot be quantified given existing scientific constraints.

Carbon Monoxide Hotspots

As discussed below, the Project would not result in potentially adverse CO concentrations or "hot spots." Further, detailed modeling of Project-specific CO "hot spots" is not needed to reach this conclusion.

An adverse CO concentration, known as a "hot spot," would occur if an exceedance of the state 1-hour standard of 20 ppm or the eight-hour standard of 9 ppm were to occur. At the time of the 1993 Handbook, the air basin was designated non-attainment under the CAAQS and NAAQS for CO (SCAQMD 2023).

It has long been recognized that CO hot spots are caused by vehicular emissions, primarily when idling at congested intersections. In response, vehicle emissions standards have become increasingly stringent in the last twenty years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentration in the air basin is now designated as attainment, as previously noted.

To establish a more accurate record of baseline CO concentrations affecting the basin, a CO "hot spot" analysis was conducted in 2003 for four busy intersections in Los Angeles at the peak morning and afternoon time periods. This "hot spot" analysis did not predict any violation of CO standards, as shown in **Table 4.3-14**.

Table 4.3-14: CO Model Results

Intersection Location	CO Concentrations (ppm)		
	Morning 1-hour	Afternoon 1-hour	8-hour
Wilshire Boulevard/Veteran Avenue	4.6	3.5	3.7
Sunset Boulevard/Highland Avenue	4.0	4.5	3.5
La Cienega Boulevard/Century Boulevard	3.7	3.1	5.2
Long Beach Boulevard/Imperial Highway	3.0	3.1	8.4

Source: Urban Crossroads (2003 AQAP, Appendix V: Modeling and Attainment Demonstrations)

Notes: Federal 1-hour standard is 35 ppm and the deferral 8-hour standard is 9.0 ppm.

It should be noted that SJVAPCD has not established its own guidelines for CO hot spots analysis. Since the SJVAPCD guidelines are based on SCAQMD methodology, it is appropriate to apply the SCAQMD criteria when analyzing CO hot spots within the SJVAPCD. As identified within SCAQMD's 2003 AQAP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak CO concentrations in the SCAB were a result of unusual meteorological and topographical conditions and not a result of traffic volumes and congestion at a particular intersection. As evidence of this, for example, 8.4 ppm 8-hour CO concentration measured at the Long Beach Boulevard and Imperial Highway intersection (highest CO generating intersection within the "hot spot" analysis), only 0.7 ppm was attributable to the traffic volumes and congestion at this intersection; the remaining 7.7 ppm were due to the ambient air measurements at the time the 2003 AQAP was prepared (Appendix B.4).

Similar considerations are also employed by other Air Districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour (vph) —or 24,000 vph where vertical and/or horizontal air does not mix—in order to generate a significant CO impact (BAAQMD 2024).

Traffic volumes generating the CO concentrations for the "hot spot" analysis is shown in **Table 4.3-15**. The busiest intersection evaluated was at Wilshire Boulevard and Veteran Avenue, which had AM/PM traffic volumes of 8,062 vph and 7,719 vph respectively (SCAQMD 2003). The 2003 AQAP estimated that the 1-hour concentration for this intersection was 4.6 ppm; this indicates that, should the daily traffic volume increase four times to 32,248 vph, CO concentrations (4.6 ppm x 4= 18.4 ppm) would still not likely exceed the most stringent 1-hour CO standard (20.0 ppm).

As shown in the Traffic Impact Analysis, the highest average AM/PM traffic volumes on a segment of road would be 4,241 vph and 4,928 vph, respectively, at the SR-99 connector to Highway 65 and Merle Haggard Drive, which is lower than the highest AM/PM traffic volumes at Wilshire Boulevard and Veteran Avenue of 8,062 vph and 7,719 vph, respectively (Appendix J). As such, Project-related traffic volumes are less than the traffic volumes identified in the 2003 AQAP. The Project considered herein would not produce the volume of traffic required to generate a CO "hot spot" either in the context of the 2003 Los Angeles hot spot study or based on representative BAAQMD CO threshold considerations. Therefore, CO "hot spots" are not an environmental impact of concern for the Project. Localized air quality impacts related to mobile-source emissions would therefore not have the potential to exceed the applicable air quality standards.

Table 4.3-15: Traffic Volumes

Intersection Location	Peak Traffic Volumes (vph)				
	Eastbound (AM/PM)	Westbound (AM/PM)	Southbound (AM/PM)	Northbound (AM/PM)	Total (AM/PM)
Wilshire Boulevard/Veteran Avenue	4,954/2,069	1,830/3,317	721 1,400	560/933	8,062 7,719
Sunset Boulevard/Highland Avenue	1,417/1,764	1,342/1,540	2,304/1,832	1,551/2,238	6,614/5,374
La Cienega Boulevard/Century Boulevard	2,540/2,243	1,890/2,728	1,384/2,029	821/1,674	6,634/8,674
Long Beach Boulevard/Imperial Highway	1,217/2,020	1,760/1,400	479/944	756/1,150	4,212/5,514

Visibility Impacts

As discussed above under Methodology, Kern County has established criteria to determine whether a project would potentially result in a visibility impact; however, the SJVAPCD has not established guidance to address visibility in CEQA documents. Per the Kern County guidelines, a visibility analysis is not required since the Project is not a large industrial stationary source project or a mining project, and it would not have long-term operational components that could generate dust, or emissions plumes related to visibility. Compliance with Regulation VIII, including implementation of all feasible dust control measures specified in SJVAPCD's *Guide for Assessing and Mitigating Air Quality Impacts* and incorporated into a Dust Control Plan, is sufficient mitigation to reduce air quality effects from construction-related PM_{10} emissions to a less than significant level (SJVAPCD 2015).

The Project's potential to expose sensitive receptors to substantial pollutant concentrations associated with visibility impacts would be less than significant with the mitigation measures described above (**Mitigation Measures MM 4.3-1** and **MM 4.3-2**), and no additional mitigation is required.

Valley Fever

The *Coccidioides immitis* fungus spores in soil, which are responsible for transmitting the Valley Fever, can disperse in the air when the soil is disturbed during construction activities, and then can be inhaled into the lungs. On-site construction workers potentially could be exposed to Valley Fever from fugitive dust generated during the construction of the Project, notably during excavation, grading, and other earthmoving activities. While there are no specific thresholds for the evaluation of potential *Coccidioides immitis* (Valley Fever) exposure, the potential for workers or area residents contracting Valley Fever as a result of the Project is evaluated based on the anticipated earthmoving activities, and considers applicant-proposed measures and compliance with Rule 8021, Section 6.3, which requires development and implementation of a dust control plan to help control the release of the *Coccidioides immitis* fungus during construction activities. Construction activities within the Project area are subject to SJVAPCD Regulation VIII (Fugitive PM_{10} Prohibition). Regulation VIII is intended to reduce ambient concentrations of PM_{10} by requiring actions to prevent, reduce, or mitigate anthropogenic fugitive dust emissions. **Mitigation Measure MM 4.3-2** would be implemented to further reduce impacts associated within Valley Fever and pandemics. By reducing fugitive dust emissions, Regulation VIII reduces potential exposure to Valley Fever. Since current long-term residents typically already have been exposed to and have developed immunity to Valley Fever, construction activities are not expected to add significantly to the exposure of off-site residents to the fungus.

Naturally Occurring Asbestos

Naturally occurring asbestos can be released from serpentinite and ultramafic rocks when the rock is broken or crushed. At the point of release, the asbestos fibers may become airborne, causing air quality and human health hazards. These rocks have been commonly used for unpaved gravel roads, landscaping, fill projects, and other improvement projects in some localities. Asbestos may be

released to the atmosphere due to vehicular traffic on unpaved roads, during grading of development projects, and at mining operations.

Serpentine and/or ultramafic rock are known to be present in 44 of California's 58 counties. These rocks are particularly abundant in the counties associated with the Sierra Nevada foothills, the Klamath Mountains, and Coast Ranges. However, according to information provided by the Department of Conservation Division of Mines and Geology, the Project site is not in an area likely to contain ultramafic rock or naturally occurring asbestos (California DOC 2000). Therefore, impacts associated with exposure of construction workers and nearby sensitive receptors to asbestos would be less than significant.

Coronavirus Disease 2019

A public health emergency was initially declared by the Secretary of the Department of Health and Human Services in late January 2020, pursuant to Section 319 of the Public Health Service Act. A public health emergency lasts for 90 days and must be renewed to continue; the public health emergency for COVID-19 was renewed several times, most recently in February 2023, and expired on May 11, 2023. A national emergency declaration was issued in March of 2020, pursuant to Section 201 of the National Emergencies Act, and expired on May 11, 2023. However, **Mitigation Measure MM 4.3-8** would require a COVID Health and Safety Plan outlining best practices to prevent and respond to COVID-19 outbreaks.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-5**, described above, would be required and:

MM 4.3-6 To minimize personnel and public exposure to potential Valley Fever–containing dust on and off site, the following control measures shall be implemented during project construction:

a. Equipment, vehicles, and other items shall be thoroughly cleaned of dust before they are moved offsite to other work locations.

b. Wherever possible, grading and trenching work shall be phased so that earth-moving equipment is working well ahead or downwind of workers on the ground.

c. The area immediately behind grading or trenching equipment shall be sprayed with water before ground workers move into the area.

d. In the event that a water truck runs out of water before dust is sufficiently dampened, ground workers exposed to dust shall leave the area until a truck can resume water spraying.

e. To the greatest extent feasible, heavy-duty earth-moving vehicles shall be closed-cab and equipped with a HEPA-filtered air system.

f. Workers shall receive training in procedures to minimize activities that may result in the release of airborne Coccidioides immitis (CI) spores and recognize the symptoms of Valley Fever and shall be instructed to promptly report suspected symptoms of work-related Valley Fever to a supervisor. Evidence of training shall be provided to the Kern County Planning and Natural Resources Department within 5 days of the training session.

g. A Valley Fever informational handout shall be provided to all onsite construction personnel and surrounding residences within 1,000 feet of the project site. The handout shall, at a minimum, provide information regarding symptoms, health effects, preventative measures, and treatment of Valley Fever. No less than 30 days prior to any work commencing, this handout shall be mailed to all existing residences within 1,000 feet of the project boundaries. Additional information and handouts can be obtained by contacting the Kern County Public Health Services Department.

h. Onsite personnel shall be trained on the proper use of personal protective equipment, including respiratory equipment. National Institute for Occupational Safety and Health-approved respirators shall be provided to onsite personnel, upon request. When exposure to dust is unavoidable, affected workers shall be provided appropriate NIOSH-approved respiratory protection. If respiratory protection is deemed necessary, employers must develop and implement a respiratory protection program in accordance with the California Occupational Safety and Health Administration's Respiratory Protection standard (8 CCR 5144).

MM 4.3-7 Prior to the issuance of grading permits, a one-time fee shall be paid to the Kern County Public Health Services Department in the amount of $3,200 for Valley Fever public awareness programs.

MM 4.3-8 At the time of project implementation, a COVID-19 Health and Safety Plan shall be prepared in accordance with the Kern County Public Health Services Department and Kern County Health Officer mandates. A copy of the COVID-19 Health and Safety Plan shall be submitted to the Kern County Planning Department to be kept on file.

MM 4.3-9 Prior to commencement of any on-site construction activities (i.e., fence construction, mobilization of construction equipment, initial grading), the Project applicant shall provide written notice to the public through mailing a notice to all parcels within 1,000 feet of the project site, as well as the resident manager of the California Aeronautical University Student Housing at the western terminus of Boughton Drive, no sooner than 15 days prior to construction activities. The notices shall include the construction schedule, a telephone number and email address where complaints and questions can be registered. Additionally, a minimum of one sign, legible at a distance of 50 feet, shall also be posted at the construction sites or adjacent to the nearest public access to the main construction

entrances throughout construction activities which include the construction schedule (updated as needed) and a telephone number where complaints can be registered. Documentation that the public notice has been sent and the sign has been posted shall be provided to the Kern County Planning and Natural Resources Department.

MM 4.3-10 Prior to the issuance of any grading or building permit, the project applicant shall establish a "construction coordinator" and submit written documentation which includes their phone number, email address and mailing address. The construction coordinator shall be responsible for the following:

a. Responding to any local complaints about construction activities. The construction coordinator shall determine the cause of the construction complaint and shall be required to implement reasonable measures such that the complaint is resolved.

b. Ensuring all appropriate construction notices have been made available to the public and that all appropriate construction signs have been installed.

c. Maintaining an ongoing up-to-date log of all construction-related complaints (i.e., blowing dust, inability to access parcels, etc.) during project construction activities. The log shall include the nature of the complaint and the measures that were undertaken to address the concerns. Upon request, the construction coordinator shall provide the log to the Planning and Natural Resources Department no later than three business days from request.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-10**, impacts would be less than significant after mitigation.

Impact 4.3-4: The project would result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The Project does not contain land uses typically associated with emitting objectionable odors. Potential odor sources associated with the Project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities and the temporary storage of typical solid waste (refuse) associated with the Project's (long-term operational) uses. Standard construction requirements would minimize odor impacts from construction. The construction odor emissions would be temporary, short-term, and intermittent in nature and would cease upon completion of the respective phase of construction and is thus considered less than significant. It is expected that Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with the County's solid waste regulations.

The Project would also be required to comply with SJVAPCD Rule 4102 to prevent occurrences of public nuisances. Therefore, the Project does not have the potential to generate objectionable odors and no mitigation is required.

Mitigation Measures

No mitigation measures are required.

Level of Significance

Impacts would be less than significant.

4.3.5 Cumulative Setting, Impacts, and Mitigation Measures

The Kern County Planning and Natural Resources Department's Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports (Kern County 2006) requires a cumulative air quality assessment to consider localized impacts, determine consistency with existing air quality plans, and provide SJVAB and Kern County emission comparison tables. In addition, the SJVAPCD's Guidance for Assessing and Mitigating Air Quality Impacts (SJVAPCD 2015) recommends accessing cumulative impacts by evaluating past, present, and reasonably foreseeable projects in the future that may impact air quality in correlation with the Project. Cumulative impacts are defined by CEQA as two or more individual effects that when considered together cause considerable impacts.

The geographic extent for considering cumulative regional air quality impacts would include Kern County as well as the SJVAB, within which the Project is located. For the assessment of localized cumulative air quality impacts, Kern County's *Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports* recommends that the assessment include projects located within a one-mile and six-mile radius of the Project boundaries, as well as similar development projects located within the SJVAB. Projects located within 6-mile radius of the Project site are summarized in **Table 3-4** in Section 3, *Project Description*, of this Draft EIR.

As noted previously, the SJVAB is a nonattainment area for the State 1-hour O_3, 8-hour O_3, PM_{10}, and $PM_{2.5}$ standards and is a nonattainment area for National 8-hour O_3 and $PM_{2.5}$ standards. This represents an existing cumulative regional impact. As previously discussed, project construction and operational emissions of these pollutants are not anticipated to violate or lead to additional violations of the NAAQS and CAAQS. Consistent with the SJVAPCD's *Guide for Assessing and Mitigating Air Quality Impacts*, the Project would accordingly result in a less than significant cumulative impact in relation to criteria air pollutants:

By its very nature, air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development. Future attainment of State and federal ambient air quality standards is a function of successful implementation of the District's attainment plans. Consequently, the District's applicant of thresholds of significance for criteria pollutants is relevant to the determination of whether a project's individual emissions would have a cumulatively significant impact on air quality.

A lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program.

Thus, if project-specific emissions would be less than the thresholds of significance for criteria pollutants, as a general matter the Project would not be expected to result in a cumulatively considerable net increase of any criteria pollutant for which the SJVAPCD is in nonattainment under applicable federal or State ambient air quality standards." (SJVAPCD 2015). However, there is scientific uncertainty regarding the offsetting of NOx emissions through VOC reductions, and the County does not have jurisdiction and control over all potential projects in the SJVAB and, thus, cannot assure that such projects would fully offset their criteria emissions pursuant to a DMA. This represents a potentially considerable contribution to the existing cumulative regional impact, for which no additional mitigation is available. Therefore, the Project's cumulative impacts for criteria pollutants are considered significant and unavoidable.

Cumulative Analysis

The project site is located within the Kern County portion of the SJVAB, which is an area that is designated as nonattainment/severe for state 1-hour ozone standards, nonattainment for state 8-hour ozone standards, nonattainment for state 24-hour and annual arithmetic mean for PM_{10} standards, nonattainment for state annual arithmetic mean for $PM_{2.5}$ standards, nonattainment/extreme for national 8-hour ozone standards, and nonattainment for national 24-hour and annual arithmetic mean for $PM_{2.5}$ standards, and is under the jurisdiction of the SJVAPCD. The SJVAPCD's approach for assessing cumulative impacts is based on the forecasts of attainment and AAQS in accordance with requirements of the federal and State clean air acts.

Localized Impacts

No projects are located within a one-mile radius of the Project boundaries. A total of 29 projects are located within a six-mile radius of the Project site. As discussed above, detailed construction information and emissions estimates were not available for these projects.

As noted earlier in this report, the Project would result in increased emissions of localized pollutants, including emissions of fugitive dust, DPM, and CO. Depending on the emissions generated by projects for which information is not currently available, it is possible that construction and operational emissions could potentially exceed SJVAPCD's significance thresholds. However, despite the implementation of the DMA outlined in **Mitigation Measure MM 4.3-5**, the emissions from the Project cannot be entirely mitigated. For this reason, cumulative localized air quality impacts associated with short-term construction and long-term operational activities would be considered potentially significant and unavoidable.

Consistency With Existing Air Quality Plans

Consistency with the AQAP, even at the cumulative level, is based on a comparison of project-generated growth in employment, population, and vehicle miles traveled within the region. With the implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-10**, the Project would

not result in significant temporary levels of NO_X, CO, and PM_{10} emissions during construction, nor would the Project obstruct SJVAPCD's ability to achieve further progress toward attainment of the State standards. However, because of scientific uncertainty regarding the offsetting of NO_X emissions through VOC reductions, and because the County does not have jurisdiction and control over all potential projects in the SJVAB and, thus, cannot assure that such projects would fully offset their criteria emissions pursuant to a DMA, cumulative impacts for criteria pollutants during construction are considered significant and unavoidable.

With regard to operation, the Project is not expected to induce growth or result in trips or criteria pollutant emissions during operation that would conflict with SJVAPCD's attainment of the State standards as the Project is not expected to exceed thresholds for any nonattainment pollutant. Nonetheless, the Project would implement **Mitigation Measures MM 4.1-3** (see *Section 4.1, Aesthetics,* for full mitigation text), and **MM 4.3-1** through **MM 4.3-5** during project operations to mitigate emissions to the fullest extent. Therefore, the Project's incremental contribution to cumulative air quality impacts related to operation would not be cumulatively considerable and would not compromise existing air quality plans. Cumulative operational impacts would not be cumulatively considerable.

California Air Resources Board Air Basin Emissions

To demonstrate the contribution of the Project's operational emissions relative to the cumulative air quality conditions in Kern County and the SJVAB, the Project's specific emissions were compared to the emission projection data for Kern County and the SJVAB. Projected Year 2020 emissions inventory data for the SJVAB, including the portion of Kern County located within the SJVAB, is summarized in **Table 4.3-16**. The emissions projections were obtained from the CARB and were developed based on the most current emissions inventory available for the year 2020. This data is used by SJVAPCD to assist in demonstrating attainment of ambient air quality standards. As depicted in **Table 4.3-16**, the Project would constitute only a small fraction of basin-wide or countywide emissions.

Table 4.3-16: Comparative Analysis Based on San Joaquin Valley Air Basin 2020 Inventory

Source	Pollutant (tons/year)					
	VOC	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
Kern County - 2020	62,720	16,882	47,396	635	15,493	4,969
SJVAB - 2020	379,634	76,772	470,879	3,478	120,664	42,986
Project (Mitigated)	**8.04**	**9.28**	**16.60**	**0.64**	**3.93**	**1.24**
Project's % of Kern	**0.013%**	**0.055%**	**0.035%**	**0.101%**	**0.025%**	**0.025%**
Project's % of SJVAB	**0.002%**	**0.012%**	**0.004%**	**0.018%**	**0.003%**	**0.003%**

Source: Urban Crossroads 2024

Notes: Emission projections for Kern County and the San Joaquin Valley Air Basin are for the year 2020, consistent with the County's Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports (Kern County 2006).

Mitigation Measures

Implementation of **Mitigation Measures MM 4.1-3** (See *Section 4.1, Aesthetics,* for full mitigation text), and **MM 4.3-1** through **MM 4.3-10** would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.1-3** (See *Section 4.1, Aesthetics,* for full mitigation text), and **MM 4.3-1** through **MM 4.3-10**, cumulative impacts would be significant and unavoidable during construction and operations after mitigation.

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Section 4.4

Biological Resources

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Section 4.4
Biological Resources

4.4.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding biological resources either present or with the potential to be present on the proposed IPG Industrial Project (Project) site. It also evaluates the existing biological conditions on the project site and its vicinity; the criteria used to evaluate the significance of potential impacts on biological resources; the methods used in evaluating these potential impacts; an analysis of potential impacts; and identifies mitigation measures that would reduce these impacts, if necessary. This section is informed by the June 2024 Biological Resources Assessment Report prepared by Dudek (Appendix C) published literature, and federal and state databases.

Literature review, further described in Appendix C, included information available in peer-reviewed journals, standard reference materials, and relevant databases, including the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB), the California Native Plant Society (CNPS) Online Inventory of Rare and Endangered Plants, the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation, and the Calflora Information about California Plants for Education, Research, and Education. Other sources of information that assessed the potential for sensitive biological and wetland resources within the project area include the U.S Geological Survey (USGS) National Hydrology Dataset, USFWS National Wetlands Inventory, and the U.S. Department of Agriculture Natural Resources Conservation Service Web Soil Survey. Furthermore, field assessments took place throughout the project site to identify and characterize existing natural resources on the site and determine the potential for special status plant and wildlife species; sensitive vegetation communities; and regulated aquatic resources, such as wetlands, to occur on the site.

4.4.2 Environmental Setting

Regional Setting

Kern County is California's third largest county, encompassing 8,161 square miles at the southern end of the Central Valley. The 49-acre project site is entirely located in the central portion of Kern County, with the greater region bounded by Kings and Tulare counties to the north, Santa Barbara and San Luis Obispo counties to the west, the Tehachapi Mountains and the Sierra Nevada to east, and the Los Padres National Forest of northern Los Angeles County to the south.

Climate

The region in which the Project is located is characterized by a typical Mediterranean climate of hot summers and mild, wet winters. Average high temperatures range from 57 degrees Fahrenheit (°F) in January to 100°F in July, with daily temperatures exceeding 100°F several days in the

summer. Average low temperatures range from 41°F in December to 67°F in July. Precipitation occurs primarily as rain, most of which falls from December to April, with an average of 5.4 inches of rainfall per year. Precipitation may also occur as a dense fog known as "Tule fog" during the winter months. Rain rarely falls during the summer months.

Vegetation

Vegetation in the San Joaquin Valley region is influenced by arid climatic conditions, topography, and past land uses. This region is an elongated, north–south oriented lowland surrounded by coastal ranges to the west and the Sierra Nevada Mountains to the east. Vegetation in the valley is characteristic of California Floristic Province communities and includes valley and foothill grasslands, meadows and seeps, vernal pools, freshwater marsh and riparian communities, coastal scrub, chenopod scrub, chaparral, and cismontane woodlands, stands of valley oak, and some desert elements in the southern San Joaquin Valley (Hickman 1993). Vegetation communities of the valley are bordered by oak-pine woodlands and mixed hardwood forests at higher elevations. Native vegetation within the valley has largely been replaced by a variety of agricultural uses.

Wildlife

Wildlife occurring within the project site is typical of the agricultural fields of western Kern County. Four common bird species and one common mammal species were audibly or visually detected, or observed by presence of sign (e.g., scat, burrows/dens, prey remains, whitewash), during the on-site survey. As noted above, the project site is dominated by non-native grassland, which is typically used by common wildlife species.

The mature trees along the residences and power lines and towers adjacent to the project site provide suitable nesting habitat for raptors; however, the site provides low to marginal suitable foraging habitat for raptor species. Bird species observed on the site were common raven (*Corvus corax*), mourning dove (*Zenaida macroura*), western kingbird (*Tyrannus verticalis*), and red-tailed hawk (*Buteo jamaicensis*). No active nests of any of these or other avian species were observed.

Amphibians require standing or flowing water for part or all of their life cycle. Ponds, seasonal pools, and drainages provide suitable habitat for common amphibian species. The project site does not contain any ponds or drainages. No amphibian species were observed during the field survey.

Most reptiles prefer a variety of habitats in which to breed and forage. They typically inhabit small burrows, which they also use as a refuge from differing ambient temperatures and for predator avoidance. Due to a history of ongoing disking practices for weed or fire control, the project site provides marginally suitable habitat for reptile species. One reptile, common side-blotched lizard (*Uta stansburiana*), was observed during the field survey.

The grassland that dominates the project site is expected to be used by various small mammal species that are often associated grassland, such as pocket gophers (*Thomomys bottae*), deer mice (*Peromyscus maniculatus*), house mouse (*Mus Musculus*), and western harvest mouse (*Reithorodontomys megalotis*). However, intensive practices, such as disking, limits their abundance within these areas. Very few small mammal burrows were observed throughout the area

surveyed. California ground squirrel burrows and burrow complexes were found to be the most abundant burrows on the project site. The highest concentrations were along road margins and the east edge of the project site where dirt spoil piles have been illegally dumped over time. One mammal species, California ground squirrel, was observed during the survey.

Coyotes and foxes (*Vulpes* spp.) may occasionally use the project site to hunt for small mammals. The federally endangered and state threaten San Joaquin kit fox may also occur on occasion but is unlikely to be resident on the site. San Joaquin kit fox is discussed in more detail in **Section 4.4.2** *Local Setting*.

Appendix C provides a list of all wildlife species observed during the site visit.

Sensitive Natural Communities

Local, state, and federal agencies regulate special status species and other sensitive biological resources and require an assessment of their presence or potential for presence to be on-site prior to the approval of proposed development on a property. These species are considered threatened enough to warrant some level of protection. Appendix C discusses sensitive biological resources observed within the project area and evaluates the potential for the project area to support other sensitive biological resources.

Sensitive vegetation communities are defined as follows:

- Vegetation alliances on CDFW's California Natural Community List with a state rank of S1, S2, or S3 (CDFW 2023a)
- Vegetation communities or habitats listed in the California Natural Diversity Database (CNDDB) (CDFW 2023b)

Special status plant and wildlife species are defined as any of the following:

- Designated as either rare, threatened, or endangered by CDFW, USFWS, or the National Marine Fisheries Service and protected under either the California Endangered Species Act (CESA) (California Fish and Game Code [CFGC] Section 2050 et seq.) or the Federal Endangered Species Act (FESA) (16 U.S. Code [U.S.C.] Section 1531 et seq.), or meets the California Environmental Quality Act (CEQA) definition for endangered, rare, or threatened (California Code of Regulations, Title 14, Section 15380[b], [d])
- California Species of Special Concern (SSC) as designated by CDFW (2023b)
- Vertebrate species that are Fully Protected species, as described in the CFGC, or candidate species being considered or proposed for listing under these same acts
- Of expressed concern to resource/regulatory agencies or local jurisdictions. This includes plants included on the CDFW Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2024), as well as species with a California Rare Plant Rank of 1, 2, 3, or 4 in the

CNPS Inventory of Rare and Endangered Plants of California (CNPS 2023a). Plants included in the CNPS Inventory are classified as follows:

- List 1A: Plants presumed extinct in California; List 1B: Plants rare, threatened, or endangered in California and elsewhere
- List 2: Plants rare, threatened, or endangered in California, but more common elsewhere
- List 3: Plants about which we need more information (a review list)
- List 4: Plants of limited distribution (a watch list)

Surface Hydrology and Jurisdictional Waters

There are no surface water bodies (creeks, streams, or rivers) within the project area. Surface water flow is unlikely to exist within these local drainages unless during heavy precipitation events. As part of the requirements of the Clean Water Act (CWA), beneficial uses for surface and ground waters must be identified in the Central Valley Regional Water Quality Control Board's Tulare Lake Basin Water Quality Control Plan. Because the project site contains no surface water bodies, there are no surface water beneficial uses associated with the project area.

Wildlife Movement Corridors

Wildlife corridors are linear features that connect large patches of natural open space and provide avenues for the migration and dispersal of terrestrial animal species. Wildlife corridors contribute to population viability by ensuring continual exchange of genes between populations, providing access to adjacent habitat areas for foraging and mating, and providing routes for recolonization of habitat after local extirpation or ecological catastrophes (e.g., wildfires). Small patches of habitats that serve to connect larger blocks of habitat can often serve as movement corridors and help reduce the adverse effects of habitat fragmentation. Such linkages may be continuous habitat or discrete habitat islands that function as steppingstones for dispersal. Given the expanse of open agricultural lands surrounding the project site, the site itself is not considered an important linkage between larger open space areas that serve as wildlife habitat. The project site and immediate area are not recognized as an important regional migratory corridor by the County of Kern or state resource agencies.

Local Setting

As previously stated, the project site is located on approximately 49.05 acres and is composed of two privately owned parcels, in the central portion of unincorporated Kern County, California. The project vicinity is characterized by industrial and commercial uses (distribution, storage, and shipping centers), transportation, vacant land, and residential uses to the east of the project site.

Natural Communities

Approximately 49.05 acres of the project site is considered non-native grassland, as shown in **Figure 4.4-1**. Non-native grasslands general habitat is grassland that is dominated by non-native species. These grasslands typically occur in areas with a history of disturbance. Non-native grassland was the only land cover type mapped within the project site, as no native vegetation communities, including any sensitive vegetation communities were identified within the project site during the 2023 survey.

Some species associated with non-native grassland include wild oats (*Avena* spp.), bromes (*Bromus* spp.), and barleys (*Hordeum* spp.). This land cover type is not given a rarity ranking by CDFW (2023a) or CNPS (2023a) because it is a non-native plant community that is widespread; therefore, it is not considered sensitive.

Figure 4.4-1: Biological Resources

Source: Appendix C

Observed Wildlife Species

Four common bird species and one common mammal species were audibly or visually detected, or observed by presence of sign (e.g., scat, burrows/dens, prey remains, whitewash), during the on-site survey. As noted above, the project site is dominated by non-native grassland, which is typically used by common wildlife species.

The mature trees along the residences and power lines and towers adjacent to the project site provide suitable nesting habitat for raptors; however, the site provides low to marginal suitable foraging habitat for raptor species. Bird species observed on the site were common raven (*Corvus corax*), mourning dove (*Zenaida macroura*), western kingbird (*Tyrannus verticalis*), and red-tailed hawk (*Buteo jamaicensis*). No active nests of any of these or other avian species were observed.

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Most reptiles prefer a variety of habitats in which to breed and forage. They typically inhabit small burrows, which they also use as a refuge from differing ambient temperatures and for predator avoidance. Due to a history of ongoing disking practices for weed or fire control, the project site provides marginally suitable habitat for reptile species. One reptile, common side-blotched lizard (*Uta stansburiana*), was observed during the field survey.

The grassland that dominates the project site is expected to be used by various small mammal species that are often associated grassland, such as pocket gophers (*Thomomys bottae*), deer mice (*Peromyscus maniculatus*), house mouse (*Mus Musculus*), and western harvest mouse (*Reithorodontomys megalotis*). However, intensive practices, such as disking, limits their abundance within these areas. Very few small mammal burrows were observed throughout the area surveyed. California ground squirrel burrows and burrow complexes were found to be the most abundant burrows on the project site. The highest concentrations were along road margins and the east edge of the project site where dirt spoil piles have been illegally dumped over time. One mammal species, California ground squirrel, was observed during the survey.

Coyotes and foxes (*Vulpes* spp.) may occasionally use the project site to hunt for small mammals. The federally endangered and state threaten San Joaquin kit fox may also occur on occasion but is unlikely to be resident on the site. San Joaquin kit fox is discussed in more detail below. Appendix C provides a list of all wildlife species observed during the site visit.

Candidate, Sensitive, or Special Status Biological Resources

Special status species are defined as those plants and wildlife that, because of their recognized rarity or vulnerability to various causes of habitat loss or population decline, are recognized by federal, state, or other agencies as under threat from human-associated developments. Some of these species receive specific protection that is defined by federal or state endangered species legislation. Others have been designated as special status on the basis of adopted policies and expertise of state resource agencies or organizations with acknowledged expertise, or policies adopted by local

governmental agencies such as counties, cities, and special districts to meet local conservation objectives. Special status species include:

- Species listed or proposed for listing as threatened or endangered, or are candidates for possible future listing as threatened or endangered, under the FESA or the CESA;
- Species that meet the definitions of rare or endangered under CEQA Guidelines Section 15380;
- All of the plants constituting California Rare Plant Ranks 1B and 2A meet the definitions of Section 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (CESA) of the CFGC, and are eligible for state listing;
- Species covered under an adopted natural community conservation plan (NCCP) or habitat conservation plan (HCP);
- Wildlife designated by CDFW as "species of special concern" or "special animals;"
- Wildlife "fully protected" in California (CFGC Sections 3511, 4700, and 5050); and, Wildlife species protected as "fur-bearing mammals" (CFGC Section 4000 et seq.).

Sensitive natural communities are designated as such by various resource agencies, such as the CDFW, or in local policies and regulations, and are generally considered to have important functions or values for wildlife and/or are recognized as declining in extent or distribution and are considered threatened enough to warrant some level of protection. For example, many local agencies in California consider protection of oak woodlands important, and federal, state, and most local agencies also consider wetlands and riparian habitat as sensitive communities. CDFW tracks communities it believes to be of conservation concern through its List of California Terrestrial Communities and the CNDDB, and these communities are typically considered special status for the purposes of CEQA analysis. The potential for each special status species to occur in the project site was evaluated according to the following criteria:

- **No Potential.** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime), and species would have been identifiable on the site if present (e.g., oak trees). Protocol surveys (if conducted) did not detect species.
- **Low Potential.** Few of the habitat components meeting the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site. Protocol surveys (if conducted) did not detect species.
- **Moderate Potential**. Some of the habitat components meeting the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

- **High Potential.** All the habitat components meeting the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- **Present.** Species is observed on the site or has been recorded (e.g., CNDDB, other reports) on the site recently (within the last 5 years).

Most avian species are afforded certain protections by the Migratory Bird Treaty Act (MBTA) and CFGC Sections 3500 through 3516. However, many of these species, including some raptors, are common and are not considered to be of special status on the basis of other regulations.

Plants

Focused plant surveys were not conducted following the CNPS's Botanical Survey Guidelines, CDFW's Protocols for Surveying and Evaluating Impacts to Special Status Native Populations and Natural Communities, or USFWS's General Rare Plant Survey Guidelines. However, habitat characteristics present with the project site were evaluated to determine the potential to support special status plant species. All plant species encountered during the field survey were identified to subspecies or variety, if applicable, to determine sensitivity status.

There are a number of special status plant species known to occur within the project vicinity. Priority special status plant species were reviewed during the database searches described above. Habitat suitability was evaluated for special status species based on their potential to occur based on the presence of associated habitat for each species, elevation, and soils present on the project site.

Based on the habitat suitability analysis, of the eight special status plant species that have been documented within the Oildale quadrangle associated with the project site, none have potential to occur on the site based on habitat suitability, soils, topography, and lack of previous documented occurrences of the species on or adjacent to the site. In particular, ongoing disking precludes these species from occurring on the site. Special status plant species documented within the Oildale quadrangle associated with the Project and their potential to occur on the project site are detailed in **Table 4.4-1**. As stated above, 27 plant species were observed during the site survey, of which none are considered special status by any regulatory agency. The list of plant species identified during the survey is provided in Appendix C.

Table 4.4-1: Special Status Plant Species and Potential to Occur on Project Site

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
Allium howellii var. howellii	Howell's onion	None/None/4.3	Valley and foothill grassland; Clay (sometimes), Serpentinite (sometimes)/perennial bulbiferous herb/Mar–Apr/165–7,220	Low potential to occur. Annual disking of the field has greatly reduced the potential for this species to occur.
Astragalus hornii var. hornii	Horn's milk-vetch	None/None/1B.1	Meadows and seeps, playas; lake margins, alkaline/annual herb/May–Oct/197–2, 785	Not expected to occur. Meadows, seeps, playas are not present within the project site.
Atriplex tularenis	Bakersfield smallscale	None/SE/1A	Chenopod scrub/annual herb/June–Oct/295–655	Absent. This species was not observed on the project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Azolla microphylla	Mexican mosquito fern	None/None/4.2	Marshes and swamps (ponds, slow water)/annual/perennial herb/Aug/100–330	Not expected to occur. The project site does not provide suitable habitat, marshes and swamps, for this species.
Calochortus striatus	Alkali mariposa-lily	None/None/1B.2	Chaparral, Chenopod scrub, Meadows and seeps, Mojavean desert scrub; Alkaline, Mesic/perennial bulbiferous herb/Apr– June/230–5,235	Not expected to occur. Meadows, seeps, chaparral and chenopod scrub are not present within the project site. Additionally, this species was not observed on the project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Chloropyron molle spp. hispidum	Hispid bird's-beak	None/None/1B.1	Meadows and seeps, playas, valley and foothill grassland; alkaline/annual herb (hemiparasitic)/June–Sep/3–510	Absent. This species was not observed on the project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
Clarkia exilis	Slender clarkia	None/None/4.3	Cismontane woodland/annual herb/Apr–May/395-3280	Not expected to occur. The project site does not provide suitable habitat, cismontane woodland, for this species. Annual disking of the field has greatly reduced the potential for this species to occur.
Convolvulus simulans	Small-flowered morning-glory	None/None/4.2	Chaparral (openings), Coastal scrub, Valley and foothill grassland; Clay, Seeps, Serpentinite/annual herb/Mar–July/100–2,430	Absent. This species was not observed on the project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Delphinium recurvata	Recurved larkspur	None/None/1B.2	Chenopod scrub, Cismontane woodland, Valley and foothill grassland; Alkaline/perennial herb/Mar–June/10–2,590	Absent. This species was not observed on the project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Diplacus pictus	Calico monkeyflower	None/None/1B.2	Broadleafed upland forest, Cismontane woodland; Disturbed areas, Granitic/annual herb/Mar–May/330–4,690	Not expected to occur. The project site does not provide suitable habitat, upland forest, cismontane woodland, for this species.
Eremalche parryi spp. kernensis	Kern mallow	FE/None/1B.2	Chenopod scrub, Pinyon and juniper woodland, Valley and foothill grassland; Clay (sometimes), Dry, Openings, Sandy (sometimes)/annual herb/Jan(Feb)Mar–May/230–4,230	Low potential to occur. Annual disking of the field has greatly reduced the potential for this species to occur.

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
Eriastrum hooveri	Hoover's eriastrum	None/None/4.2	Chenopod scrub, pinyon and juniper woodland, valley and foothill grassland; sometimes gravelly/annual herb/(Feb)Mar–July/ 164–3,000	Absent. This species was not observed on the project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Eriogonum gossypinum	Cottony buckwheat	None/None/4.2	Chenopod scrub, valley and foothill grassland; clay/annual herb/Mar–Sep/328–1,800	Absent. This species was not observed on the project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Eschscholzia lemmonii spp. kernensis	Tejon poppy	None/None/1B.1	Chenopod scrub, Valley and foothill grassland/annual herb/(Feb)Mar–May/525–3280	Low potential to occur. Annual disking of the field has greatly reduced the potential for this species to occur.
Goodmania luteola	Golden goodmania	None/None/4.2	Meadows and seeps, Mojavean desert scrub, Playas, Valley and foothill grassland; Alkaline (sometimes), Clay (sometimes)/annual herb/Apr–Aug/65–7,220	Not expected to occur. The project site does not provide suitable habitat, meadows and seeps, for this species.
Hesperevax caulescens	Hogwallow starfish	None/None/4.2	Valley and foothill grassland (mesic clay), Vernal pools (shallow); Alkaline (sometimes)/annual herb/Mar–June/0–1,655	Not expected to occur. The project site does not provide suitable habitat, vernal pools, for this species.
Horedeum intercedens	Vernal barley	None/None/3.2	Coastal dunes, Coastal scrub, Valley and foothill grassland (depressions, saline flats), Vernal pools/annual herb/Mar–	Not expected to occur. The project site does not provide suitable habitat for this species.

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
			June/15–3280	
Imparvata brevifola	California satintail	None/None/2B.1	Chaparral, coastal scrub, meadows, and seeps, Mojavean desert scrub, riparian scrub; mesic/ perennial rhizomatous herb/Sep–May/0–3,985	Not expected to occur. The project site does not provide suitable habitat for this species.
Lasthenia ferrisiae	Ferris' goldfields	None/None/4.2	Vernal pools (alkaline, clay)/annual herb/Feb–May/65–2295	Not expected to occur. The project site does not provide suitable habitat, vernal pools, for this species.
Layia leucopappa	Comanche Point layia	None/None/1B.1	Chenopod scrub, Valley and foothill grassland/annual herb/Mar–Apr/330–1150	Low potential to occur. Annual disking of the field has greatly reduced the potential for this species to occur.
Mongolia cogdonii	San Joaquin woolly-threads	FE/None/1B.2	Chenopod scrub, valley and foothill grassland (sandy)/annual herb/Feb–May/197–2,620	Not expected to occur. The project site does not contain the necessary subalkaline sandy soils required by San Joaquin woolly-threads. "San Joaquin woolly-threads is essentially restricted to sandy soils, and thus was always somewhat limited distribution (Taylor 1993)." In addition, there are no observations within 5-miles and would consider this potential to occur if the adjacent properties had any occurrences of this species to have a seed bank present.
Navarretia setiloba	Piute Mountains navarretia	None/None/1B.1	Cismontane woodland, Pinyon and juniper woodland, Valley and foothill grassland; Clay (sometimes), Gravelly (sometimes), Loam (sometimes)/annual herb/Apr–July/935–6,890	Absent. This species was not observed on the project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur. Additionally, the project site is outside the known elevation range for this species.

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
Opuntia basilaris var. treleasei	Bakersfield cactus	FE/SE/1B.1	Chenopod scrub, cismontane woodland, valley and foothill grassland; sandy or gravelly/ perennial stem succulent/Apr–May/328–4,755	Absent. This species was not observed on the project site during the survey effort. Annual disking of the field has greatly reduced the potential for this species to occur.
Stylocline citroleum	Oil neststraw	None/None/1B.1	Chenopod scrub, Coastal scrub, Valley and foothill grassland; Clay/annual herb/Mar– Apr/165–1,310	Low potential to occur. Annual disking of the field has greatly reduced the potential for this species to occur.
Stylocline masonii	Mason's neststraw	None/None/1B.1	Chenopod scrub, Pinyon and juniper woodland; Sandy/annual herb/Mar–May/330–3,935	Not expected to occur. The project site does not provide suitable habitat for this species.
Tortula californica	California screw moss	None/None/1B.2	Chenopod scrub, Valley and foothill grassland; Sandy/moss/N.A./35–4,790	Not expected to occur. The project site does not contain suitable soils for this species.
Trichostema ovatum	San Joaquin bluecurls	None/None/4.2	Chenopod scrub, valley and foothill grassland/ annual herb/(Apr–June)July–Oct/213–1,045	Occurs. Several small populations were observed along access roads and the earthen ditches around the site. None were observed within the larger areas subject to annual disking of the project site.

Status Legend:
FE: Federally listed as endangered
SE: State-listed as endangered California Rare Plant Rank
1B: Plants rare, threatened, or endangered in California and elsewhere
2B: Plants rare, threatened, or endangered in California but more common elsewhere
4: Watch List: Plants of limited distribution
.1 Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 Moderately threatened in California (20%–80% occurrences threatened / moderate degree and immediacy of threat)

Wildlife

To determine the potential for special status wildlife to occur on the project site, a list of wildlife species through a query of the CNDDB was compiled. Two species were determined to have some potential to occur based on habitat suitability and previously documented occurrences of the species in the project vicinity. Other wildlife species were rejected from consideration based on factors such as lack of suitable aquatic or terrestrial habitat, or the site being outside of the species' known range. In addition, many special status wildlife species that occur in the area are avian species that may occasionally only fly over or forage on the site but are not expected to nest on the site.

Table 4.4-2 lists the potential for occurrence of the special status wildlife species that are recorded within the Oildale U.S. Geological Survey quadrangle, where the Project is located. A cumulative list of wildlife species is included in Appendix C.

Table 4.4-2: Special Status Wildlife Species and Potential to Occur on Project Site

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
Invertebrates				
Bombus crotchii	Crotch's bumble bee	None/None	Open grassland and scrub communities supporting suitable floral resources.	Low to moderate potential to occur. Open grassland habitat is present, but no known floral resources, such as host plants, are present. Limited nectar producing plants occur on-site. Several California ground squirrel burrows were observed which could potentially be used as a nest site. There is one occurrence within approximately 2.5 miles of the project site per the California Natural Diversity Database (CNDDB) (CDFW 2023b).
Branchinecta lynchi	Vernal pool fairy shrimp	FT/None	Vernal pools, seasonally ponded areas within vernal swales, and ephemeral freshwater habitats.	Not expected to occur. There are no vernal pools on the project site. No CNDDB records have been recorded of this species within 5 miles of the project site (CDFW 2023b).
Danaus plexippus	Monarch butterfly	Candidate/None	Wind-protected tree groves with nectar sources and nearby water sources.	Not expected to occur. No suitable habitat present. No wind-protected tree groves with nectar sources and nearby water sources. No milkweed (*Asclepias* spp.) were observed on-site during a botanical focused survey conducted in June 2024. No CNDDB records have been recorded of this species within 5 miles of the project site (CDFW 2023b).
Amphibians				
Spea hammondii	Western spadefoot	None/SSC	Primarily grassland and vernal pools, but also in ephemeral wetlands that persist at least 3 weeks in chaparral, coastal scrub,	Not expected to occur. No suitable habitat present on the project site. No CNDDB records have been recorded of this species

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
			valley–foothill woodlands, pastures, and other agriculture.	within 5 miles of the project site (CDFW 2023b).
Reptiles				
Anniella grinnelli	Bakersfield legless lizard	None/SSC	Southern San Joaquin Valley. Known from two disjunct areas: the east side of the Carrizo Plain and portions of the city limits of Bakersfield. Often found underneath leaf litter, rocks, and logs (CDFW 2023b).	Not expected to occur. The project site lacks suitable habitat required for this species. In addition, there are no occurrences within approximately 5 miles of the project site (CDFW 2023b).
Arizona elegans occidentalis	California glossy snake	None/SSC	Arid scrub, rocky washes, grasslands, chaparral, open areas with loose soil.	Not expected to occur. No suitable habitat present on the project site. In addition, there are no occurrences within approximately 5 miles of the project site (CDFW 2023b).
Gambelia sila	Blunt-nosed leopard lizard	FE/FP, SE	Sparsely vegetated alkali and desert scrubs, including semi-arid grasslands, alkali flats, and washes.	Not expected to occur. The project site is regularly maintained for weed or fire protection purposes by annual disking. In addition, the surrounding areas have been regularly disked for fire and weed abatement from the project site approximately 0.5-mile north to Merle Haggard Rd. Because of the annual disturbances and alteration to the landscape from annual maintenance, it is considered that this species is not expected to occur. Small mammal burrows observed on the site are disked annually for weed and fire abatement. The closest and most recent documentation of this species is from 1992 and is approximately 3.25 miles north of the project site (CDFW 2023b).
Birds				

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
Athene cunicularia (burrow sites and some wintering sites)	Burrowing owl	BCC/SSC	Nests and forages in grassland, open scrub, and agriculture, particularly with ground squirrel burrows.	Moderate potential to occur. The project site provides suitable habitat where this species may forage or den. Several California ground squirrel burrows and complexes were observed throughout the project site, most in the east edge of the site where dirt spoil piles have accumulated over the years. Although no sign of presence was observed during survey of the site. The closest documented record of this species is within 1.2 miles of the project site (CDFW 2023b).
Buteo swainsoni (nesting)	Swainson's hawk	None/ST	Nests in open woodland and savanna, riparian, and in isolated large trees; forages in nearby grasslands and agricultural areas such as wheat and alfalfa fields and pasture.	Low potential to occur. No suitable nesting habitat on the project site. Several large trees are associated with the residences to the east. The project site provides marginally suitable foraging for this species. One historical occurrence from 1935 was recorded within the vicinity of the Kern River, approximately 3.25 miles south of the project site (CDFW 2023b).
Coccyzus americanus occidentalis (nesting)	Western yellowbilled cuckoo	FT/SE	Nests in dense, wide riparian woodlands and forest with well-developed understories.	Not expected to occur. No suitable nesting or foraging habitat is present. No CNDDB records have been recorded of this species within 5 miles of the project site (CDFW 2023b).
Empidonax traillii extimus (nesting)	Southwestern willow flycatcher	FE/SE	Nests in dense riparian habitats along streams, reservoirs, or wetlands; uses variety of riparian and shrubland habitats during migration.	Not expected to occur. No suitable nesting or foraging habitat is present. No CNDDB records have been recorded of this species within 5 miles of the project site (CDFW 2023b).
Gymnogyps californianus	California condor	FE/FP, SE	Nests in rock formations, deep caves, and occasionally in cavities in giant sequoia trees	Not expected to occur. No suitable nesting or foraging habitat is present. No CNDDB records have been recorded of this species

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
			(Sequoiadendron giganteus); forages in relatively open habitats where large animal carcasses can be detected.	within 5 miles of the project site (CDFW 2023b).
Mammals				
Aeorestes cinereus	Northern hoary bat	None/None	Forest, woodland riparian, and wetland habitats; also, juniper scrub, riparian forest, and desert scrub in arid areas; roosts in tree foliage and sometimes cavities, such as woodpecker holes.	Not expected to occur. No suitable nesting or foraging habitat is present. No CNDDB records have been recorded of this species within 5 miles of the project site (CDFW 2023b).
Eumops perotis californicus	Western mastiff bat	None/SSC	Chaparral, coastal and desert scrub, coniferous and deciduous forest, and woodland; roosts in crevices in rocky canyons and cliffs where the canyon or cliff is vertical or nearly vertical, trees, and tunnels.	Not expected to occur. No suitable roosting or foraging habitat is present. No CNDDB records have been recorded of this species within 5 miles of the project site (CDFW 2023b).
Perognathus inornatus	San Joaquin pocket mouse	None/None	Open grassland and scrub areas on fine textured soils.	Not expected to occur. The project site is regularly maintained, providing low-quality habitat for this species. No suitable burrows for were observed. In addition, there are no occurrences within approximately 5 miles of the project site (CDFW 2023b).
Sorex ornatus relictus	Buena Vista Lake ornate shrew	FE, BCC/SSC	Marshes, wetlands, streams, and sloughs along lake basins in southern San Joaquin Valley; historical occurrences include Buena Vista, Tulare, and Kern Lakes; distribution poorly known.	Not expected to occur. No suitable habitat present on the project site. No CNDDB records have been recorded of this species within 5 miles of the project site (CDFW 2023b).
Taxidea taxus	American badger	None/SSC	Dry, open, treeless areas; grasslands, coastal scrub, agriculture, and pastures, especially with friable soils.	Not expected to occur. The project site is regularly maintained, providing low-quality habitat for this species. Although CNDDB records indicate presence within 0.1 miles of the site, no burrows suitable for this species was observed on-site. In addition,

Scientific Name	Common Name	Status (Federal/State/California Rare Plant Rank)	Primary Habitat Associations/ Life Forms/ Blooming Period/ Elevation Range (feet)	Potential to Occur
				the CNDDB record is from 1900 (CDFW 2023b).
Vulpes macrotis mutica	San Joaquin kit fox	FE/ST	Grasslands and scrublands, including those that have been modified; oak woodland, alkali sink scrubland, vernal pool, and alkali meadow.	Moderate to high potential to occur. The project site provides suitable habitat where this species may forage or den. Several California ground squirrel burrows and complexes were observed throughout the project site, most in the east edge of the site where dirt spoil piles have accumulated over the years. Although no sign of presence of San Joaquin kit fox was observed during the survey of the site, several historical records of this species have been documented within 0.1 miles to 5 miles from the project site (CDFW 2023b).

Status Abbreviations:
FE: Federally Endangered
FT: Federally Threatened
BCC: U.S. Fish and Wildlife Service Bird of Conservation Concern
SSC: California Species of Special Concern
FP: California Fully Protected Species
SE: State Endangered
ST: State Threatened

Burrowing Owl

Burrowing owl is a California SSC. With a relatively wide-ranging distribution throughout the west, burrowing owls are considered to be habitat generalists. In California, burrowing owls are yearlong residents of open, dry grassland and desert habitats, and in grass, forb, and open shrub stages of pinyon-juniper and ponderosa pine habitats. Preferred habitat is typified by short, sparse vegetation with few shrubs, level to gentle topography, and well-drained soils.

The presence of burrows is the most essential component of burrowing owl habitat because they are required for nesting, roosting, cover, and catching prey. In California, western burrowing owls most commonly live in burrows created by California ground squirrels. Burrowing owls may occur in human-altered landscapes, such as agricultural areas, ruderal grassy fields, vacant lots, and pastures, if the vegetation structure is suitable (i.e., open and sparse); useable burrows are available; and foraging habitat occurs in close proximity. Debris piles, riprap, culverts, and pipes can be used for nesting, secondary shelter sites, and roosting.

Potentially suitable burrowing owl burrows (burrow openings approximately 4 inches in diameter or greater) or burrow complexes were observed during the survey effort (**Figure 4.4-1**). However, no burrowing owls or burrowing owl sign (whitewash, pellets, feathers, or prey remains) were observed during the survey. Nevertheless, burrowing owls could move onto the site between the time of the site survey and proposed ground disturbance activities.

San Joaquin Kit Fox

San Joaquin kit fox is in the family Canidae and is a year-round resident of arid and semi-arid regions of the San Joaquin Valley and surrounding valleys, Sierra Nevada foothills, and Coast Ranges from northern Santa Barbara and Ventura Counties north to Contra Costa and San Joaquin Counties. This species lives in annual grasslands or grassy open habitats with scattered shrubby vegetation. It requires loose-textured sandy soils for burrowing and a suitable prey base of rodents. Kit foxes in the northern portion of the range are mostly associated with annual grassland and valley oak woodland. Where kit foxes are found in annual grassland, such as in surrounding valleys, they are generally associated with brome grasses, fescue (*Festuca* spp.), wild oats (*Avena fatua*), barley (*Hordeum* spp.), and filaree (*Erodium* spp.).

As a federally listed endangered and state-listed threatened species, San Joaquin kit fox is protected by federal and state statutes (FESA and CESA). To determine presence/absence of kit fox in the project region, USFWS established the San Joaquin Kit Fox Survey Protocol for the Northern Range (Northern Range Protocol), further described in Appendix C. The Northern Range Protocol calls for an early evaluation of a site and its potential to support San Joaquin kit fox to determine whether protocol surveys are necessary. The entire project site was walked to assess the site and the potential for use by San Joaquin kit fox.

During the survey, several burrows meeting the minimum size criteria (openings 4 inches in diameter or greater) were identified and examined (**Figure 4.4-1**). According to the Northern Range Protocol, burrows were identified as being either natal dens, active dens, or potential dens. “Natal dens” are dens at which the presence of pups was confirmed either by observation or sign such as

scat and tracks. "Active dens" refers to dens presumed to be occupied at the time of examination, or to have been recently occupied, due to sign such as recent digging, tracks, and/or fresh scat. "Potential dens" include those that were judged to be of a particular size, but that were not recently active, as well as dens that were not confirmed to have been excavated by the species identified due to a lack of definitive sign. None were confirmed to be San Joaquin kit fox natal dens or active dens. Furthermore, none of these burrows were determined to be occupied or otherwise used by kit fox based on the lack of sign (e.g., scat, prey remains, digging, claw marks) of kit fox.

Because the number of kit foxes can vary greatly from year to year, and successful dispersal may allow individuals to occupy areas between established populations, it is possible that transient individual San Joaquin kit foxes could occur intermittently on the project site during foraging or dispersal events.

Crotch's Bumble Bee

Crotch's bumble bee (*Bombus crotchii*) is a state candidate for listing as threatened. This species ranges throughout much of central and Southern California, along the central and Southern California coasts, through the Central Valley, and in the surrounding foothills. However, it now appears to be absent from much of its former range, and its population appears to have declined drastically, especially in its former stronghold in the Central Valley.

Crotch's bumble bee occurs in open grassland and scrub communities supporting suitable floral resources. Data from a variety of resources states that Crotch's bumble bee is most commonly associated with the species from the following families, in descending order based on number of observations: *Fabaceae, Apocynaceae, Asteraceae, Lamiaceae*, and *Boraginaceae*. The genera *Asclepias*, *Chaenactis, Lupinus, Medicago, Phacelia*, and *Salvia* were cited as example food plants (Appendix C). The species nests primarily underground and may be reliant on small mammal burrows. Little is known about winter hibernacula, but the species is presumed to rely on microhabitats for overwintering similar to those of other bumble bees, including loose disturbed soil, leaf litter, and other debris.

Crotch's bumble bee has a low to moderate potential to occur within the study area, as it contains open grassland; however, there is limited floral resources including the genera *Phacelia, Clarkia, Eriogonum*, and *Eschscholzia* species present due to annual disking of the site for fire and weed abatement. Crotch's bumble bee is a generalist forager and could forage anywhere within the study area where suitable floral resources are present. Although the study area supports limited suitable floral resources, the actual area occupied by specific resources with potential to support nesting for the species is likely a much smaller portion of the entire study area. Nesting is primarily located underground in abandoned holes made by ground squirrels, mice, and rats, but may be aboveground in abandoned bird nests or empty cavities.

Surveys were conducted within two 3-acre parcels representing approximately 10% of the project site (**Figure 4.4-1**). Surveys were conducted for one hour per 3-acre parcel. During the survey, several burrows (openings 4 inches in diameter or greater) were identified and examined **(Figure 4.4-1**). Additionally, small mammal burrows observed throughout the project site during a botanical pass were also evaluated for presence of nesting Crotch's bumble bee. None were

confirmed to be used by Crotch's bumble bee for nesting during a site-specific survey conducted in June 2024. Furthermore, because the survey was conducted later in the nesting season, many of the spring blooming floral species have died. Late spring/summer floral flowering species were sparse on-site. Nevertheless, there is a low to moderate potential for this species to occur on the project site.

Sensitive Natural Communities

Sensitive natural communities and habitats are defined by the CDFW as those natural communities that have a reduced range and/or are imperiled as a result of residential and commercial development, agriculture, energy production and mining, or an influx of invasive and other problematic species. Vegetation mapping was conducted during the initial habitat assessment based on the California Natural Community List (CDFW 2023a) and the web-based version of the Manual of California Vegetation (CNPS 2023b), which use the scientific name of the dominant species in that alliance as the alliance name. Both are based on the Manual of California Vegetation, Second Edition. No native vegetation communities, including any sensitive vegetation communities, were identified within the project site.

Critical Habitat

Under FESA, to the extent feasible, the USFWS and National Marine Fisheries Service (NMFS) are required to designate critical habitat for endangered and threatened species. Critical habitat is defined as areas of land, water, and air space containing the physical and biological features essential for the survival and recovery of endangered and threatened species. Designated critical habitat includes sites for breeding and rearing, movement or migration, feeding, roosting, cover, and shelter. Designated critical habitats require special management and protection of existing resources, including water quality and quantity, host animals and plants, food availability, pollinators, sunlight, and specific soil types. Critical habitat delineates all suitable habitat, occupied or not, essential to the survival and recovery of the species.

As further described below, formal wildlife movement studies were not conducted for the project site. Given the expanse of open agricultural lands surrounding the project site, the site itself is not considered an important linkage between larger open space areas that serve as wildlife habitat; in addition, the project site and immediate area are not recognized as an important regional migratory corridor by the County of Kern or state resource agencies. Therefore, no critical habitat was identified within the project site.

Areas of Critical Environmental Concern

Areas of Critical Environmental Concern are designated areas by the Bureau of Land Management where special management is provided for fish and wildlife or other natural resources. The project site is not located within or adjacent to any Areas of Critical Environmental Concern.

Aquatic Resources

There are no surface water bodies (creeks, streams, or rivers) within the project area, nor does the project site contain any ponds or drainages (**Figure 4.4-2**). Therefore, a formal evaluation of the

potential for jurisdictional waters of the United States and waters of the state, including wetlands, to occur on-site was not conducted. However, the habitat assessment did take into consideration all potential jurisdictional features that would need to be formally evaluated, such as vegetation communities dominated by hydrophytic vegetation and stream channels or other evidence of an ordinary high water mark within the project site. Connectivity to local water conveyance features to determine the discharge points and their connection to regional waterways was also considered to be formally evaluated.

Figure 4.4-2: USFWS National Wetlands Inventory

Source: Dudek, 2024

Wildlife Movement Corridors

Formal wildlife movement studies were not conducted for the project site. The site and immediate area are not recognized as an important regional migratory corridor by the County of Kern or state resource agencies. Although some animals may pass through or along the site during localized movement events in search of food or shelter, the location of the project site and surrounding developed areas to the east, south, and west pose as restrictions to movement. San Joaquin kit foxes are accustomed to urban settings and would not constrain their movement due to implementation of the Project.

4.4.3 Regulatory Setting

Federal, state, regional, and local biological resource policies and regulations applicable to the Project are identified below.

Federal

Federal Endangered Species Act of 1973 (16 U.S. Code 1531 through 1543)

The FESA (16 U.S.C. 1531 et seq.) was enacted to provide a means by which endangered and threatened species and the ecosystems on which they depend may be conserved. The FESA and the implementing regulations (50 Code of Federal Regulations [CFR] 17.1 et seq.) include provisions for the protection and management of federally listed threatened or endangered plants and animals and their critical habitats. Generally, the USFWS regulates upland and freshwater species, and the NMFS oversees provisions for protection of anadromous, marine, and estuarine species. Section 4 of the FESA requires the USFWS and/or NMFS to make determinations on whether any species should be listed as an endangered or threatened species and to designate critical habitat for endangered and threatened species (16 U.S.C. 1533). Critical habitat is defined in the FESA as an area occupied by a listed species with physical or geographical/biological features essential to the species conservation or locations not currently occupied by listed species which are essential to the species conservation. 50 CFR 424.02 Section 9 of the FESA (16 U.S.C. 1538, 50 CFR 17.21402 et seq.) prohibits the unauthorized take of any species that is listed as threatened or endangered under the FESA. Take that is incidental to and not the purpose of the carrying out of otherwise lawful activities may be permitted under Section 7 and Section 10 of the FESA.

Section 7 of the FESA requires federal agencies to consult with the USFWS and/or NMFS and obtain a biological opinion prior to carrying out any federal program or agency action that may adversely affect threatened or endangered species. The FESA Section 7 consultation process and biological opinion includes an evaluation of whether a federal project, including issuance of an incidental take permit (ITP) under FESA Section 10, is likely to jeopardize the continued existence and recovery of any endangered or threatened species or result in the destruction or adverse modification of critical habitat designated for the species. If a proposed federal action would result in take of a listed animal species or adverse modification of designated critical habitat, FESA Section 7 requires the USFWS to provide an incidental take statement that includes reasonable and prudent measures and terms and conditions implementing those measures, to minimize the effects

of such take. Compliance by the federal agency and any applicant with the incidental take statement exempts potential take or adverse critical habitat modification resulting from the proposed action from the prohibitions in Section 9 of the FESA.

Section 9 lists actions that are prohibited under the FESA. Although take of a listed species is prohibited, it is allowed when it is incidental to an otherwise legal activity. Section 9 prohibits take of listed species of fish, wildlife, and plants without special exemption. The definition of "harm" includes significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns related to breeding, feeding, or shelter. "Harass" is defined as actions that create the likelihood of injury to listed species by disrupting normal behavioral patterns related to breeding, feeding, and shelter significantly.

Section 10 of the FESA provides mechanisms for authorizing otherwise prohibited take through the ITP process for a proposed action that does not involve a discretionary approval by a federal agency. Under Section 10(a) of the FESA, an ITP can be obtained provided the permit applicant submits to the USFWS a habitat conservation plan (often termed an HCP, or a multiple species habitat conservation plan when addressing more than one species) that satisfies Section 10(a)(2)(A) of the FESA, and provided the USFWS determines that the habitat conservation plan meets the issuance criteria of Section 10(a)(2)(B) of the FESA. Section 10(a)(2)(B) of the FESA requires the following criteria be met before the USFWS may issue an ITP: (1) The taking will be incidental; (2) The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (3) The applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided; (4) The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild; and (5) The applicant will ensure that other measures that the USFWS may require as being necessary or appropriate will be provided.

The USFWS is required to annually identify species that are candidates for FESA listing, including species that USFWS records indicate are subject to sufficient biological vulnerability and threats to support a proposal for listing but for which a proposal has not been published due to other listing priorities. The list of candidate species is intended to: (1) notify the public that species face survival threats; (2) provide advance knowledge of potential listings for consideration by environmental planners and developers; (3) provide information that may stimulate and guide conservation efforts; (4) request additional input regarding candidate species; and (5) request information for setting listing priorities (*Federal Register* 79, No. 234 at 72451, December 5, 2014). The USFWS and other federal agencies, including the Bureau of Land Management, may also informally identify sensitive species or species of concern. These species are not subject to FESA or other federal statutory protection but are considered by the USFWS and other agencies when evaluating the effects of a potential action or development resource management plans, including recovery plans under the FESA.

Migratory Bird Treaty Act (16 U.S. Code 703 through 712)

The MBTA (16 U.S.C. 703–712) includes provisions for the protection of migratory birds and prohibits the non-permitted take of most migratory birds. Take under the MBTA is defined as to "pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer

to barter, barter, offer to purchase, purchase, deliver for shipment, ship export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any part, nest, or egg of any such bird, or any product, whether or not manufactured" (16 U.S.C. 703(a)). Apart from certain limited exceptions, the USFWS has not implemented an ITP program for the MBTA.

Clean Water Act (33 U.S. Code §1251 et seq.)

The federal CWA was enacted to protect the nation's waters. Section 404 of the CWA authorizes the Secretary of the Army, acting through the U.S. Army Corps of Engineers (USACE), to issue permits regulating the discharge of dredged or fill materials into "navigable waters at specified disposal sites." Waters of the United States (WOUS) are defined in CFR, Title 33, Section 328.3, subdivision (a) to include navigable waters, perennial and intermittent streams, lakes, rivers, and ponds, as well as wetlands, marshes, and wet meadows. The CWA extends additional protection to certain sensitive aquatic habitats, including wetlands. Authorization to discharge dredge or fill materials into sensitive aquatic habitats requires that an applicant demonstrate the proposed activity represents the least environmentally damaging practicable alternative for the proposed project. A proposed discharge into federally regulated wetlands must also not result in a net loss of wetland functions or values (USACE, U.S. Department of Defense, and U.S. Environmental Protection Agency [EPA] 2008). All authorizations to discharge dredge or fill materials into WOUS must demonstrate that the proposed projects have been designed to avoid, minimize, and mitigate for all unavoidable effects on water of the United States.

The location and extent of WOUS are formally identified by the USACE through a jurisdictional delineation process applying technical criteria described in various guidance documents issued by the USACE, including the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2) (USACE 2010), *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States* (Lichvar and McColley 2008), and in USACE Regulatory Guidance Letter No. 05-05 (USACE 2005).

The Section 404 permit program also applies to the dredge and fill of federal wetlands. Physically, a federal wetland must meet three specified criteria: (i) less permeable soils more likely to cause rainwater and other surface water flows to pond; (ii) seasonal ponding during specified types of rain events; and (iii) the presence of plants that are consistent with seasonally ponding. The extent to which a wetland area that meets the applicable criteria is federally jurisdictional; however, it is subject to considerable legal uncertainty.

On December 30, 2022, the EPA and the Department of the Army (the agencies) announced a final rule founded upon the pre-2015 definition of "waters of the United States," updated to reflect consideration of Supreme Court decisions, the science, and the agencies' technical expertise. The rule restores fundamental protections so that the nation will be closer to achieving Congress' direction in the CWA that our waters be fishable and swimmable. It also ensures that our waters support recreation and wildlife. In this rule, consistent with the general framework of the 1986 regulations, the agencies interpret the term "waters of the United States" to include:

- traditional navigable waters, the territorial seas, and interstate waters ("paragraph (a)(1) waters");
- impoundments of "waters of the United States" ("paragraph (a)(2) impoundments");
- tributaries to traditional navigable waters, the territorial seas, interstate waters, or paragraph (a)(2) impoundments when the tributaries meet either the relatively permanent standard or the significant nexus standard ("jurisdictional tributaries");
- wetlands adjacent to paragraph (a)(1) waters, wetlands adjacent to and with a continuous surface connection to relatively permanent paragraph (a)(2) impoundments, wetlands adjacent to tributaries that meet the relatively permanent standard, and wetlands adjacent to paragraph (a)(2) impoundments or jurisdictional tributaries when the wetlands meet the significant nexus standard ("jurisdictional adjacent wetlands"); and
- intrastate lakes and ponds, streams, or wetlands not identified in paragraphs (a)(1) through (4) that meet either the relatively permanent standard or the significant nexus standard ("paragraph (a)(5) waters").

In addition, this rule codifies several exclusions from the definition of "waters of the United States," including longstanding exclusions for prior converted cropland and waste treatment systems, and for features that were generally considered non-jurisdictional under the pre-2015 regulatory regime (EPA 2023).

State

California Endangered Species Act (California State Fish and Game Code §2050 et seq.)

The CESA (CFGC 2050 et seq.) is intended to conserve, protect, restore, and enhance any state-protected endangered or threatened species and its habitat and is implemented by the CDFW. CESA prohibits the unauthorized take of species listed as threatened or endangered under the act. Take under state law is defined as actions to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" a state-listed species (CFGC Section 86). The CFGC authorizes the take of endangered, threatened, or candidate species through an ITP that may be issued by the CDFW under Section 2081. Alternatively, an incidental take of CESA-listed species may be authorized under Section 2080.1, which allows the CDFW to find that an ITP issued under FESA is consistent with CEQA state take permit requirements.

CDFW also maintains lists of SSC. An SSC designation is administrative in nature and does not create a formal legal status. CDFW has indicated that SSC designations are intended to: (1) focus attention on at-risk animals identified by state, local, and federal entities; land managers; planners; consulting biologists; and others; (2) stimulate species research; and (3) stimulate conservation measures that would avoid a CESA listing.

California State Fish and Game Code §1600-1616

Sections 1600 to 1616 of the CFGC states that it is unlawful to "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake" without first notifying CDFW of that activity. If CDFW determines and informs the project proponent that the activity will not substantially adversely affect any existing fish or wildlife resources, the activity may be undertaken without further permitting. If CDFW determines that the proposed activity may substantially and adversely affect an existing fish or wildlife resource, a Lake or Streambed Alteration Agreement must be completed and approved by the CDFW, including reasonable measures necessary to protect the affected resources may be required prior to initiating the proposed activity (CFGC 1602).

State Waters (Water Code Section 13000 et seq.)

The Porter-Cologne Water Quality Control Act (Porter-Cologne) provides the State and Regional Boards with the authority to regulate discharges of waste to wetlands or other waters of the state. Section 13050(e) of the Water Code defines waters of the state to mean "any surface water or groundwater, including saline waters, within the boundaries of the state." Discharges of waste have been construed to include fill, any material resulting from human activity, or any other discharge that may directly or indirectly impact waters of the state. All WOUS in California are also waters of the state. Non-federal waters, including wetlands or waters that the USACE has delineated as isolated from federally regulated rivers or streams, are regulated by the State and Regional Boards under Porter-Cologne. State jurisdiction over waters of the state is broader in scope than federal jurisdiction of WOUS in California.

In general, Porter-Cologne requires that all parties proposing a discharge that could affect waters of the state file a report of waste discharge with the applicable regional board. The regional board may either issue waste discharge requirements (WDRs), including conditions and measures to protect waters of the state in a public hearing, or may waive the issuance of WDRs with or without additional discharge conditions. As discussed above, Section 4012 of the federal CWA requires state agencies certification that a proposed permit for the fill of a WOUS complies with state water quality objectives. In some instances, the state definition of a water may be larger in size and/or broader in scope than the definition used for federal CWA delineation purposes. Most regional boards utilize the 401 certification process to determine whether additional WDRs may be required for impacts to waters of the state that are not addressed by a proposed federal fill permit. Discharges to waters of the state that are not federally regulated require compliance with the Porter-Cologne discharge notice and WDR issuance process. Many regional boards have adopted criteria for the issuance of WDRs that are similar to federal CWA Section 404 permit requirements, including the need to demonstrate a project has been designed to avoid, minimize, and mitigate for unavoidable effects to waters of the state and would not result in a net loss of wetlands.

The State Board is considering the adoption of a Wetland and Riparian Area Protection Policy in three phases (State Board Resolution No. 2008-0026) in three phases. Phase 1, the "Wetland Area Protection and Dredge and Fill Permitting Policy," is currently under review by the Board and includes a proposed wetland definition, delineation methods, an assessment framework for collecting and reporting aquatic resource information, and requirements applicable to discharges of

dredged or fill material. A draft policy, draft regulation text, and CEQA analysis of the Phase 1 proposal remain pending.

California State Fish and Game Code §§3503, 3503.5 and 3513 (Raptors and Migratory Birds)

Several provisions of the CFGC protect avian species, nests, and eggs. Section 3503 provides that it is unlawful "to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto." Section 3503.5 extends these statutory protections more specifically to raptors and birds of prey (Falconiformes or Strigiformes). The CDFW has not implemented ITP programs for Sections 3503 or 3503.5. Section 3513 makes it unlawful to "possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Treaty Act." As discussed above, apart from certain limited exceptions, the USFWS has not implemented an incidental take program for the MBTA.

Sections 3511, 4700, 5050, and 5515 of the CFGC prohibit the take or possession of certain birds, mammals, fish, and reptiles. These species are commonly referred to as "fully protected" under state law and state agencies are prohibited from permitting actions that would result in the incidental take of these species except under the auspices of an approved NCCP.

California Native Plant Protection Act of 1977; California Fish and Game Code §1900 et seq.

The Native Plant Protection Act of 1977 (CFGC 1900 et seq.) authorizes CDFW to designate rare and endangered native plants and provides specific protection measures for state-listed species.

CEQA Guidelines Section 15380

CEQA Guidelines Section 15380(b) provides that species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to be "endangered" or "rare" within the meaning of the statute. To be "endangered" means that the species survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors. A species is "rare" when either: (1) although not presently threatened with extinction, the species exists in such small numbers throughout all or a significant portion of its range that it may become endangered if the environment worsens or (2) the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and not be considered "threatened" within the meaning of CESA.

Natural Community Conservation Planning Act (California Fish and Game Code 2800 et seq.)

In 1991 California enacted the Natural Community Conservation Planning Act (CFGC Section 2800 et seq.) to authorize the creation and implementation of NCCPs to conserve natural

communities at the ecosystem level while accommodating compatible land use. The act was revised in 2003 and has been subsequently amended. An NCCP is intended to function much like a federal HCP and provide for the long-term conservation of wildlife and plant communities in regional locations in manner that also allows for economic development and growth. Section 2805(e) allows the incidental take of fully protected species that are covered under an approved NCCP.

Regional and Local

Metropolitan Bakersfield General Plan

The Project is in the Metropolitan Bakersfield General Plan (MBGP) area and would therefore be subject to its applicable policies and measures. The Conservation/Biological Resources, Land Use, and Open Space and Park Element of the MBGP include goals, policies, and implementation measures related to biological resources that apply to the Project, as described below.

Chapter V, Conservation/Biological Resources Element

Goals

Goal 1. Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources.

Goal 2. To conserve and enhance habitat areas designated 'sensitive' animal and plant species.

Policies

Policy 1. Direct development away from 'sensitive biological resource' areas, unless effective mitigation measures can be implemented.

Policy 5. Determine the locations and extent of suitable habitat areas required for the effective conservation management of designated 'sensitive' plant and animal species.

Implementation Measures

Implementation Measure 1. When considering discretionary development proposals, consult available biological resource data covering the area. Determine the potential impacts and necessary mitigation measures for identified biological resources, as required in the California Environmental Quality Act. Regularly consult with resource agencies.

Metropolitan Bakersfield Habitat Conservation Plan

The Project falls within the plan area boundary of the Metropolitan Bakersfield Habitat Conservation Plan (MBHCP). The MBHCP, which expired on January 1, 2023, served as an HCP pursuant to Section 10(a)(1)(B) of the Endangered Species Act and ITP issued under Section 2081 of CESA by CDFW that focused on the conservation of species and habitats in the Metropolitan Bakersfield area. The MBHCP allowed permittees to obtain take of Threatened, Endangered, and Rare plant and animal species covered by the MBHCP. Regulation of take of species was authorized by the USFWS and the CDFW for lawful actions (e.g., public, and private projects).

The MBHCP covered take of 17 species of concern in the 261,120-acre plan area. Because of the expiration of the MBHCP as of January 1, 2023, the MBHCP will not apply to the Project.

Kern County Development Standards

Chapter 19.81, Dark Skies Ordinance (Outdoor Lighting)

In November 2011, the County of Kern approved a Dark Skies Ordinance. The purpose of this ordinance is to maintain the existing character of Kern County by requiring a minimal approach to outdoor lighting, recognizing that excessive illumination can create a glow that may obscure the night sky, and that excessive illumination or glare may constitute a nuisance. The ordinance provides requirements for outdoor lighting within specified unincorporated areas of Kern County to accomplish the following objectives:

Objective 1: Encourage a safe, secure, and less light-oriented nighttime environment for residents, businesses and visitors.

Objective 2: Promote a reduction in unnecessary light intensity and glare, and to reduce light spillover onto adjacent properties.

Objective 3: Protect the ability to view the night sky by restricting unnecessary upward projections of light.

Objective 4: Promote a reduction in the generation of greenhouse gases by reducing wasted electricity that can result from excessive or unwanted outdoor lighting.

4.4.4 Impacts and Mitigation Measures

Methodology

The following impact analysis is based on existing and potential biological resources occurring in or near the project site, as identified by the Biological Resources Assessment prepared for the Project. Biological resources evaluated include special status plant and wildlife species. Other resources, (e.g., wetlands, riparian habitat, movement corridors) are not anticipated to occur within the project site.

As described in Appendix C, biological field surveys were conducted on March 4, 2023, via biological habitat assessment, vegetation mapping, and identification of flora and fauna present within the project site. Based on the results of initial assessments, priority areas were identified for further investigation, including focused surveys. The project site was observed to have several California ground squirrel (*Otospermophilus beecheyi*) burrows, which have the potential to support special status burrowing mammals, such as burrowing owl (*Athene cunicularia*) and San Joaquin kit fox (*Vulpes macrotis mutica*). The potential for special status species to occur on the project site is based on the results of literature review, surveys of the project site, presence of suitable habitat, and the proximity of the project site to previously recorded occurrences.

As noted in Section 4.4.3, *Regulatory Setting*, the MBHCP, the MBGP, and the Dark Skies Ordinance provide a framework to guide development projects in the portion of Kern County where the Project is located. In addition, several federal and state statutes and regulations are relevant (or potentially relevant) to the plant and wildlife resources located on the project site, including the following: CESA (CFGC Section 2050 et seq), FESA (16 U.S.C. 1531 et seq), MBTA (16 U.S.C. 703–712), federal CWA, and CEQA Guideline Section 15380.

The following section addresses potential impacts to biological resources caused by implementation of the Project, particularly those considered to be special status or otherwise regulated by resource agencies noted above. Recommendations to address potential impacts are provided below.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations or by the CDFW or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS;

- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;
- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state HCP.

Project Impacts

Impact 4.4-1: The project would have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service.

Special Status Plant Species

Direct and Indirect Impacts

Special status plant species have a low expectation to occur on the project site; therefore, there is a low potential for direct or indirect impacts to special status plant species from project implementation. The project site is currently dominated by non-native grassland and is subject to disturbance from management practices. No special status plant species were observed during the survey conducted in March 2023, and special status plants are not expected to occur on the project site.

However, there remains a low possibility for special status plant species to occur on the project site. As such, **Mitigation Measure MM 4.4-5** would require a preconstruction survey be conducted. If any special status plants are identified as part of this survey, consultation with CDFW or US Fish and Wildlife Service (USFWS) would occur if required by applicable law. Therefore, with implementation of **Mitigation Measure MM 4.4-5**, potential direct and indirect impacts to special status plant species would be reduced to less than significant.

Special Status Wildlife

The following evaluates the Project's potential direct and indirect impacts on three special status wildlife species that could potentially occur on-site during construction activities: burrowing owl, San Joaquin kit fox, and Crotch's bumble bee, along with nesting birds.

Indirect Impacts

Burrowing Owl

Construction activities have the potential to result in indirect impacts to burrowing owls both on, and immediately adjacent to, the project site if this species occurs prior to and/or during project construction. These impacts include dust, noise and vibration, trash and debris, increased human presence, vehicle collisions, and chemical spills. These potential short-term or temporary indirect impacts to burrowing owls would be potentially significant under CEQA.

To minimize human presence during construction activities, **Mitigation Measures MM 4.4-1, MM 4.4-2, MM 4.4-3**, and **MM 4.4-4** would require ongoing biological monitoring, completion of a worker environmental awareness training, compliance with vegetation control measures listed within **Section 4.9-9** (see MM 4.4-3 below), regular removal of trash and debris on-site via animal-resistant trash receptacles, and completion of preconstruction surveys with consultation with CDFW and USFWS as applicable should species occur. Further, **MM 4.4-9** would require burrowing owl surveys to be conducted prior to ground disturbance activities and appropriate construction buffers established around any burrowing owl burrows found on or immediately adjacent to the project site, thus minimizing most short-term indirect impacts. **MM 4.4-12** would require nighttime lighting during construction or operation to be directed away from areas containing habitat for special status wildlife. Lastly, **Mitigation Measure MM 4.9-1** (see Section 4.9, *Hazards and Hazardous Materials,* for full mitigation measure text) would ensure prompt and effective response to any accidental chemical spills, as well as the repair and cleanup of hazardous waste. Therefore, implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-4, MM 4.4-9, MM 4.4-12**, and **MM 4.9-1** would reduce potential indirect impacts to burrowing owls to less than significant.

San Joaquin Kit Fox

Construction activities have the potential to result in short-term indirect impacts to San Joaquin kit fox, should any be passing through or foraging on the project site during construction. Those impacts could include construction associated dust, noise and vibration, trash and debris, increased human presence, vehicle collisions, and chemical spills. Should individual kit foxes occupy the project site prior to construction, these short-term or temporary indirect impacts to kit foxes would be potentially significant under CEQA.

As mentioned above, **Mitigation Measures MM 4.4-1** through **MM 4.4-4** would require ongoing biological monitoring, completion of worker environmental awareness training, compliance with vegetation control measures listed within Section 4.9-9 (see MM 4.4-3 below), regular removal of trash and debris on-site via animal-resistant trash receptacles, and completion of preconstruction surveys with consultation with CDFW and USFWS as applicable should species occur. Further, **Mitigation Measure MM 4.4-10** would require a preconstruction survey for San Joaquin kit fox and, if determined present, would result in establishment of a San Joaquin kit fox monitoring and mitigation plan that would include avoidance and minimization measures to reduce potential indirect impacts. Lastly, **Mitigation Measures MM 4.4-12** and **MM 4.9-1** (see Section 4.9, *Hazards and Hazardous Materials*) would respectively require nighttime lighting to be shifted

away from special status wildlife habitats and ensure prompt and effective responses to accidental chemical spills and cleanup of hazardous waste. Therefore, implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-4, MM 4.4-10**, **MM 4.4-12,** and **MM 4.9-1** would reduce potential indirect impacts to San Joaquin kit fox to less than significant.

Crotch's Bumble Bee

The Project could result in indirect impacts on individual Crotch's bumble bees due to noise and vibration and other indirect effects. Ongoing biological monitoring, worker environmental awareness training, effective cleanup of trash and debris, and completion of preconstruction surveys would reduce indirect impacts to wildlife species in the area, including the Crotch's bumble bee (**Mitigation Measures MM 4.4-1** through **MM 4.4-4**). Additionally, implementation of **Mitigation Measures MM 4.4-11** and **MM 4.4-12** would reduce potential indirect impacts from noise and vibration by requiring a preconstruction survey for Crotch's bumble bee, avoidance of nesting resources, and a 100-foot buffer, if present, until the nesting period has concluded. **Mitigation Measure MM 4.9-1** would further ensure prompt and effective responses to accidental chemical spills and cleanup of hazardous waste. Therefore, implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-4**, **MM 4.4-11**, and **MM 4.9-1**, would reduce potential indirect impacts on Crotch's bumble bees.

Nesting Birds

Construction activities have the potential to result in indirect impacts to nesting migratory birds and raptors. Those impacts could include the loss of an active nest through increased dust, noise and vibration, increased human presence, and nighttime lighting. Potential short-term or temporary indirect impacts to active bird nests would be significant under CEQA.

Potential post-construction (long-term) activities that have the potential to result in significant indirect impacts to migratory birds and raptors include nighttime lighting that may adversely affect active nests. This long-term indirect impact to migratory birds and raptors would be potentially significant under CEQA.

Mitigation Measures MM 4.4-1 through **MM 4.4-4** would reduce indirect impacts to wildlife species in the area, including nesting birds, by requiring ongoing biological monitoring, worker environmental awareness training, compliance with all biological resource mitigation requirements, and completion of preconstruction surveys. To ensure compliance with the CFGC and MBTA, and to avoid potential indirect impacts to nesting birds specifically, vegetation removal activities would be conducted outside the general bird nesting season (February 15 through September 15, depending on the species). If vegetation cannot be removed outside the bird nesting season, a pre-construction nesting bird survey (**Mitigation Measure MM 4.4-6**) by a qualified biologist would be required prior to vegetation removal. Indirect impacts would include increased dust, noise and vibration, human presence, nighttime lighting, and vehicle collisions. Further, **Mitigation Measure MM 4.4-12** would require nighttime lighting to be shifted away from special status wildlife habitats Therefore, implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-4, MM 4.4-6**, and **MM 4.4-12** would reduce potential indirect impacts to nesting birds and raptors to less than significant.

Direct Impacts

Burrowing Owl

The project site provides suitable foraging and nesting habitat for burrowing owls. Several suitable burrowing owl burrows (burrow openings approximately 4 inches in diameter or greater) or burrow complexes were observed during the survey effort. As previously noted, no burrowing owls or their sign (e.g., whitewash, pellets, prey remains, feathers) were observed during the biological survey conducted on the project site. However, the potential for burrowing owls to use the ground squirrel burrows on-site as temporary shelter, nesting, or overwintering prior to project implementation cannot be entirely ruled out. In the unlikely event that, burrowing owls move onto the site prior to construction, ground disturbance activities could result in injury or mortality to burrowing owls. Because this species is a CDFW SSC and is protected by provisions in the CFGC addressing active bird nests and raptors, such injury or mortality would constitute a potentially significant impact under CEQA. **Mitigation Measure MM 4.4-9** includes a requirement for a preconstruction survey for burrowing owls on the site, prescribes buffers for avoidance of occupied burrows, and describes when passive relocation may be used, if necessary, to exclude owls from the project site. With implementation of **Mitigation Measure MM 4.4-9**, potential direct impacts to burrowing owl would be reduced to less than significant.

San Joaquin Kit Fox

Several burrows or burrow complexes meeting the minimum size criteria were identified and examined (**Figure 4.4-1**). Of these, none were confirmed to be San Joaquin kit fox natal dens or active dens. Furthermore, none of these burrows were occupied by kit fox, and none showed sign (e.g., scat, prey remains, digging) of recent use by kit fox. In addition, no sign (e.g., tracks, scat, dens, prey remains) of kit fox presence was observed during the field survey. The loss of the site as foraging and habitat for kit fox is not expected to substantially affect populations of this species in the region. Per the results of the CNDDB search, several historical records of this species have been documented within 0.1 mile to 5 miles from the project site. Although this species is not expected to den and/or breed on the project site, individual foxes could temporarily move through the site in search of prey or during movements between larger open space areas in the region with more suitable foraging habitat. In the unlikely event that an individual kit fox temporarily moves onto or through the site prior to or during construction, project activities could result in injury or mortality to individual kit foxes. Because of the rarity of this species, which is federally listed as endangered and state-listed as threatened, the loss of a San Joaquin kit fox would be a potentially significant impact under CEQA. Implementation of **Mitigation Measure MM 4.4-10** includes a requirement for preconstruction surveys and standard measures recommended by USFWS to avoid impacts to San Joaquin kit fox prior to and during construction activities. With implementation of **MM 4.4-10**, potential impacts to San Joaquin kit fox would be reduced to less than significant with mitigation.

Crotch's Bumble Bee

Crotch's bumble bee is a state candidate for listing an endangered. It occurs in open grassland and scrub communities supporting suitable floral resources. It was not observed during surveys but has

potential to occur on the project site. The Project could result in direct impacts to individuals of this uncommon species or loss of suitable floral resources.

Implementation of **Mitigation Measure MM 4.4-11** would reduce potential direct impacts by requiring a preconstruction survey for Crotch's bumble bee and avoidance of nesting resources, if present, until the nesting period has concluded.

Nesting Birds

Similar to most other sites containing trees, shrubs, and other vegetation, the project site contains opportunities for birds of prey (raptors) and other avian species to nest on-site. Native nesting bird species with potential to occur within the project site are protected by CFGC Sections 3503 and 3503.5, and by the federal MBTA (16 U.S.C. 703–711). In particular, CFGC Section 3503 provides that it is unlawful to take, possess, or needlessly destroy the active nests or eggs of any bird in California; Section 3503.5 protects all raptors and their eggs and active nests; and the MBTA prohibits the take (including killing, capturing, selling, trading, and transport) of native migratory bird species throughout the United States. Currently, California considers any nest that is under construction or modification, or is supporting eggs, nestlings, or juveniles as "active." Therefore, impacts to nesting migratory birds and raptors would be significant under CEQA absent mitigation.

To ensure compliance with the CFGC and MBTA and to avoid potential impacts to nesting birds, it is recommended that vegetation removal activities be conducted outside the general bird nesting season (February 1 through August 31, depending on the species). Per **Mitigation Measure MM 4.4-6**, if construction activities such as vegetation removal cannot occur outside the bird nesting season, a pre-construction nesting bird survey by a qualified biologist is required prior to vegetation removal; if active nests are found, appropriate non-disturbance buffers would be established around any active nests until young have successfully fledged. Preconstruction nesting bird surveys would also be required via **Mitigation Measure MM 4.4-7** if construction activities are scheduled to take place during breeding seasons for raptors or other migratory birds (February 1 through August 31). Additionally, construction areas would be surveyed for actively nesting birds prior to any vegetation removal during site preparation per **Mitigation Measure MM 4.4-8**. With implementation of **Mitigation Measures MM 4.4-6, MM 4.4-7**, and **MM 4.4-8**, direct impacts to nesting migratory birds and raptors would be less than significant.

Mitigation Measures

Avoidance and minimization measures are designed to reduce or eliminate impacts on special status species through project construction, operation, and decommissioning. Detailed specific measures are outlined below for each special status species that may occur on the project site.

Implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12**, as described above and **MM 4.9-1** (Section 4.9, *Hazards and Hazardous Materials*) would be required.

MM 4.4-1 Prior to the issuance of grading permits, the project operator shall retain a Lead Biologist(s) who meets the qualifications of an Authorized Biologist as defined by California Department of Fish and Wildlife (CDFW) Service to oversee

compliance with protection measures for all listed and other special-status species that may be affected by the construction and operation of the project. The resume and contact information for the Lead Biologist(s) shall be provided in writing to the Planning and Natural Resources Department.

The following measures pertain to the Lead Biologist(s):

a. The Lead Biologist(s), or their designee, shall be on the project site during all construction activities which include, but are not limited to, installation of perimeter fencing, clearing of vegetation, grading activities, and facility construction.

b. The Lead Biologist(s) or their designee shall have the right to halt all activities that are in violation of the special-status species protection measures, as well as any regulatory permits from the U.S. Fish and Wildlife Service and/or the California Department of Fish and Wildlife, if applicable. Work shall proceed only after hazards to special-status species are removed and the species is no longer at risk.

MM 4.4-2 Prior to the issuance of grading permits, the Lead Biologist shall develop a Worker Environmental Awareness Training Program containing life history and identification information of special-status wildlife and plant species with potential to occur on site. The Worker Environmental Awareness Training Program shall review responsibilities for all on-site personnel including trash control, checking under and around vehicles and heavy equipment before starting, scanning for wildlife resources, contacting the Lead Biologist in the unanticipated instance of encountering special status wildlife species, and prohibition of pets and firearms. All on-site personnel shall be required to attend a worker environmental training. A sticker shall be placed on hard hats, indicating that the worker has completed the Worker Environmental Awareness Training. Copies of all prepared materials including, but not limited to, PowerPoint presentations, videos, information handouts and signed acknowledgement from each worker who has attended the required training shall be provided to the Planning and Natural Resources Department.

MM 4.4-3 During construction of the project site, the project proponent and/or contractor(s) shall implement the following general avoidance and protective measures:

a. Immediately prior to conducting vegetation clearing or similar activities, the Lead Biologist or their designee shall perform a pre-construction visual survey of the area to ensure that no special-status species are present. Daily reports of these inspections shall be retained by the Lead Biologist and provided to the Kern County Planning and Natural Resources Department, U.S. Fish and Wildlife Service, or California Department Fish and Wildlife upon request.

b. Within the vicinity of any construction activities, sensitive biological resources (i.e., special-status species, jurisdictional drainages, nesting birds, etc.) shall be delineated with stakes and/or flagging.

c. All construction activities shall be confined within the project construction area, which may include temporary access roads, haul roads, and staging areas specifically designated and marked for these purposes. At no time shall equipment or personnel be allowed to adversely affect areas outside the project site.

d. Any spoils shall be stockpiled in disturbed areas that lack native vegetation to the maximum extent practicable. Spoils that have been stockpiled and inactive for more than 24 hours shall be inspected by a qualified biologist for signs of special-status wildlife before moving or disturbing.

e. To prevent inadvertent entrapment of San Joaquin kit foxes, American badgers, or other animals during construction, all excavated steep-walled holes or trenches more than two (2) feet deep shall be covered with plywood or similar materials at the close of each working day. If holes or trenches cannot be covered, one or more escape ramps constructed of earthen fill or wooden planks, no less than 12 inches wide and secured at the top, shall be placed a minimum of every 100 feet within the open trench. Covered and non-covered holes or trenches shall be thoroughly inspected for trapped animals by a qualified biologist at the beginning and end of each working day. Immediately before such holes or trenches are filled, they shall again be thoroughly inspected by trained Staff approved by the Lead Biologist. If any trapped animals are observed, escape ramps or structures shall be installed immediately to allow for their escape. If a listed species is trapped, the Lead Biologist shall immediately confer with the U.S. Fish and Wildlife Service and/or California Department of Fish and Wildlife.

f. All construction pipes, culverts, or similar structures with a diameter of four (4) inches or greater that are stored at the site for more than 24 hours and without endcaps shall be thoroughly inspected by a qualified biologist prior to being moved or capped. If a listed wildlife species is discovered inside a pipe, that section of pipe shall not be moved until a qualified biologist has been consulted and the animal has either moved from the structure on its own accord or until the animal has been captured and relocated in conformance with appropriate wildlife agency guidelines.

g. No construction vehicle or equipment parked on the project site shall be moved prior to inspecting the ground beneath the vehicle or equipment for the presence of listed wildlife species. If present, the animal shall be left to move on its own.

h. A speed limit of 15 miles per hour shall be enforced within the limits of the project site. If night work occurs on the project site, the speed limit will be 10 miles per hour.

i. Fueling of construction equipment shall take place within existing roads or disturbed areas. No refueling within or adjacent to drainages (within 150 feet) shall be permitted. Contractor equipment shall be checked for leaks prior to operation and repaired as necessary.

j. Trash and food items shall be contained in closed containers to reduce the attractiveness to opportunistic predators such as common ravens, coyotes, and feral dogs.

k. Workers shall be prohibited from bringing pets and firearms to the project site and from feeding wildlife.

l. No pets shall be allowed in project areas, except for trained canine animals related to security and operation of the facility.

m. Intentional killing or collection of any listed plant or wildlife species shall be prohibited.

n. Herbicides that may be used as vegetation control measures in project areas shall be applied in accordance with submeasures below. All uses of such herbicidal compounds shall observe label and other restrictions mandated by the U.S Protection Agency, California Department of Food and Agriculture, and state/federal legislation as well as additional project related restrictions deemed necessary by the U.S. Fish and Wildlife Service or California Department of Fish and Wildlife.

    1. The construction contractor or project personnel shall use herbicides that are approved by the California Department of Fish and Wildlife (CDFW) and United States Fish and Wildlife Service (USFWS) for use in California and are appropriate for application adjacent to natural vegetation areas (i.e., nonagricultural use). Personnel applying herbicides shall have all appropriate State and local herbicide applicator licenses and comply with all State and local regulations regarding herbicide use.

    2. Herbicides shall be mixed and applied in conformance with the manufacturer's directions.

    3. The herbicide applicator shall be equipped with splash protection clothing and gear, chemical resistant gloves, chemical spill/splash wash supplies, and material safety data sheets for all hazardous materials to be used. To minimize harm to wildlife, vegetation, and water bodies, herbicides shall not be applied directly to wildlife.

4. Products identified as non-toxic to birds and small mammals shall be used if nests or dens are observed; and herbicides shall not be applied if it is raining at the site, rain is imminent, or the target area has puddles or standing water.

5. Herbicides shall not be applied when wind velocity exceeds 10 miles per hour. If spray is observed to be drifting to a non-target location, spraying shall be discontinued until conditions causing the drift have abated.

6. A written record of all herbicide applications on the site, including dates and amounts, shall be furnished annually to the Kern County Planning and Natural Resources Department.

MM 4.4-4 No more than (30) days prior to the issuance of any grading permits or the start of ground disturbance, a qualified biologist knowledgeable in the identification of all special-status wildlife species shall conduct a pre-construction survey of areas proposed for disturbance within the project site and 500-foot buffer (where legally accessible) to determine if any special-status species are present. If, as a result of this pre-construction survey it is determined that special-status wildlife species are present, the project proponent shall confer with the U.S. Fish and Wildlife Service or California Department of Fish and Wildlife, as required by applicable law, for proper avoidance measures or the need for take authorization through the acquisition of an incidental take permit, pursuant to Fish and Game Code section 2081 subdivision (d).

MM 4.4-5 No more than thirty (30) days prior to the start of ground disturbance activities or issuance of any grading permits, a qualified biologist knowledgeable on the identification of rare plant species shall conduct a pre-construction plant survey of areas of proposed disturbance within the project site and 100-foot buffer (where legally accessible) to determine if any special-status plant species are present. If special-status plants are identified on-site, their locations shall be mapped and the project proponent shall confer with CDFW or USFWS as required by applicable law to facilitate salvage or seed collection.

MM 4.4-6 If construction activities are conducted during the typical nesting bird season (February 15 through September 15), pre-construction surveys shall be conducted by a qualified biologist prior to any site preparation and/or construction activity to identify potential nesting bird activity. The survey area shall include a 500-foot buffer surrounding the property. Swainson's hawk protocol-level surveys shall be consistent with the survey methods developed by the Swainson's Hawk Technical Advisory Committee (SWHA TAC 2000); If no active nests are found within the survey area, no further mitigation is required. If nesting activity is identified during the pre-construction survey process, the following measures will be implemented:

a. If active nest sites of bird species protected under the Migratory Bird Treaty Act and/or California Fish and Game Code are observed within the project site, then the project will be modified and/or delayed as necessary to avoid direct take of the identified nests, eggs, and/or young;

b. If active nest sites of raptors and/or bird species of special concern are observed within the vicinity of the project site, then the appropriate buffer around the nest site (typically 250 feet for passerines and 500 feet for raptors) will be established. Construction activities in the buffer zone will be prohibited until the young have fledged the nest and achieved independence; and,

c. Active nests shall be documented by a qualified biologist, and a letter report shall be submitted to the Kern County Planning and Natural Resources Department documenting project compliance with the Migratory Bird Treaty Act and California Fish and Game Code.

MM 4.4-7 Pre-construction protocol-level surveys by a qualified biologist for nesting birds shall be required if construction activities are scheduled to occur during the breeding season for raptors and other migratory birds (February 1– August 31), to reduce potential impacts to nesting birds and raptors. The survey shall be conducted within 30 days of ground disturbance activities.

a. If any nesting birds/raptors are observed, a qualified biologist shall determine buffer distances and/or the timing of project activities so that the proposed Project does not cause nest abandonment or destruction of eggs or young. This measure shall be implemented so that the proposed Project remains in compliance with the Migratory Bird Treaty Act and applicable State regulations.

MM 4.4-8 Prior to any vegetation removal during site preparation, the areas required for construction shall be surveyed for actively nesting birds. If any wildlife is encountered during the course of construction, the wildlife shall be allowed to leave the construction area unharmed. Should any active bird nests be identified, the vegetation shall not be removed in areas that contain actively nesting birds. A biological monitor shall survey the areas of vegetation slated for removal, a report shall be submitted to the Kern County Planning and Natural Resources Department for review prior to site preparation.

MM 4.4-9 Preconstruction surveys shall be conducted by a qualified biologist to locate active breeding or wintering burrowing owl burrows no fewer than 14 days prior to commencement of ground-disturbing activities. Surveys need not be conducted for all areas of suitable habitat at one time; they may be phased so that surveys occur within 14 days prior to that portion of the project site disturbed.

The survey methodology shall be consistent with the methods outlined in the 2012 California Department of Fish and Wildlife Staff Report on Burrowing Owl Mitigation and shall consist of walking parallel transects 7 to 20 meters apart, adjusting for vegetation height and density as needed, and noting any potential burrows with fresh burrowing owl sign or presence of burrowing owls. As each burrow is investigated, surveying biologists shall also look for signs of American badger and San Joaquin kit fox. Copies of the survey results shall be submitted to California Department of Fish and Wildlife and the Kern County Planning and Natural Resources Department.

If burrowing owls are detected on-site, the avoidance buffers outlined below should be established. These buffers shall be implemented prior to and during any ground-disturbing activities. Specifically, California Department of Fish and Wildlife's Staff Report recommends that impacts to occupied burrows be avoided in accordance with the following table unless a qualified biologist, approved by California Department of Fish and Wildlife, verifies through non-invasive methods that either: 1) the birds have not begun egg laying and incubation; or 2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival. Visible markers shall be placed near the identified burrow(s) to ensure that machinery does not collapse the burrow(s).

Location	Time of Year	Level of Disturbance		
		Low	Med	High
Nesting sites	April 1 – Aug 15	200 m*	500 m	500 m
Nesting sites	Aug 16 – Oct 15	200 m*	200 m	500 m
Nesting sites	Oct 16 – Mar 31	50 m	100 m	500 m

*meters (m)

If burrow avoidance is infeasible during the non-breeding season or during the breeding season (February 1 through August 31) where resident owls have not yet begun egg laying or incubation, or where the juveniles are foraging independently and capable of independent survival, a qualified biologist shall implement a passive relocation program in accordance with *Appendix E* (i.e., *Example Components for Burrowing Owl Artificial Burrow and Exclusion Plans*) of the 2012 California Department of Fish and Wildlife Staff Report on Burrowing Owl Mitigation.

If passive relocation is required, a qualified biologist shall prepare a Burrowing Owl Exclusion and Mitigation Plan and a Mitigation Land Management Plan, in accordance with the 2012 California Department of Fish and Wildlife Staff Report on Burrowing Owl Mitigation, for review by California Department of Fish and Wildlife prior to passive relocation activities. If applicable, the Mitigation Land Management Plan shall include a requirement for the permanent conservation of

offsite Burrowing Owl Passive Relocation Compensatory Mitigation. At a minimum, the following recommendations shall be implemented:

a. Temporarily disturbed habitat shall be restored, if feasible, to pre-project conditions including decompacting soil and revegetating.

b. Permanent impacts to nesting, occupied and satellite burrows and/or burrowing owl habitat shall be mitigated such that the habitat acreage, number of burrows and burrowing owl impacted are replaced based on a site-specific analysis and shall include permanent conservation of similar vegetation communities (grassland, scrublands, desert, urban, and agriculture) to provide for burrowing owl nesting, foraging, wintering, and dispersal (i.e., during breeding and non-breeding seasons) comparable to or better than that of the impact area, and with sufficiently large acreage, and presence of fossorial mammals.

c. Permanently protect mitigation land through a conservation easement, deed restriction, or similar mechanism deeded to a nonprofit conservation organization or public agency with a conservation mission. If the project is located within the service area of a California Department of Fish and Wildlife -approved burrowing owl conservation bank, the project operator may purchase available burrowing owl conservation bank credits. Land identified to mitigate for passive relocation of burrowing owl may be combined with other offsite mitigation requirements of the proposed Project if the compensatory habitat is deemed suitable to support the species.

MM 4.4-10 Prior to and during construction activities:

a. If any San Joaquin kit fox dens are found during pre-construction surveys, the status of the dens shall be evaluated no more than 14 days prior to project ground disturbance. Provided that no evidence of kit fox occupation is observed, potential dens shall be marked and a 50-foot avoidance buffer delineated using stakes and flagging or other similar material to prevent inadvertent damage to the potential den. If a potential den cannot be avoided, it may be hand-excavated following United States Fish and Wildlife Service standardized recommendations for protection of the San Joaquin kit fox prior to or during ground disturbance by the lead biologist. If kit fox activity is observed at a den, the den status shall change to “known” per United States Fish and Wildlife Service guidelines (1999), and the buffer distance shall be increased to 100 feet. Absolutely no excavation of San Joaquin kit fox known or pupping dens shall occur without prior authorization from the United States Fish and Wildlife Service and California Department of Fish and Wildlife.

b. To enable kit foxes and other wildlife (e.g., American badger) to pass through the project site during construction, the perimeter security fence shall leave a

5-inch opening between the fence mesh and the ground or the fence shall be raised 5 inches above the ground. The bottom of the fence fabric shall be knuckled (wrapped back to form a smooth edge) to protect wildlife that passes under the fence.

c. All pipes, culverts, or similar structures with a diameter of four inches or more that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the United States Fish and Wildlife Service has been consulted. If necessary, under the direct supervision of the biologist, the pipe may be moved once to remove it from the path of construction activity until the fox has escaped.

d. To prevent inadvertent entrapment of San Joaquin kit foxes, badgers, or other animals during construction, all excavated, steep-walled holes or trenches more than two feet deep shall be covered with plywood or similar materials at the close of each working day, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals. If trapped animals are observed, escape ramps or structures shall be installed immediately to allow escape. If listed species are trapped, the United States Fish and Wildlife Service and California Department of Fish and Wildlife shall be contacted.

e. All vertical tubes used in project construction, such as chain link fencing poles shall be temporarily or permanently capped at the time they are installed to avoid the entrapment and death of special-status birds.

MM 4.4-11 A qualified biologist shall conduct a survey for Crotch's bumble bee and their requisite habitat using the California Department of Fish and Wildlife -approved protocol during the blooming period immediately prior to project construction to detect bumble bees and potential nesting sites. The survey shall be conducted within a survey area that includes a 50-foot buffer around the Project footprint and results submitted to California Department of Fish and Wildlife at least seven (7) days prior to commencing any project activities. If Crotch's bumble bee is identified during surveys or at any time during Project construction, the project proponent shall confer with California Department of Fish and Wildlife to determine if take can be avoided. If avoidance of Crotch's bumble bee nest(s) is not feasible, take authorization prior to ground disturbing activities is warranted. Ake authorization would occur through issuance of an Incidental Take Permit by California Department of Fish and Wildlife, pursuant to Fish and Game Code section 2081(b). Alternatively, in the absence of surveys, the project proponent may assume presence and apply for and acquire an Incidental Take Permit for Crotch's bumble bee prior to initiating project activities.

MM 4.4-12 If nighttime lighting for construction activities and operations is required and is within 50 feet of the outside edge of areas containing habitat for special-status wildlife, as determined by the qualified biologist, lighting shall be directed away from those areas that contain habitat for special-status wildlife.

Level of Significance After Mitigation

With implementation of **MM 4.4-1** through **MM 4.4-12, MM 4.9-1,** and **MM 4.9-4** (see **Section 4.9**, *Hazards and Hazardous Materials*), impacts would be less than significant after mitigation.

Impact 4.4-2: The project would have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service.

As stated in Section 4.4.2, *Local Setting*, one land cover type was identified on-site, which is not considered sensitive pursuant to local, state, and federal guidelines and policies. The Project would result in permanent impacts to 49.05 acres of non-native grassland, which is not considered sensitive by CDFW. Therefore, no significant impacts to habitat or vegetation communities identified in local or regional plans, policies, or regulations, or by CDFW or USFWS would occur, and the impact would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance

No impacts would occur.

Impact 4.4-3: The project would have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

As detailed in Section 4.4.2, *Aquatic Resources*, there are no sensitive aquatic features within or adjacent to the project site; therefore, no significant impact would occur.

Mitigation Measures

No Mitigation Measures are required.

Level of Significance After Mitigation

No impacts would occur.

Impact 4.4-4: The project would interfere substantially with the movement of any resident or migratory fish or wildlife species or with established resident or migratory wildlife corridors or impede the use of wildlife nursery sites.

As discussed above, the project site does not provide for regional wildlife movement or serve as a regional wildlife corridor, nor include any streams or water courses. Because the project site does not serve as a lone corridor between fragmented portions of open space, project development would not impede local or seasonal wildlife movement between large open space areas in the project region. Therefore, no adverse or significant impacts would occur to wildlife movement corridors.

In addition, because no native wildlife nursery sites, such as bat colony roosting sites or colonial bird nesting areas, occur on the project site, development of the site would not likely impede the use of wildlife nursery sites by native species. However, as discussed in **Impact 4.4-1** above, construction of the Project would require the removal of existing vegetation and introduce noise, dust, and human activity that could impacts nesting avian species if present.

Potential impacts on wildlife within the project area, including nesting bird species, would be reduced by ensuring compliance with all biological resource mitigation measures outlined in **Mitigation Measure MM 4.4-3**. Further, per **Mitigation Measure MM 4.4-6**, if construction activities such as vegetation removal cannot occur outside the bird nesting season, a pre-construction nesting bird survey by a qualified biologist is required prior to vegetation removal; if active nests are found, appropriate non-disturbance buffers would be established around any active nests until young have successfully fledged. Preconstruction nesting bird surveys would also be required via **Mitigation Measure MM 4.4-7** if construction activities are scheduled to take place during breeding seasons for raptors or other migratory birds (February 1 through August 31). Furthermore, construction areas would be surveyed for actively nesting birds prior to any vegetation removal during site preparation per **Mitigation Measure MM 4.4-8**. Therefore, with the implementation of **Mitigation Measures MM 4.4-3** and **MM 4.4-6** through **MM 4.4-8**, impacts to wildlife corridors and wildlife nursery sites would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.4-3, MM 4.4-6, MM 4.4-7**, and **MM 4.4-8** would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.4-3, MM 4.4-6, MM 4.4-7**, and **MM 4.4-8**, impacts would be less than significant after mitigation.

Impact 4.4-5: The project would conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The Project would follow the regulations outlined in and consistent with the MBGP Goals and Policies; measures discussed in **Impacts 4.4-1** and **4.4-5**; and implement the aforementioned Mitigation Measures, thereby ensuring biological resources identified in the general plans would

be protected in accordance with FESA, CESA, and CEQA. Thus, the Project would not be in conflict with local policies or ordinances for protection of biological resources, and impacts would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12,** and **MM 4.9-1** (Section 4.9, *Hazards and Hazardous Materials*).

Level of Significance

With implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12,** and **MM 4.9-1** (Section 4.9, *Hazards and Hazardous Materials*), impacts would be less than significant after mitigation.

Impact 4.4-6: The project would conflict with the provisions of an adopted habitat conservation plan, natural conservation community plan, or other approved local, regional, or state habitat conservation plan.

The project site is within the previous boundaries of the MBHCP Sphere of Influence. However, as mentioned above, the MBHCP expired on January 1, 2023. The MBHCP previously served as an HCP pursuant to Section 10(a)(1)(B) of the Endangered Species Act and ITP issued under Section 2081 of CESA by CDFW that focused on the conservation of species and habitats in the Metropolitan Bakersfield area. The MBHCP expired as of January 1, 2023, and therefore no longer applies to the Project. Therefore, the proposed Project would not conflict with any adopted HCP, NCCP, or other approved local, regional, or state HCP.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

No impacts would occur.

4.4.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

The geographic scope for cumulative impacts to biological resources includes 29 projects within a six-mile radius of the Project. Analysis of cumulative impacts takes into consideration the entirety of impacts that the projects, zone changes, and the general plan amendments previously discussed would have on biological resources. This geographic scope of analysis is appropriate because, although impacts associated with the Project would primarily be localized to the disturbance areas, losses of vegetation or fragmentation of wildlife corridors could combine with similar impacts of other projects beyond these limited impact areas.

Cumulative impacts for a project would be significant if the incremental effects of the individual project are considerable when combined with the effects of past projects, other current projects, and probable future projects. As described above, the project-specific impacts of the project would be less than significant with implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12**, and **MM 4.9-1** (Section 4.9, *Hazards and Hazardous Materials*).

As urbanization pressures increase within Kern County, impacts to biological resources at a cumulative level within the region are anticipated. As described in Table 3-8, *Cumulative Projects*, in Chapter 3, *Project Description*, of this Draft EIR, other projects that result in the conversion of undeveloped land to developed land and the associated habitat loss are all proposed within the same region as the Project. In general, bioregions are defined through physical and environmental features, including watershed boundaries and soil terrain characteristics. Areas to the north and west of the Tehachapi Mountains, and to the south of the San Gabrial Mountains, are within a different bioregion and are separated from the project site by the natural geography that these ranges present. State Route 99 crosses through Bakersfield going north to south and also acts as a barrier to wildlife movement.

As described above, there are three special status species that could occupy the project site and vicinity including the burrowing owl, San Juaquin kit fox, and Crotch's bumble bee, along with nesting birds. Implementation of the Project, along with related projects, has the potential to impact these wildlife species. The project site contains habitat that can support plants, insects, rodents, and small birds that provide prey base for raptors and terrestrial wildlife. In addition, based on the analyses completed for the Project, the region is known to support a diversity of special status species, most of which are not expected to utilize the project site on a transient basis, if at all.

Given the number of present and reasonably foreseeable future development projects in the region, the Project, when combined with other projects, when combined with other projects, could contribute to cumulative loss of habitat for special status species. Implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12** would reduce impacts to less than significant for the Project. Although the Project, when combined with other related development projects throughout the County, could cumulatively impact habitat for special status species, particularly San Joaquin kit fox and burrowing owl as noted in the Biological Report, there being no occupied dens or evidence of species occupying the site, in addition to the extensive development that exists within the surrounding land, cumulative impacts would be less than significant in this regard.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12**, and **MM 4.9-1** (Section 4.9, *Hazards and Hazardous Materials*) would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12**, and **MM 4.9-1** (Section 4.9, *Hazards and Hazardous Materials*), cumulative impacts would be less than significant after mitigation.

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Section 4.5

Cultural Resources

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Section 4.5

Cultural Resources

4.5.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding cultural and historical resources in the proposed IPG Industrial Project (Project) site, including the area's pre-Contact, ethnographic, and historical settings. This section also summarizes the results of preliminary cultural surveys of the Project site and analyzes the impacts on cultural resources that would result from implementation of the Project, and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the 2024 Phase I Historical/Archaeological Resources Survey and the 2023 Paleontological Resources Assessment Report, both prepared by CRM Tech (Appendix D).

The cultural resources report and Native American consultation were conducted for purposes of compliance with the California Environmental Quality Act (CEQA) and Assembly Bill 52 (AB 52). This evaluation does not include maps or location descriptions and such information is not included in the appendix because of the confidential nature of the location of cultural resources. The Project's potential impacts on tribal cultural resources are addressed in Section 4.18, *Tribal Cultural Resources*.

Cultural Resource Terminology

For the purposes of CEQA, "cultural resources" generally refer to pre-Contact and post-Contact (historic) archaeological sites and the built environment. Cultural resources can also include areas determined to be important to Native Americans. "Historical resources" generally refer to cultural resources that have been determined to be significant, either by eligibility for listing in state/local registers of historical resources, or by determination of a lead agency (see definitions in the following list). Historical resources can also include areas determined to be important to Native Americans, such as sacred sites. Sacred sites are most often important to Native American groups because of the role of the location in traditional ceremonies or activities.

The following definitions of key cultural resources terms are used in this section:

- **Archaeological Site:** A site is defined by the National Register of Historic Places (NRHP) as the place or places where the remnants of a past culture survive in a physical context that allows for the interpretation of these remains. Archaeological remains usually take the form of artifacts (e.g., fragments of tools, vestiges of utilitarian, or non-utilitarian objects), features (e.g., remnants of walls, cooking hearths, or midden deposits), and ecological evidence (e.g., pollen remaining from plants that were in the area when the activities occurred). **Pre-Contact archaeological sites** generally represent the material remains of Native American groups and their activities dating to the period before European contact

(the Contact period). In some cases, pre-Contact sites may contain evidence of trade contact with Europeans. **Ethnohistoric archaeological sites** are defined as Native American settlements occupied after the arrival of European settlers in California. **Historic archaeological sites** reflect the activities of nonnative populations in the period after initial European contact (the post-Contact period, also known as the historic period).

- **Artifact:** An object that has been made, modified, or used by a human being
- **Cultural Resource:** A cultural resource is a location of human activity, occupation, or use identifiable through field inventory, historical documentation, or oral evidence. Cultural resources include archaeological resources and built environment resources (sometimes known as historic architectural resources), and may include sites, structures, buildings, objects, artifacts, works of art, architecture, and natural features that were important in past human events. They may consist of physical remains or areas where significant human events occurred, even though evidence of the events no longer remains. Cultural resources also include places that are considered to be of traditional cultural or religious importance to social or cultural groups.
- **Cultural Resources Study Area:** All areas within the project site boundary plus a 1-mile buffer
- **Cultural Resources Survey Area:** All areas of potential permanent and temporary impacts for a reasonable worst-case development within the project site, plus a 60-foot buffer to account for secondary or unanticipated impacts
- **Ethnographic:** Relating to the study of human cultures. "Ethnographic resources" represent the heritage resource of a particular ethnic or cultural group, such as Native Americans or African, European, Latino, or Asian immigrants. They may include traditional resource-collecting areas, ceremonial sites, value-imbued landscape features, cemeteries, shrines, or ethnic neighborhoods and structures.
- **Historic period:** The period that begins with the arrival of the first nonnative population and thus varies by area. In 1772, Commander Don Pedro Fages was the first European man to enter Kern County, initiating the historic period in the Project study area.
- **Historical resource:** This term is used for the purposes of CEQA and is defined in the CEQA Guidelines (§15064.5) as: (1) a resource listed in, or determined to be eligible for listing in the California Register of Historical Resources (CRHR); (2) a resource included in a local register of historical resources, as defined in Public Resources Code (PRC) §5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC §5024.1(g); and (3) any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record.
- **Isolate:** An isolated artifact or small group of artifacts that appear to reflect a single event, loci, or activity. It may lack identifiable context but has the potential to add important

information about a region, culture, or person. Isolates are not considered under CEQA to be significant and, thus, do not require avoidance mitigation (CEQA Statute §21083.2 and CEQA Guidelines §15064.5). However, all isolates located during the field effort, are recorded and the data are transmitted to the appropriate California Historical Resources Information System Information Center.

- **Lithic:** Of or pertaining to stone. In archaeology, lithic artifacts are chipped or flaked stone tools and the stone debris resulting from their manufacture.
- **Native American sacred site:** An area that has been, and often continues to be, of religious significance to Native American peoples, such as an area where religious ceremonies are practiced or an area that is central to their origins as a people. They also include areas where Native Americans gather plants for food, medicinal, or economic purposes.
- **Pre-Contact period:** The era prior to 1772. The latter part of the pre-Contact period (post-1542) is also referred to as the protohistoric period in some areas, which marks a transitional period during which native populations began to be influenced by European presence, resulting in gradual changes to their lifeways.
- **Tribal Cultural Resource:** These are defined in AB 52 as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe" that are either included or determined to be eligible for inclusion in the CRHR or included in a local register of historical resources (PRC § 21074 (a)(1)). Refer to Section 4.18, *Tribal Cultural Resources*, of this Draft EIR for further discussion.
- **Unique Archaeological Resource:** This term is used for the purposes of CEQA and is defined in PRC Section 21083.2(g) as an archaeological artifact, object, or site that does not merely add to the current body of knowledge. A unique archaeological resource has a clearly demonstrated and a high probability that it either contains information needed to answer important scientific research questions and that there is demonstrable public interest in that information, has a special and particular quality (such as being the oldest of its type or the best available example of its type), or is directly associated with a scientifically recognized important event or person of the past.

4.5.2 Environmental Setting

The Project is in unincorporated Kern County and approximately 1.7 miles north of the city of Bakersfield. The project site is approximately 49.05 acres in size and consists of two privately owned parcels: Assessor's Parcel Numbers 492-010-13 and -17. These two parcels are west of Airport Drive and between Boughton and Skyway drives, in the southeast quarter of Section 2, Township 29 South, Range 27 East, Mount Diablo Baseline and Meridian, as depicted in the U.S. Geological Survey (USGS) 7.5-minute quadrangle *Oildale, California*. The Project is located in the southeastern end of the San Joaquin Valley where the Sierra Nevada, Great Valley, and Coastal Range physiographic provinces meet.

The project site is surrounded by the Meadows Field Airport to the west, several apartment complexes and a self-storage facility to the east, and vacant industrially zoned land to the north and

the south. One large soil stockpile and several smaller ones are located along the eastern side of the southern half of the property. Currently there are no standing structures or groves within the project area, but broken irrigation pipes and standpipes were observed along with a concrete structural foundation. The surface soils are composed of light brown fine- and medium-grained alluvial sands with small granitic cobbles. The ground surface project area has been recently disked, and the scattered vegetation remaining includes wild mustard, string meadows, foxtails, and other small shrubs and grasses.

The following overview of the general area's cultural past provides context for the relevance of resources found in the general project area. This section is not intended to be a comprehensive review of the current resources available; rather, it serves as an overview. Further details can be found in the Phase I Historical/Archaeological Resources Survey and Paleontological Resources Assessment Report prepared by CRM Tech (CRM Tech, 2023; Appendix F.2).

Archaeological Context

Early archaeological investigations in the San Joaquin Valley of California have primarily been conducted at sites located in the Buena Vista and Tulare Lakes regions. The earliest evidence of human occupation in the southern San Joaquin Valley, discovered at the Witt locality at Tulare Lake and reported by West et al. in 1991, included some of the oldest human remains in North America. These investigations of the artifacts of the San Joaquin Valley's pre-Contact cultural groups have revealed a complex history of cultural change that has occurred over time. Through these studies, a cultural chronological framework encompassing three basic periods has been developed. The following general framework proposes three primary periods, although the beginning and ending dates of the recognized cultural horizons vary among different parts of the region:

- Paleoindian Period (circa 16,000 to 8,550 years before present)
- Archaic Period (circa 8,550 years before present to 1,000 Anno Domini)
- Emergent Period (circa 1000 to 1776 Anno Domini)

Paleoindian Period: Native peoples of this period created fluted spearhead bases designed to be hafted to wooden shafts, possibly indicative of hunting now extinct megafauna. The distinctive method of thinning bifaces and spearhead preforms by removing long, linear flakes left diagnostic Paleoindian markers at tool-making sites. Other artifacts associated with the Paleoindian toolkit include choppers, cutting tools, retouched flakes, and perforators. Sites from this period are very rare, and most are deeply buried.

Archaic Period: Archaic sites are characterized by abundant lithic scatters of considerable size with many biface thinning flakes, bifacial preforms broken during manufacture, and well-made groundstone bowls and basin metates. Diverse architectural features such as house floors and significant deposits of refuse materials reflect both land- and water-associated subsistence activities. Cultural materials from the Archaic Period include temporally diagnostic forms of beads

and ornaments manufactured from Haliotis and Olivella shells. Spindle-shaped charmstones are also found. The Archaic Period can be further broken down into lower, middle, and upper phases.

Emergent Period: Sites from this period typically contain lithic scatters from the manufacture of small arrow points, expedient groundstone tools such as tabular metates and unshaped manos, wooden mortars with stone pestles, acorn or mesquite bean granaries, ceramic vessels, shell beads suggestive of extensive trading networks, and steatite implements such as pipes and arrow shaft straighteners. The bow and arrow replace the dart and atlatl at sites from the Emergent Period. Specialized sites of local shell bead manufacturing are recognized by the presence of bead blanks and manufacturing debris, a pattern that might indicate the introduction of monetized systems of exchange.

Ethnohistoric Context

The Bakersfield area is generally considered a part of the traditional homeland of the Southern Valley Yokuts near its northern limits, where the project area is located. The territory of the Southern Valley Yokuts extended from the southern San Joaquin Valley, between the San Joaquin and the lower Kings rivers, and to the Tehachapi Mountains. The Southern Valley Yokuts sustained themselves with fish, waterfowl, shellfish, roots, and seeds found in abundance near the many rivers, lakes, sloughs, and the seasonal marshes. Baskets were important in securing and processing foods, along with nets, sinew-backed bows, stone-tipped arrows, and stone scrapers. Stone mortars, wooden mortars, and pestles were obtained through trade, as were the lithic materials used to make stone tools. Perforated marine shell disks were used as currency. There is no evidence of clay vessel manufacturing among the Southern Valley Yokuts, probably due to their skill in basket making and a preferential use of baskets in daily chores.

The native lifestyle of the Southern Valley Yokuts received little influence from early, casual contacts with Spaniards in the late 1700s and early 1800s. In 1833, however, an epidemic of introduced disease devastated the native population with an estimated 75 percent mortality rate. After the annexation of Alta California by the United States, the decline of Southern Valley Yokuts population and culture accelerated as Euro-American settlers overran the tribal territory and displaced the native people. Eventually, the Southern Valley Yokuts were mostly interned on the Tejon Reservation and, later, the Tule River Reservation.

Regional Historic Context

Spanish and Mexican explorations occurred in the San Joaquin Valley in the early nineteenth century. Despite the repeated explorations, the southern portion of the San Joaquin Valley remained largely devoid of any non-Native American population at the time of American annexation in 1848. The first major “growth spur” in the southern San Joaquin Valley took place between the 1860s and the 1890s, when the ever-increasing number of settlers shifted the focus of regional economy from animal husbandry to dry farming for grains, especially wheat. Meanwhile, the completion of the Southern Pacific Railroad from 1873 to 1876 and the competing San Francisco and San Joaquin Valley Railway from 1895 to 1897 gave rise to a string of towns across the vast stretches of

farmlands. Then, from 1890 to 1910, the grain fields gradually gave way to irrigated orchards and vineyards, which were joined after 1920 by truck farms and cotton fields.

The City of Bakersfield was first incorporated in 1873 and became the county seat the next year. Two years later, the city was disincorporated and was not reincorporated until 1898 (Appendix D). During the twentieth century, San Joaquin Valley farmers distinguished themselves as the leading agricultural producers in California, and in some instances the entire nation. Around 1900, an oil boom along the Kern River brought the Bakersfield area to the forefront of California's budding petroleum industry, although agriculture remained the dominant factor in the area's economy as well as its cultural heritage. However, in the most recent decades, the housing boom has played a pivotal role in the growth of the southern San Joaquin Valley region, turning much of the once-prime farmland into master-planned residential communities.

History of the Project Vicinity

In the mid-nineteenth century, a branched road running generally north–south about a quarter mile to the east of the Project location was the only human-made feature noted in the vicinity. By the turn of the century, scattered roads lined by occasional buildings and other developments had been established in the surrounding area, including an Oil City branch railway line and a canal. The outskirts of the Project location remained sparsely settled and presumably dominated by agriculture and oil extraction in the early and mid-twentieth century.

Historical maps indicate that a building, presumably a farmstead, was in place in the project area by 1935 along today's Airport Drive, joined by two more buildings near Boughton Drive by 1952 and an orchard. By 1968 the presumed farmstead was the only the residence along Airport Drive, with only half of the orchard remaining. The property was clear of buildings and the orchard by 1984. In 1930, census records showed that the property was being farmed with the help of Hawaiian native Fred Nishimoto as a laborer.

The Meadows Field Airport, formerly known as Kern County Airport No. 1, was built by the local Chamber of Commerce in 1926 to transport mail and passengers. Upon its acquisition by Kern County in 1935, it became the first county-owned airport in the nation (Appendix D). During World War II, it became an auxiliary air training facility for the Army Air Corps, and afterward it was returned to the County for commercial use. It was renamed in 1957 after Cecil Meadows, Kern County's then-Director of Airports (Appendix D).

In the 1980s and 1990s, the surrounding area began the transformation from agriculture to suburban residential development, pushing west toward Airport Drive. More residential development occurred on nearby properties during the ensuing decade, including several parcels directly across Airport Drive to the east. Within the Project boundaries, meanwhile, even though all agricultural operations had ceased by the mid-1980s, no major changes have occurred in the overall character of the property.

Existing Cultural Resources

To identify cultural resources and characterize the Project's potential effects on cultural resources, a cultural resources study was completed for the project area, which included retrieving archival records at the Southern San Joaquin Valley Information Center (SSJVIC) at California State University, Bakersfield. In addition to the records search and literature review, Native American Tribal consultation, a Sacred Lands File (SLF) search, and field survey were conducted for the site. The methodology and results of these efforts are summarized in this report subsection.

Records Search

An archival records search was conducted at the SSJVIC on June 6, 2023 (CRM Tech, 2023; Appendix F.2). Sources consulted during the research included published literature in local and regional history, contemporary publications, federal and local real estate records, online genealogical databases, historical maps of the Bakersfield area, and aerial/satellite photographs of the project vicinity. Among the maps consulted were U.S. General Land Office land survey maps dated 1855 and USGS topographic maps dated from 1902 to 1973, which are available at the websites of the U.S. Bureau of Land Management and the USGS. The aerial and satellite photographs, taken between 1952 and 2023, are available at the Nationwide Environmental Title Research website and through Google Earth software.

The results of the records search indicated that the project area had not been previously surveyed for cultural resources, and no cultural resources had been recorded within or adjacent to the Project boundaries. Within the 1-mile scope of the records search, SSJVIC records identified a total of 22 previous studies on various tracts of land and linear features, including a linear survey along the segment of Airport Drive adjacent to the eastern Project boundary (**Figure 4.5-1**). As a result of these past survey efforts, 13 cultural resources were previously recorded within the 1-mile radius, including 12 sites and an isolate (i.e., a locality with fewer than three artifacts), as listed in **Table 4.5-1.**

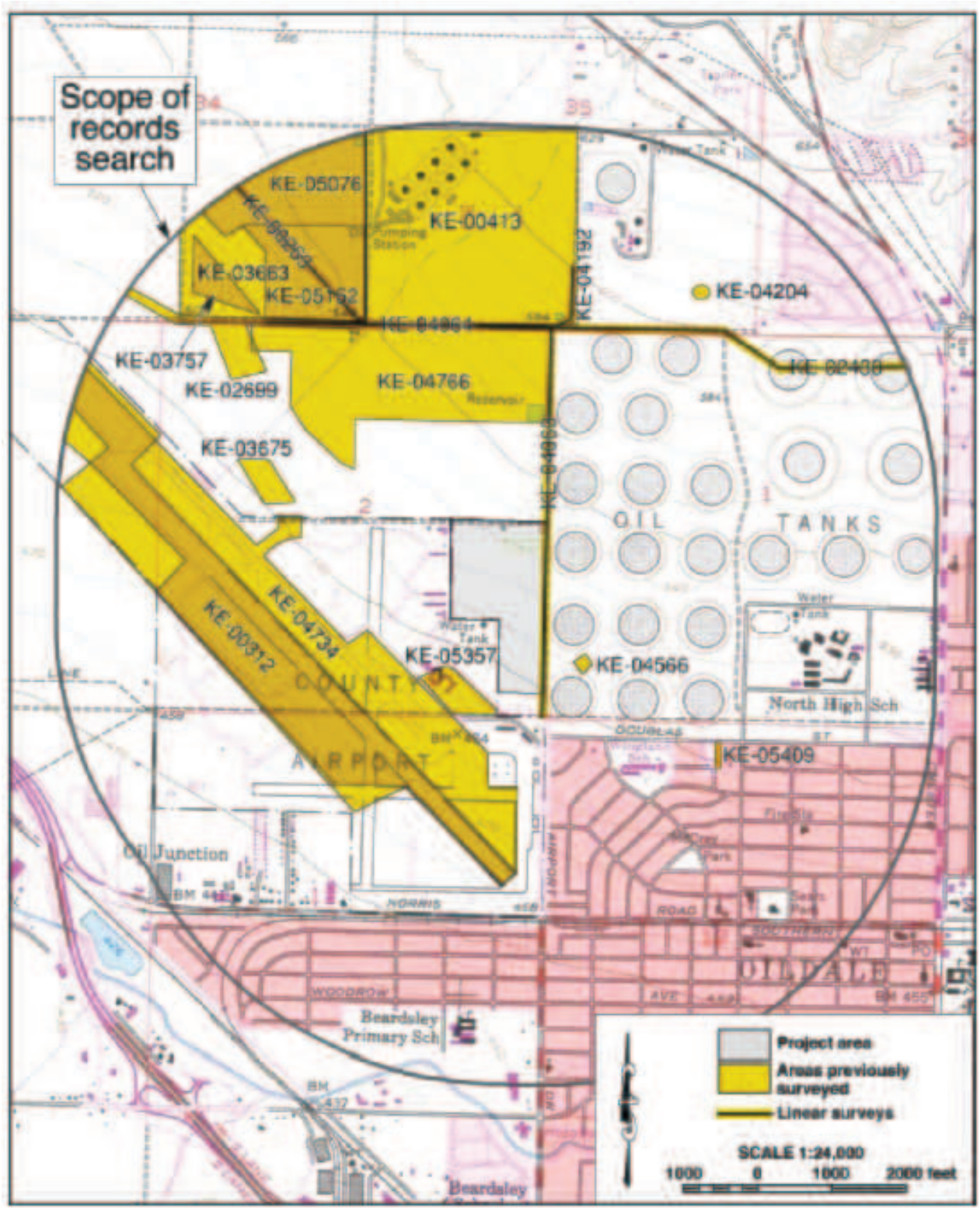
Table 4.5-1: Previously Recorded Cultural Resources Within the Scope of the Records Search

Resource No.	Description
15-003322	Historic-period refuse scatter
15-003323	Historic-period refuse scatter
15-004728	Unnamed railroad siding
15-004734	Beardsley Irrigation Canal
15-008037	Building, date/description unspecified
15-008134	Building, date/description unspecified
15-008184	Building, date/description unspecified
15-008203	Building, date/description unspecified
15-008232	Building, date/description unspecified
15-008249	Building, date/description unspecified
15-008515	Building, date/description unspecified
15-009854	Isolate: piece of amethyst glass

Resource No.	Description
15-021383	Foundation of four-bay parking stalls

All of these known cultural resources dated to the post-Contact (historic) period, and no pre-Contact sites or isolates were recorded within the records search scope. The majority of the sites, numbering seven in total, represented buildings of historical age, although specific dates of construction and descriptions were not provided by the SSJVIC. Other sites included refuse scatters, structural remains, and linear features such as a railroad siding and the Beardsley Irrigation Canal. The one isolate was a piece of sun-colored amethyst glass. All of the previously recorded cultural resources were found at least 0.75 mile from the Project location.

Figure 4.5-1: Cultural Resources Project Study Area



Phase 1 Field Survey

During the field survey, three previously undocumented cultural resources were recorded within the project area and given temporary designations pending assignment of permanent identification numbers in the California Historical Resources Inventory. Two of these resources were of pre-Contact origin, each representing an isolated artifact. The third dated to the post-Contact period and consisted of the remains of a former orchard. No other cultural resources were identified within or adjacent to the Project area. A small amount of modern refuse was observed along the Project boundaries, including cans, bottles, and construction materials, but none of the items was of any historical or archaeological interest.

Isolates 4020-1 and 4020-2: Isolate 4020-1 is a rounded, complete granitic mano encountered in the northeastern corner of the Project area. The mano measures approximately 14 centimeters in diameter and was found in close proximity to the concrete pad and footings recorded at Site 4020-3H. Isolate 4020-2 is a granitic unifacial mano fragment measuring approximately 10 by 9.5 by 6 centimeters in size, located in the central portion of the Project area.

Site 4020-3H: This post-Contact site was recorded in the northeast corner of the Project area. Among the components of the site are the remains of a concrete pad and footings associated with a demolished building, likely a garage, two refuse scatters, and the fragmented remains of a concrete irrigation system used for the orchard that once occupied the property. Feature 1 of the site consists of the concrete pad and footings, which measure approximately 50 feet north–south by 33 feet east–west in total size. The concrete pad, located in the center of the feature, measures approximately 33 feet east–west by 26 feet north–south.

Two refuse scatters were also recorded at the site. One was located near the western site boundary, and the other just to the west of Feature 1. The refuse items present within the scatters included broken glass bottles, rusted can fragments, oil filters, lumber, concrete fragments, and household items such as plates and bowl fragments. Fragments of concrete irrigation pipes and standpipes were observed in the westerly refuse scatter and also scattered across the rest of the site.

Resource Evaluation

Isolates 4020-1 and 4020-2

The pre-Contact isolates discovered during this study consists of a complete granitic mano and a granitic mano fragment, and neither of them had any other associated artifacts or archaeological features nearby. Such isolates, or localities with fewer than three artifacts, by definition do not qualify as archaeological sites because of their lack of contextual integrity. As such, Isolates 4020-1 and 4020-2 do not constitute potential historical resources and require no further consideration.

Site 4020-3H

Site 4020-3H, consisting of a concrete pad and footings, two refuse scatters, and the remnants of an irrigation system from a former orchard, is the only potential historical resource identified in the Project area that requires proper evaluation. With the removal of the buildings and orchard many decades ago, these remains lack sufficient historic integrity to relate to their period of origin.

Furthermore, historical background research during this study uncovered no evidence that these features are closely associated with any persons or events of recognized historic significance, nor do they demonstrate any special merits in design and construction or any particular potential for important archaeological data. In summary, Site 4020-3H does not appear to meet any of the criteria for listing in the CRHR. Therefore, it does not qualify as a historical resource under CEQA provisions.

Native American Consultation

Sacred Lands File Search

The California Native American Heritage Commission (NAHC) maintains a confidential SLF which contains sites of traditional, cultural, or religious value to the Native American communities. In an effort to determine whether any sacred sites are listed on its SLF, CRM Tech contacted the NAHC for a SLF search for the Project on May 25, 2023. In response to CRM Tech's inquiry, the NAHC stated in a letter dated June 21, 2023, that the SLF search identified no Native American cultural resources in the Project vicinity. Noting that the absence of specific information does not preclude the presence of cultural resources in the vicinity, the commission recommended contacting local Native American groups for pertinent information and proceeded to provide a referral list of nine individuals associated with five local Native American groups.

Assembly Bill No. 52 Tribal Consultation

On August 8, 2023, pursuant to AB 52, Kern County sent consultation notification letters via certified mail to four California Native American tribal contacts on the County's Master List for AB 52 consultation. Consultation letters were sent to contacts for the Tejon Indian Tribe, the Torres Martinez Desert Cahuilla Indians, the Twenty-Nine Palms Band of Mission Indians, and the Yuhaaviatam of San Manuel Nation. No responses were received from the above listed Native American tribes during the 30-day consultation inquiry period, which ended September 8, 2023. The Project's potential impacts on tribal cultural resources are addressed in Section 4.18, *Tribal Cultural Resources*.

Native American Consultation Summary

No known cemeteries or burial sites are located within the Project vicinity and no responses to the consultation notification letters were received. No Native American sacred sites or human burials are known to be located within the Project site boundaries, and no responses to the consultation notification letters were received.

4.5.3 Regulatory Setting

Federal

National Historic Preservation Act of 1966

Enacted in 1966, the National Historic Preservation Act (NHPA) declared a national policy of historic preservation and instituted a multifaceted program, administered by the Secretary of the Interior to encourage the achievement of preservation goals at the federal, state, and local levels. The NHPA authorized the expansion and maintenance of the NRHP, established the position of State Historic Preservation Office and provided for the designation of State Review Boards, set up a mechanism to certify local governments to carry out the purposes of the NHPA, established assistance for the preservation of Native American cultural heritage, and created the Advisory Council on Historic Preservation (ACHP). Section 106 of the NHPA states that federal agencies with direct or indirect jurisdiction over federally funded, assisted, or licensed undertakings must take into account the effect of the undertaking on any historic property that is included in, or eligible for inclusion in, the NRHP and that the ACHP must be afforded an opportunity to comment, through a process outlined in the ACHP regulations at 36 Code of Federal Regulations Part 800, on such undertakings.

National Register of Historic Places

As presented in 36 Code of Federal Regulations 60.2, the NRHP was established by the NHPA of 1966 as "an authoritative guide to be used by federal, state, and local governments, private groups, and citizens to identify the Nation's cultural resources and to indicate what properties should be considered for protection from destruction or impairment." The NRHP recognizes properties that are significant at the national, state, and local levels. To be eligible for listing in the NRHP, a resource must be significant in American history, architecture, archaeology, engineering, or culture. Districts, sites, buildings, structures, and objects of potential significance must also possess integrity of location, design, setting, materials, workmanship, feeling, and association. A property is eligible for the NRHP if it is significant under one or more of the following criteria:

- **Criterion A:** It is associated with events that have made a significant contribution to the broad patterns of our history.
- **Criterion B:** It is associated with the lives of persons who are significant in our past.
- **Criterion C:** It embodies the distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction.
- **Criterion D:** It has yielded, or may be likely to yield, information important in prehistory or history.

Cemeteries, birthplaces, or graves of historic figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations;

reconstructed historic buildings; and properties that are primarily commemorative in nature are not considered eligible for the NRHP unless they satisfy certain conditions. In general, a resource must be at least 50 years of age to be considered for the NRHP, unless it satisfies a standard of exceptional importance.

State

California Environmental Quality Act

CEQA requires the assessment of a project's effects on cultural resources. Pursuant to CEQA, a historical resource is a resource listed in, or eligible for listing in, the CRHR. In addition, resources included in a local register of historic resources or identified as significant in a local survey conducted in accordance with State guidelines are also considered historic resources under CEQA, unless a preponderance of the facts demonstrates otherwise. Properties listed in or formally determined eligible for listing in the NRHP are automatically included in the CRHR. According to CEQA, the fact that a resource is not listed in or determined eligible for listing in the CRHR or is not included in a local register or survey shall not preclude a lead agency, as defined by CEQA, from determining that the resource may be a historical resource as defined in California PRC Section 5024.1. CEQA applies to archaeological resources when (1) the archaeological resource satisfies the definition of a historical resource, or (2) the archaeological resource satisfies the definition of a unique archaeological resource. A unique archaeological resource is an archaeological artifact, object, or site that has a high probability of meeting any of the following criteria:

- The archaeological resource contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information.
- The archaeological resource has a special and particular quality such as being the oldest of its type or the best available example of its type.
- The archaeological resource is directly associated with a scientifically recognized important event or person of the past.

California Register of Historical Resources

Under the California PRC, Section 5024.19(a), the CRHR was created in 1992 and implemented in 1998 as "an authoritative guide in California to be used by State and local agencies, private groups, and citizens to identify the State's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change." Certain properties, including those listed in or formally determined eligible for listing in the NRHP and California Historical Landmarks numbered 770 and higher, are automatically included in the CRHR. Other properties recognized under the California Points of Historical Interest program, identified as significant in historical resources surveys or designated by local landmarks programs, may be nominated for inclusion in the CRHR. A resource, either an individual property or a contributor to a historic district, may be listed in the CRHR if the State Historical Resources Commission (SHRC) determines that it meets one or more of the following criteria, which are modeled on NRHP criteria:

- **Criterion 1.** It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- **Criterion 2.** It is associated with the lives of persons important in our past.
- **Criterion 3.** It embodies the distinctive characteristics of a type, period, region, or method of construction; represents the work of an important creative individual; or possesses high artistic values.
- **Criterion 4.** It has yielded, or may be likely to yield, information important in history or prehistory.

Furthermore, under PRC Section 4852(c), a cultural resource must retain integrity to be considered eligible for the CRHR. Specifically, it must retain sufficient character or appearance to be recognizable as a historical resource and convey reasons of significance. Integrity is evaluated with regard to retention of such factors as location, design, setting, materials, workmanship, feeling, and association. Cultural sites that have been affected by ground-disturbing activities, such as grazing and off-road vehicle use (both of which have occurred within the project site), often lack integrity because they have been directly damaged or removed from their original location, among other changes.

Typically, an archaeological site in California is recommended eligible for listing in the CRHR based on its potential to yield information important about the region's past (Criterion 4). Important information includes chronological markers such as Projectile point styles or obsidian artifacts that can be subjected to dating methods or undisturbed deposits that retain their stratigraphic integrity. Sites such as these have the ability to address research questions.

California Historical Landmarks

California Historical Landmarks (CHLs) are buildings, structures, sites, or places that have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value and that have been determined to have statewide historical significance by meeting at least one of the criteria listed below. The resource also must be approved for designation by the County Board of Supervisors (or the city or town council in whose jurisdiction it is located), be recommended by the SHRC, and be officially designated by the Director of California State Parks. The specific standards now in use were first applied in the designation of CHL No. 770. CHLs No. 770 and above are automatically listed in the CRHR.

To be eligible for designation as a landmark, a resource must meet at least one of the following criteria:

- It is the first, last, only, or most significant of its type in the State or within a large geographic region (Northern, Central, or Southern California).
- It is associated with an individual or group having a profound influence on the history of California.

- It is a prototype of, or an outstanding example of, a period, style, architectural movement or construction or is one of the more notable works or the best surviving work in a region of a pioneer architect, designer, or master builder.

California Points of Historical Interest

California Points of Historical Interest are sites, buildings, features, or events that are of local (city or county) significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value. Points of historical interest designated after December 1997 and recommended by the SHRC are also listed in the CRHR. No historic resource may be designated as both a landmark and a point. If a point is later granted status as a landmark, the point designation will be retired. In practice, the point designation program is most often used in localities that do not have a locally enacted cultural heritage or preservation ordinance.

To be eligible for designation as a point of historical interest, a resource must meet at least one of the following criteria:

- It is the first, last, only, or most significant of its type within the local geographic region (city or county).
- It is associated with an individual or group having a profound influence on the history of the local area.
- It is a prototype of, or an outstanding example of, a period, style, architectural movement or construction or is one of the more notable works or the best surviving work in the local region of a pioneer architect, designer, or master builder.

Native American Heritage Commission

Section 5097.91 of the California PRC established the NAHC, whose duties include the inventory of places of religious or social significance to Native Americans and the identification of known graves and cemeteries of Native Americans on private lands. Section 5097.98 of the PRC specifies a protocol to be followed when the NAHC receives notification of a discovery of Native American human remains from a county coroner.

California Public Records Act

Sections 6254(r) and 6254.10 of the California Public Records Act were enacted to protect archaeological sites from unauthorized excavation, looting, or vandalism. Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Section 6254.10 specifically exempts from disclosure requests for "records that relate to archaeological site information and reports, maintained by, or in the possession of the Department of Parks and Recreation, the SHRC, the State Lands Commission, the NAHC, another

State agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a State or local agency."

Health and Safety Code, Sections 7050 and 7052

Health and Safety Code, Section 7050.5, declares that, in the event of the discovery of human remains outside of a dedicated cemetery, all ground disturbance must cease, and the county coroner must be notified. Section 7052 establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives.

California Penal Code, Section 622.5

The California Penal Code, Section 622.5, provides misdemeanor penalties for injuring or destroying objects of historic or archaeological interest located on public or private lands, but specifically excludes the landowner.

California Public Resources Code Section 5097.98

California PRC Section 5097.98, as amended, provides procedures in the event human remains of Native American origin are discovered during project implementation. PRC Section 5097.98 requires that no further disturbances occur in the immediate vicinity of the discovery, that the discovery is adequately protected according to generally accepted cultural and archaeological standards, and that further activities take into account the possibility of multiple burials. PRC Section 5097.98 further requires the NAHC, upon notification by a county coroner, designate and notify a Most Likely Descendant regarding the discovery of Native American human remains. The Most Likely Descendant has 48 hours from the time of being granted access to the site by the landowner to inspect the discovery and provide recommendations to the landowner for the treatment of the human remains and any associated grave goods.

In the event that no descendant is identified, or the descendant fails to make a recommendation for disposition, or if the landowner rejects the recommendation of the descendant, the landowner may, with appropriate dignity, reinter the remains and burial items on the property in a location that will not be subject to further disturbance.

Assembly Bill 52 and Related Public Resources Code Sections

AB 52 was approved by California State Governor Edmund Gerry "Jerry" Brown, Jr. on September 25, 2014. The act amended California PRC Section 5097.94, and added PRC Sections 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2, and 21084.3. AB 52 applies specifically to projects for which a Notice of Preparation or a Notice of Intent to Adopt a Negative Declaration or Mitigated Negative Declaration will be filed on or after July 1, 2015. The primary intent of AB 52 was to include California Native American Tribes early in the environmental review process and to establish a new category of resources related to Native Americans that require consideration under CEQA, known as tribal cultural resources. PRC Section 21074(a)(1) and (2) defines tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with

cultural value to a California Native American Tribe" that are either included or determined to be eligible for inclusion in the CRHR or included in a local register of historical resources, or a resource that is determined to be a tribal cultural resource by a lead agency, in its discretion and supported by substantial evidence. On July 30, 2016, the California Natural Resources Agency adopted the final text for tribal cultural resources update to Appendix G of the CEQA Guidelines, which was approved by the Office of Administrative Law on September 27, 2016.

PRC Section 21080.3.1 requires that within 14 days of a lead agency determining that an application for a project is complete, or a decision by a public agency to undertake a project, the lead agency provide formal notification to the designated contact, or a tribal representative, of California Native American Tribes who are traditionally and culturally affiliated with the geographic area of the project (as defined in PRC Section 21073) and who have requested in writing to be informed by the lead agency (PRC Section 21080.3.1(b)). Tribes interested in consultation must respond in writing within 30 days from receipt of the lead agency's formal notification and the lead agency must begin consultation within 30 days of receiving the tribe's request for consultation (PRC Sections 21080.3.1(d) and 21080.3.1(e)).

PRC Section 21080.3.2(a) identifies the following as potential consultation discussion topics: the type of environmental review necessary, the significance of tribal cultural resources, the significance of the Project's impacts on the tribal cultural resources, Project alternatives or appropriate measures for preservation, and mitigation measures. Consultation is considered concluded when either (1) the parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or (2) a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached (PRC Section 21080.3.2(b)).

If a California Native American Tribe has requested consultation pursuant to Section 21080.3.1 and has failed to provide comments to the lead agency, or otherwise failed to engage in the consultation process, or if the lead agency has complied with Section 21080.3.1(d) and the California Native American Tribe has failed to request consultation within 30 days, the lead agency may certify an EIR or adopt a Mitigated Negative Declaration (PRC Section 21082.3(d)(2) and (3)).

PRC Section 21082.3(c)(1) states that any information (including the location, description, and use of the tribal cultural resources) that is submitted by a California Native American Tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public without the prior consent of the tribe that provided the information. If the lead agency publishes any information submitted by a California Native American Tribe during the consultation or environmental review process, that information shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public.

Local

Metropolitan Bakersfield General Plan

The Project is within the administrative boundaries of the Metropolitan Bakersfield General Plan and would therefore be subject to its applicable policies and measures. The Land Use Element includes the following policies related to cultural resources that would apply to the Project:

Policies

Policy 5: Provide for streetscape improvements, landscape, and signage which uniquely identify major and/or historic residential neighborhoods.

Policy 7: Provide for the retention of historic residential neighborhoods as identified in the Historical Resources Element if adopted by the City of Bakersfield.

Policy 27: Require that new commercial uses maintain visual compatibility with single-family residences in areas designated for historic preservation.

Policy 72: Promote the creation of both residential and commercial historic districts, and encourage the upgrading of historic structures.

Policy 104: As part of the environmental review procedure, an evaluation of the significance of paleontological, archaeological, and historical resources and the impact of proposed development on those resources shall be conducted and appropriate mitigation and monitoring included for development Projects.

Policy 106: The preservation of significant historical resources as identified on Table 4.10-1 [Metropolitan Bakersfield General Plan, 2007:II-19] shall be encouraged by developing and implementing incentives such as building and planning application permit fee waivers, Mills Act contracts, grants and loans, implementing the State Historic Building Code and other incentives as identified in the City's Historic Preservation Ordinance.

Policy 107: The preservation of significant historical resources shall be promoted and other public agencies or private organizations shall be encouraged to assist in the purchase and/or relocation of sites, buildings, and structures deemed to be of historical significance.

4.5.4 Impacts and Mitigation Measures

Methodology

This analysis is based on a variety of resources, including the Phase I Historical/Archaeological Resources Survey and Paleontological Resources Assessment Report prepared by CRM Tech (CRM Tech, 2023; Appendix F.2), an SLF search conducted by the NAHC, and AB 52 notification letters to solicit information regarding the presence of tribal cultural resources. Using the aforementioned resources and professional judgment, impacts were analyzed according to CEQA significance criteria described in this report subsection.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would meet either of the following criteria:

- It would cause a substantial adverse change in the significance of a historical or archaeological resource pursuant to CEQA Guidelines Section 15064.5.
- It would disturb any human remains, including those interred outside of formal cemeteries.

Section 21083.2(g) of CEQA further defines "unique archaeological resources" to determine whether a project may have a significant effect on archaeological resources. As used in this section, a unique archaeological resource is an archaeological artifact, object, or site that does not merely add to the current body of knowledge; it has a clearly demonstrated and a high probability that it meets any of the following criteria:

- It contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
- It has a special and particular quality such as being the oldest of its type or the best available of its type.
- It is directly associated with a scientifically recognized important event or person of the past.

According to CEQA Guidelines, California Code of Regulations Title 14, 15064.5, a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment (California Code of Regulations Title 14, 15064.5(b)). The guidelines further state that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historic resource would be materially impaired. Actions that would materially impair the significance of a historical resource are any actions that would demolish or adversely alter those physical characteristics of a

historical resource that convey its historical significance and qualify it for inclusion in the CRHR or in a local register or survey that meet the requirements of PRC Sections 5020.1(k) and 5024.1(g).

Project Impacts

Impact 4.5-1: The project would cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5.

Historic resources in this context refer to the built environment, mainly buildings and structures more than 45 years of age that may be eligible for inclusion on the CRHR or NRHP. The records search conducted at SSJVIC identified 13 cultural resources dated to the historic period within 1 mile of the Project area. All of the recorded resources were found at least 0.75 mile from the Project location. The pedestrian survey identified a historic-period site in the northeast corner of the Project area, but with the removal of the buildings and orchards many decades ago, these remains lack sufficient historic integrity to relate to their period of origin. Without these features and associated persons or events of recognized historic evidence, the historical site discovered does not appear to meet any of the criteria for listing in the CRHR. Accordingly, the Project would not have an adverse impact on historic-period built environment resources.

Though unlikely, subsurface construction activities always have the potential to damage or destroy previously undiscovered historic resources such as wood, stone, foundations, and other structural remains; debris filled wells or privies; and deposits of wood, glass, ceramic, and other refuse, if encountered. This would represent a potentially significant impact related to historic resources. However, implementation of **Mitigation Measures MM 4.5-1** through **MM 4.5-3** would reduce potential direct and indirect impacts to historic resources that may be discovered during Project construction to less than significant.

Mitigation Measures

MM 4.5-1 Prior to initial ground disturbance, or the issuance of grading permits, the Project applicant shall retain a qualified Lead Archaeologist to carry out all mitigation measures related to archaeological resources. The contact information for this Lead Archaeologist shall be provided to the Kern County Planning and Natural Resources Department prior to the commencement of any construction activities on-site. Further, the Lead Archaeologist, shall be responsible for ensuring the following employee training provisions are implemented during implementation of the Project:

a. Prior to commencement of any ground disturbing activities, the Lead Archaeologist shall prepare Cultural Resources Sensitivity Training materials, including a Cultural Resources Sensitivity Training Guide, to be used in an orientation program given to all personnel working on the Project. The training guide may be presented in video form. A copy of the proposed training materials, including the Cultural Resources Sensitivity Training Guide, shall

be provided to the Planning and Natural Resources Department prior to the issuance of any grading or building permit.

b. The Project proponent/operator shall ensure all new employees or on-site workers who have not participated in earlier Cultural Resources Sensitivity Trainings shall meet provisions specified above.

c. The training shall include an overview of potential cultural resources that could be encountered during ground disturbing activities to facilitate worker recognition, avoidance, and subsequent immediate notification to the Lead Archaeologist for further evaluation and action, as appropriate; and penalties for unauthorized artifact collecting or intentional disturbance of archaeological resources.

d. A copy of the Cultural Resources Sensitivity Training Guide/Materials shall be kept on-site and available for all personnel to review and be familiar with as necessary. It is the responsibility of the Lead Archaeologist to ensure all employees receive appropriate training before commencing work on-site.

MM 4.5-2 The project proponent shall comply with the following in the event of inadvertent discovery of resources occur during implementation of the Project. Prior to the issuance of grading permits, the Project proponent shall ensure the following measures are implemented for resources, which are discretionarily considered historical resources for the purposes of this Project:

a. The construction zone shall be narrowed or otherwise altered to avoid resources. All avoidance areas delineated on the site plan shall be coordinated through the lead archeologist and submitted to the Kern County Planning and Natural Resources Department for approval.

b. In coordination with the qualified archaeologist avoidance shall be ensured by the delineation of environmentally sensitive areas. Protective fencing shall not identify the protected area as a cultural resource area in order to discourage unauthorized disturbance or collection of artifacts.

c. A qualified Archaeologist and Native American Monitor shall monitor all Project-related ground disturbing activities within 150 feet of the environmentally sensitive areas, in order to ensure avoidance. The Native American monitor shall be selected from a list of Native American contacts with traditional ties to the Project area, provided by the Native American Heritage Commission and/or consultation with Native American tribal groups who may have interest in the Project area. The archaeological monitor shall work under the supervision of the qualified archaeologist.

d. If avoidance is demonstrated to be infeasible, the resource shall be collected and curated at an appropriate curatorial facility. Or if avoidance is demonstrated to be infeasible, a detailed Cultural Resources Treatment Plan shall be prepared and implemented by a qualified archaeologist. The Cultural

Resources Treatment Plan shall include a research design and a scope of work for data recovery of the portion(s) to be impacted by the Project. Treatment may consist of (but would not be limited to):

1. a sufficient avoidance buffer to protect the resource until data recovery and/or removal is completed;
2. sample excavation;
3. surface artifact collection;
4. site documentation; and,
5. historical research, with the aim to target the recovery of important scientific data contained in the portion of the significant resource to be impacted by the Project.
6. The Cultural Resources Treatment Plan shall also include provisions for analysis of data in a regional context, reporting of results within a timely manner, and curation of artifacts and data at an approved facility. The reports documenting the implementation of the Cultural Resources Treatment Plan shall be submitted to and approved by the Kern County Planning and Natural Resources Director and shall also be submitted to the Southern San Joaquin Valley Information Center at California State University, Bakersfield.

Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

Impact 4.5-2: The project would cause a substantial adverse change in the significance of an archeological resource as defined in Section 15064.5.

Records search results from the SSJVIC for the Project boundaries identify 12 historic-period sites or isolates; however, they were found at least 0.75 mile from the Project location. Furthermore, the SLF search conducted by the NAHC did not reveal any Native American cultural resources within the Project site. On July 17, 2023, a pedestrian survey was attempted; however, access to the Project site was limited because the survey area was overgrown with vegetation, creating impassible conditions and extremely poor ground visibility. Vegetation removal was performed prior to a second field survey on August 2, 2023. During the survey, isolates were discovered (Isolates 4020-1 and 4020-2), further described in Section 4.5.2, Environmental Setting. However, such isolates, or localities with fewer than three artifacts, by definition, do not qualify as archaeological sites because of their lack of contextual integrity.

Construction, grading and excavation activities have the potential to unearth previously undiscovered, intact archaeological materials. If such materials, including human remains, are found, a potentially significant impact may occur.

Therefore, **MM 4.5-1** through **MM 4.5-3** would be implemented to address potential impacts to archaeological resources during construction.

Mitigation Measures

Implementation of **MM 4.5-1** and **MM 4.5-2** would be required.

Level of Significance After Mitigation

Impacts would be less than significant after implementation of **MM 4.5-1** and **MM 4.5-2**.

Impact 4.5-3: The project would disturb any human remains, including those interred outside of formal cemeteries.

Although no formal cemeteries or areas containing human remains are known to be in the Project vicinity, the possibility always exists that construction-related ground disturbance may uncover previously undiscovered human remains.

In the unlikely event such a discovery is made, CEQA Guidelines Section 15064.5, Health and Safety Code Section 7050.5, and PRC Sections 5097.94 and Section 5097.98 must be followed. Implementation of **Mitigation Measure MM 4.5-3**, which details inadvertent discovery of human remains procedures, would reduce potential impacts of previously undiscovered human remains to a less than significant level.

Mitigation Measures

MM 4.5-3 If human remains are uncovered during Project construction, the Project applicant shall immediately halt work, contact the Kern County Coroner to evaluate the remains, and follow the procedures and protocols set forth in California Environmental Quality Act Guidelines Section 15064.5(e)(1). Notification shall be made to the Kern County Planning and Natural Resources Department within 12 hours of contacting the Coroner. If the County Coroner determines the remains are Native American, the Coroner shall contact the Native American Heritage Commission, in accordance with Health and Safety Code Section 7050.5, subdivision (c), and Public Resources Code 5097.98 (as amended by Assembly Bill 2641). The Native American Heritage Commission shall designate a Most Likely Descendant for the remains per Public Resources Code 5097.98. Per Public Resources Code 5097.98, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the Most Likely Descendant regarding their recommendations, if

applicable, taking into account the possibility of multiple human remains. If the remains are determined to be neither of forensic value to the Coroner, nor of Native American origin, provisions of the California Health and Safety Code (7100 et seq.) directing identification of the next of kin shall apply. No work shall recommence on the site until all provisions of these reviews have occurred.

Level of Significance After Mitigation

Impacts would be less than significant after implementation of **MM 4.5-3**.

4.5.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects located in the vicinity of the project site.

The geographic context for this analysis includes the southern San Joaquin Valley, in unincorporated Kern County. Past, present, and future development projects contribute to impacts on cultural or tribal cultural resources. As analyzed in the Metropolitan Bakersfield General Plan, there could be a cumulative impact in the County, with respect to historical, archaeological, and cultural resources, as a result of future development and related construction activities in the region. However, potential cumulative impacts would be mitigated to below a level of significance at an individual Project level by adherence to applicable current State and federal laws and regulations, as well as other applicable laws, regulations and mitigations, such as adherence to standard conditions of approval that require monitoring of construction sites in proximity to known resources, immediate cessation of construction activity upon discovery of unidentified human remains, and the protection of cultural resources that are discovered, as described in the mitigation measures above. Moreover, the Project's incremental contribution to less than significant cumulative impacts would not be cumulatively considerable or significant given all projects of similar scope will also adhere to similar development standards in this regard.

The combination of the aforementioned and described efforts, standard construction conditions and implementation of **Mitigation Measures MM 4.5-1** through **MM 4.5-3** would reduce potential cumulative impacts related to historical, archaeological, and cultural resources to a less than significant level.

Mitigation Measures

Implementation of **MM 4.5-1** through **MM 4.5-3** would be required.

Level of Significance After Mitigation

With implementation of **MM 4.5-1** through **MM 4.5-3**, cumulative impacts would be less than significant.

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Section 4.6

Energy

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Section 4.6
Energy

4.6.1 Introduction

This section of the Draft Environmental Impact Report (EIR) analyzes the energy implications associated with implementation of the proposed IPG Industrial Project (Project), focusing on the following energy resources:

- Electricity
- Natural gas
- Transportation-related energy (petroleum-based fuels)

Additionally, this section includes a summary of the Project's anticipated energy needs and identifies mitigation measures that would reduce impacts, if necessary.

This section is informed by the May 23, 2024, Airport Drive Warehouse Energy Analysis prepared by Urban Crossroads, Inc. (Appendix E). The information found herein, as well as other aspects of the Project's environmental-related energy impacts, are discussed in greater detail in other sections of this Draft EIR: Chapter 3, *Project Description*, Section 4.3, *Air Quality*, and Section 4.8, *Greenhouse Gas Emissions*.

Further, this section provides the content and analysis required by Public Resources Code (PRC), Section 21100(b)(3), and described in Appendix F to the California Environmental Quality Act (CEQA) Guidelines [Association of Environmental Planners (AEP) 2024]. PRC Section 21100(b) and Section 15126.4 of the CEQA Guidelines require an EIR to identify mitigation measures to minimize a project's significant effects on the environment, including measures to reduce the wasteful, inefficient, and unnecessary consumption of energy.

Appendix F states that the potential energy implications of a project shall be considered in an EIR, to the extent relevant and applicable to the project. Further, Appendix F states that a project's energy consumption and proposed conservation measures may be addressed, as relevant and applicable, in the Project Description, Environmental Setting and Impact Analysis, portions of technical sections, as well as through mitigation measures and alternatives.

In late 2018, the California Natural Resources Agency finalized updates to the 2018 CEQA Guidelines (California Natural Resources Agency 2018). Appendix G was amended to now include the analysis of energy. Previously included in Appendix F, the Appendix G Checklist now provides questions to determine the following: whether a project could result in wasteful energy resource consumption during its construction or operation; or whether a project conflicts with State or local renewable energy or energy efficiency plans (California Natural Resources Agency 2018).

4.6.2 Environmental Setting

Electricity

Electricity, a consumptive utility, is a human-made resource. The production of electricity requires the consumption or conversion of energy resources, including water, wind, oil, gas, coal, solar, geothermal, and nuclear resources, into energy. The delivery of electricity involves a number of system components for distribution and use. The electricity generated is distributed through a network of transmission and distribution lines, commonly called a power grid.

Energy capacity, or electrical power, is generally measured in watts (W), while energy use is measured in watt-hours (Wh). For example, if a light bulb has a capacity rating of 100 W, the energy required to keep the bulb on for 1 hour would be 100 Wh. If 10 100 W bulbs were on for 1 hour, the energy required would be 1,000 Wh, or 1 kilowatt-hour (kWh). On a utility scale, a generator's capacity (the potential to generate) is typically rated in megawatts (MW), which is 1 million watts; while energy usage is measured with a time component, typically in megawatt-hours (MWh) or gigawatt-hours (GWh), which is 1 billion watt-hours.

Retail electric service in Kern County is split between Pacific Gas and Electric (PG&E) and Southern California Edison. The Project is located in PG&E's electric service territory. Accordingly, electric power for construction and operations would be brought to the site through a PG&E service connection.

PG&E is an investor-owned utility company that provides natural gas and electric service to approximately 16 million people throughout a 70,000-square-mile service area in northern and central California, including Kern County (County) (PG&E 2024a). In 2022, approximately 38% of PG&E's electricity came from renewable resources including solar, wind, geothermal, biomass, and small hydroelectric sources. Additionally, approximately 95% of PG&E's total electric power mix is from greenhouse gas (GHG) free sources, which include nuclear and large hydroelectric sources of energy (CEC 2024a).

The California Energy Commission (CEC) tracks electricity and natural gas consumption across the State of California for residential and nonresidential sources. In 2022, the County used a total of 14,861 GWh of electricity. Approximately 81% of the electricity usage in the County came from nonresidential sources (CEC 2024b).

Natural Gas

Natural gas is a combustible mixture of simple hydrocarbon compounds (primarily methane) that is used as a fuel source. Natural gas consumed in California is obtained from naturally occurring reservoirs and delivered through high-pressure transmission pipelines. Natural gas provides almost one-third of the state's total energy requirements. Natural gas is measured in terms of cubic feet (cf), therms, or British thermal units (BTU).

PG&E provides natural gas in the vicinity of the Project. Per the CEC, the County used a total of 1,774 million therms of natural gas in 2022. Approximately 94% of the natural gas use in the County came from nonresidential sources (CEC 2024c).

Transportation

In California, petroleum fuels refined from crude oil are the dominant source of energy for transportation sources. Petroleum usage in California includes petroleum products such as motor gasoline, distillate fuel, liquefied petroleum gases, and jet fuel. The State has implemented a number of policies, rules, and regulations to improve vehicle efficiency, increase the development and use of alternative fuels, reduce air pollutant and GHG emissions from the transportation sector, and reduce vehicle miles traveled (VMT). The CEC predicts a decline in demand for gasoline and an increase in the use of alternative fuels (Bailey et al. 2023). According to the California Air Resources Board's (CARB's) EMFAC2021 Web Database, which estimates the emissions inventory of on-road mobile sources in California, Kern County on-road transportation sources consumed approximately 410 million gallons of gasoline and 268 million gallons of diesel fuel in 2022 (CARB 2024).

4.6.3 Regulatory Setting

Federal

Energy Policy and Conservation Act of 1975 and Alternative Motor Fuels Act of 1988

Enacted in 1975, the Energy Policy and Conservation Act (EPCA) established the first fuel economy standards for on-road motor vehicles sold in the United States and assigned responsibility for establishing and revising vehicle fuel economy standards to the National Highway Traffic Safety Administration (NHTSA). The Alternative Motor Fuels Act of 1988 amended a portion of the EPCA to encourage the use of alternative fuels, including electricity. The act directs the secretary of energy to take action to ensure that the maximum practical number of federal passenger vehicles and light-duty trucks be powered by alcohol or natural gas or be dual-fueled vehicles.

Energy Policy Acts of 1992 and 2005

The Energy Policy Act of 1992 established goals and mandates to increase the use of clean energy in the United States while also amending utility laws and requiring improvements in building and vehicle energy efficiency. The Energy Policy Act of 2005 provided tax incentives and loan guarantees for alternative energy sources such as wind and geothermal. Additionally, the Act set targets for the quantity of biofuels to be mixed with gasoline, resulting in a significant increase in ethanol production.

Energy Independence and Security Act of 2007

Enacted in December 2007, the Energy Independence and Security Act (EISA) aimed to move the United States toward greater energy independence through the following:

- Increasing the production of clean renewable fuels
- Increasing the efficiency of products, buildings, and vehicles
- Improving the energy performance of the federal government
- Improving vehicle fuel economy

The EISA included the first increase in fuel economy standards for passenger cars since 1975 and included a new energy grant program for use by local governments in implementing energy-efficiency initiatives as well as a variety of green building incentives and programs.

Corporate Average Fuel Economy and Vehicle Fuel Efficiency Standards

Established by the U.S. Congress in 1975, the Corporate Average Fuel Economy (CAFE) standards reduce energy consumption by increasing the fuel economy of cars and light trucks (collectively, light-duty vehicles). The NHTSA CAFE standards regulate how far vehicles must travel on a gallon of fuel. The NHTSA and United States Environmental Protection Agency (EPA) jointly administer the CAFE standards (NHTSA 2024). The U.S. Congress has specified that CAFE standards must be set at the "maximum feasible level" with consideration given for the following:

- Technological feasibility
- Economic practicality
- Effect of other standards on fuel economy
- Need for the nation to conserve energy

The CAFE standards have been rolled out in multiple phases.

The first phase included final standards for model years 2017 through 2021. In 2012, the agencies jointly adopted more stringent Phase 2 standards for light-duty cars and trucks, which apply to model years 2017 through 2025. In April 2022, the NHTSA announced new light-duty vehicle fuel economy standards for model years 2024 through 2026, which would require an industry-wide fleet average of approximately 49 miles per gallon in model year 2026. Announced in June 2024, the most recent CAFE standards would require an industry-wide fleet average of approximately 50.4 miles per gallon in model year 2031 for passenger cars and light trucks. The final CAFE standards increase 2% per year for passenger cars in model years 2027 through 2031 and 2% per year for light trucks in model years 2029 through 2031 (NHTSA 2024).

The NHTSA and the EPA have jointly developed fuel efficiency standards for medium- and heavy-duty trucks. The Phase 1 heavy-duty truck standards applied to combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles for model years 2014 through 2018. In August of 2016, the agencies adopted more stringent Phase 2 standards for medium- and heavy-duty vehicles. These standards apply to model years 2018 through 2027 for certain trailers and model years 2021 through 2027 for semi-trucks, large pickup trucks, vans, and all types and sizes of buses and work trucks. The Phase 2 heavy-duty truck standards require the phase-in of a 5% to 25% reduction in

fuel consumption over the 2017 baseline, depending on the compliance year and vehicle type (EPA and NHTSA 2016).

The most recent fuel efficiency standards for heavy-duty pickup trucks and vans, announced in June 2024, would require an industry-wide fleet average of an estimated 2.851 gallons per 100 miles in model year 2035. The final fuel efficiency standards for heavy-duty pickup trucks and vans increase at a rate of 10% per year in model years 2030 through 2032 and 8% per year in model years 2033 through 2035 (NHTSA 2024).

Inflation Reduction Act of 2022

The Inflation Reduction Act (IRA) of 2022 is considered the most ambitious climate law in U.S. history and is intended to reduce GHG emissions, help build a clean economy, reduce energy costs for Americans, and advance environmental justice. With funding from the IRA, the EPA launched a network of clean energy financing and provided grant funding for pollution-reduction programs (EPA 2023).

State

Warren-Alquist Energy Resources Conservation and Development Act

Initially passed in 1974 and since amended, the Warren-Alquist Energy Resources Conservation and Development Act (Warren-Alquist Act) created the CEC, California's primary energy policy and planning agency. The CEC has seven responsibilities:

- Forecasting future energy needs
- Promoting energy efficiency and conservation through setting standards
- Supporting energy-related research
- Developing renewable energy resources
- Advancing alternative and renewable transportation fuels and technologies
- Certifying thermal power plants 50 MW or larger
- Planning for and directing State response to energy emergencies

The CEC regulates energy resources by encouraging and coordinating research into energy supply and demand problems to reduce the rate of growth of energy consumption. Additionally, the Warren-Alquist Act acknowledges the need for renewable energy resources and encourages the CEC to explore renewable energy options that would be in line with environmental and public safety goals (PRC Section 25000 et seq.).

Senate Bill 1389

Senate Bill (SB) 1389 (PRC Sections 25300–25323; SB 1389) requires the CEC to prepare a biennial integrated energy policy report that assesses major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors. Further, the report provides policy

recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety (PRC Section 25301[a]). The 2023 Integrated Energy Policy Report provides the results of the CEC's assessments of a variety of energy issues facing California. These include speeding connection of clean resources to the electricity grid, the potential use of clean and renewable hydrogen, and the California Energy Demand Forecast to 2040, gas decarbonization, energy efficiency, the Clean Transportation Program, Assembly Bill (AB) 1257, and publicly owned utilities' progress toward peak demand reserves and margins (Bailey et al. 2023).

Title 24 of the California Code of Regulations (California Building Code)

The California Building Energy Efficiency Standards serve to reduce statewide wasteful, uneconomical, and unnecessary uses of energy. They include requirements in the Energy Code (California Code of Regulations [CCR], Title 24, Part 6) and California Green Building Standards Code (CALGreen Code) (CCR, Title 24, Part 11).

The Energy Code applies to new construction of both residential and nonresidential buildings, and regulates energy consumed for heating, cooling, ventilation, water heating, and lighting. The building efficiency standards are enforced through the local building permit processes, and local government agencies may adopt and enforce energy standards for new buildings, provided that these standards meet or exceed those provided in the Title 24 guidelines. The Energy Code is updated every three years, with the 2022 Building Energy Efficiency Standards that became effective on January 1, 2023, being the most recent approved update.

The CALGreen Code is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went into effect on August 1, 2009, and is administered by the California Building Standards Commission. The CALGreen Code is updated on a regular basis, with the 2022 California Green Building Code Standards that became effective on January 1, 2023, being the most recent approved update.

Assembly Bill 1493 Pavley Regulations and Fuel Efficiency Standards

Enacted on July 22, 2002, AB 1493 required CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light-duty trucks. Under this legislation, CARB adopted regulations to reduce GHG emissions from noncommercial passenger vehicles (cars and light-duty trucks). Although the bill is aimed specifically at reducing GHG emissions, a co-benefit of the Pavley standards is an improvement in fuel efficiency and thus a reduction in fuel consumption.

California Renewables Portfolio Standard (SB 100)

California's Renewables Portfolio Standard (RPS) was initially established in 2002 by SB 1078 and requires electricity providers (utilities, cooperatives, community choice aggregators) to provide a specified minimum portion of their electricity supply from eligible renewable resources by milestone target years. State legislative actions have since modified and accelerated the RPS several times, resulting in one of the most ambitious renewable energy standards in the country. In October 2015, SB 350 increased the State's renewable electricity procurement goal from 33% by 2020 to

50% by 2030. In addition, the State is required to double statewide energy-efficiency savings in electricity and natural gas end uses by 2030.

In December 2021, SB 100 increased the renewable electricity procurement goal set by SB 350 from 50% to 60% by 2030 with new interim targets of 44% by 2024 and 52% by 2027. Additionally, SB 100 requires renewable energy and zero-carbon electricity system to supply 100% of electric retail sales by 2045 (CPUC 2024).

The California Public Utilities Commission (CPUC) and CEC jointly implement the RPS program. The CPUC implements and administers RPS compliance rules for California's retail sellers of electricity, which include large and small investor-owned utilities, electric service providers and community choice aggregators. The CEC is responsible for the certification of electrical generation facilities as eligible renewable energy resources and adopting regulations for the enforcement of RPS procurement requirements of publicly owned utilities (CPUC 2024).

Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles

In 2004, CARB adopted the Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling to reduce public exposure to diesel particulate matter emissions (Title 13 CCR Section 2485). The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than 5 minutes at any given location. While the goal of this measure is primarily to reduce public health impacts from diesel emissions, compliance with the regulation also results in energy savings in the form of reduced fuel consumption from unnecessary idling.

Assembly Bill 32 & Senate Bill 32

In 2006, the California State Legislature adopted AB 32 (codified in the California Health and Safety Code, Division 25.5–California Global Warming Solutions Act of 2006), which focuses on reducing GHG emissions in California to 1990 levels by 2020. CARB has the primary responsibility for reducing statewide GHG emissions; however, AB 32 also tasked the CEC and the CPUC with providing information, analysis, and recommendations to CARB regarding strategies to reduce GHG emissions in the energy sector.

In 2016, SB 32 and its companion bill AB 197 amended Health and Safety Code Division 25.5, established a new climate pollution reduction target of 40% below 1990 levels by 2030, and included provisions to ensure that the benefits of state climate policies reach into disadvantaged communities.

Low Carbon Fuel Standard

In 2007, Executive Order S-01-07 established the Low Carbon Fuel Standard (LCFS), which requires producers of petroleum-based fuels to reduce the carbon intensity of their products, starting with 0.25% in 2011 and culminating in a 10% total reduction in 2020. Petroleum importers,

refiners, and wholesalers have two options: develop their own low-carbon fuel products; or buy LCFS credits from other companies that develop and sell low-carbon alternative fuels, such as biofuels, electricity, natural gas and hydrogen. CARB is responsible for administering the LCFS.

The LCSF regulation was amended in 2018 to require a 20% reduction in the carbon intensity of transportation fuels by 2030 and expand the fuel types and activities eligible to participate in the LCFS (CARB 2018a).

Senate Bill 375; Sustainable Communities Strategy

SB 375 establishes mechanisms for the development of regional targets for reducing passenger vehicle and light-duty truck GHG emissions. Through the SB 375 process, metropolitan planning organizations such as the Kern Council of Governments (KCOG) work with local jurisdictions to develop sustainable community strategies (SCSs). An SCS is designed to integrate development patterns and the transportation network in a way that reduces GHG emissions while meeting housing needs and other regional planning objectives. While SB 375 does not require local governments to amend their general plans to implement SCSs, it does incentivize them to do so. KCOG's current reduction target for per capita vehicular emissions from passenger vehicles and light-duty trucks is 9% by 2020 and 15% by 2035 compared to 2005 (KCOG 2022).

KCOG most recently adopted the 2022 Regional Transportation Plan, which includes an SCS component in accordance with SB 375.

Advanced Clean Cars Program and Zero Emission Vehicles

In 2012, Executive Order B-16-2012 was issued, which called for the increased penetration of zero-emission vehicles (ZEVs) into California's vehicle fleet to help California achieve a reduction of GHG emissions from the transportation sector equaling 80% less than 1990 levels by 2050. ZEVs include plug-in electric vehicles, such as battery electric vehicles and plug-in hybrid electric vehicles, and hydrogen fuel cell electric vehicles. Furthering the statewide target for the transportation sector, the executive order also required CARB, the CEC, and the CPUC to establish benchmarks that will (1) allow over 1.5 million ZEVs to be on California roadways by 2025 and (2) provide the state's residents with easy access to ZEV infrastructure.

In 2012, CARB approved the Advanced Clean Cars Program, a new emissions-control program for model years 2015 through 2025. The program combined the control of smog, soot, and GHGs with requirements that about 15% of new cars sold in California in 2025 be plug-in hybrid, battery electric, or fuel cell vehicles.

In 2018, Executive Order B-48-18 was issued, which served to launch an eight-year initiative to accelerate the sale of ZEVs through a mix of rebate programs and infrastructure improvements. The executive order also set a new ZEV target of five million EVs in California by 2030 and provided funding for multiple state agencies, including the CEC (to increase charging infrastructure) and CARB (to provide rebates for the purchase of new ZEVs and incentives for low-income customers).

2022 Scoping Plan for Achieving Carbon Neutrality

Approved by CARB in December 2022, the 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan) assesses progress toward the State's GHG reduction goals and establishes a path to achieve carbon neutrality no later than 2045. The 2022 Scoping Plan focuses on outcomes needed to achieve carbon neutrality by assessing paths for advancing transportation technology, clean energy deployment, maintenance and preservation of natural and working lands, and more. Further, the plan is designed to meet the State's long-term climate objectives. Carbon negative technologies are identified as an essential component in achieving statewide carbon neutrality (CARB 2022).

Local

Metropolitan Bakersfield General Plan

Kern County and the City of Bakersfield jointly prepared and separately adopted a coordinated general plan for the metropolitan area of Bakersfield, which includes the Project area (City of Bakersfield and Kern County 2007). Goals, policies, and implementation measures from the Metropolitan Bakersfield General Plan (MBGP) that are related to energy efficiency and energy consumption (and applicable to the Project) are provided below. The MBGP contains additional policies, goals, and implementation measures that are more general (that is, not project-specific). Accordingly, these measures are not listed below but all policies, goals, and implementation measures in the MBGP are incorporated by reference (as stated in Chapter 2, *Introduction*).

Chapter 5: Conservation/Air Quality

Goals

Goal 3. Reduce the amount of vehicular emissions in the planning area.

Policies

Policy 6. Participate in alternative fuel programs.

Policy 10. Implement the Transportation System Management Program (July 1984) for Metropolitan Bakersfield to improve traffic flow, reduce vehicle trips, and increase street capacity.

Policy 12. Encourage the use of mass transit, carpooling and other transportation options to reduce vehicle miles traveled.

Policy 13. Consider establishing priority parking areas for carpoolers in projects with relatively large numbers of employees to reduce vehicle miles traveled and improve air quality.

Policy 14. Establish park and ride facilities to encourage carpooling and the use of mass transit.

Policy 15. Promote the use of bicycles by providing attractive bicycle paths and requiring provision of storage facilities in commercial and industrial projects.

Policy 18. Encourage walking for short distance trips through the creation of pedestrian friendly sidewalks and street crossings.

Policy 19. Promote a pattern of land uses which locates residential uses in close proximity to employment and commercial services to minimize vehicular travel.

Policy 22. Require the provision of secure, convenient bike storage racks at shopping centers, office buildings, and other places of employment in the Bakersfield Metropolitan area.

Policy 23. Encourage the provision of shower and locker facilities by employers, for employees who bicycle or jog to work.

Policy 24 Encourage employers to implement programs for staggered work hours, compressed work weeks, or other measures which relieve vehicle congestion during commute periods and reduce total work trips.

Policy 29. Encourage the use of alternative fuel and low or zero-emission vehicles.

Implementation Measures

Measure 5. Expand the use of alternative fuel and low or zero-emission vehicles in the metropolitan area for public and private use to achieve 10 percent usage.

Measure 6. Create the private and public infrastructure necessary to support alternative fuel vehicles.

4.6.4 Impacts and Mitigation Measures

This section describes the methodology used in conducting the CEQA impact analysis for energy; the thresholds of significance used in assessing impacts to energy; and the assessment of impacts to energy, including relevant mitigation measures.

Methodology

This analysis addresses the Project's potential energy use during construction and operation, including electricity, natural gas, and transportation fuel for vehicle and truck trips. The Airport Drive Warehouse Energy Analysis prepared for the Project (Appendix E) includes detailed data and assumptions as well as model inputs and the resulting outputs.

The analysis below generally follows Appendix F of the CEQA Guidelines, which states that the goal of conserving energy includes decreasing overall per capita energy consumption, decreasing reliance on fossil fuels such as coal, natural gas, and oil, and increasing reliance on renewable energy.

To determine whether implementing the Project would result in the inefficient, wasteful or unnecessary consumption of fuel or energy, this analysis considers the recommendations of

Appendix F of the CEQA Guidelines, which states that environmental impact analyses of energy conservation may include the following:

- The Project's energy requirements and energy use efficiencies by amount and fuel type for each stage of the Project, including construction, operation, maintenance, and removal. If appropriate, the energy intensiveness of materials may be discussed.
- The effects of the Project on local and regional energy supplies and on requirements for additional capacity.
- The effects of the Project on peak- and base-period demands for electricity and other forms of energy.
- The degree to which the Project complies with existing energy standards.
- The effects of the Project on energy resources.
- The Project's projected transportation energy use requirements and overall use of efficient transportation alternatives.

Modeling and Assumptions

CalEEMod

In May 2022, the San Joaquin Valley Air Pollution Control District, in conjunction with the California Air Pollution Control Officers Association and other California air districts, released the latest version of the California Emissions Estimator Model (CalEEMod): Version 2022.1. The purpose of this model is to calculate construction-source and operational-source criteria pollutants and GHG emissions from direct and indirect sources as well as energy usage. Accordingly, the latest version of CalEEMod has been used to determine the Project's anticipated transportation and facility energy demands. Appendix E of this EIR provides outputs from the annual model runs.

Emission Factors Model

For on-road vehicles, this energy study utilizes the different fuel types for each vehicle class from the annual EMissions FACtor model (EMFAC2021) emission inventory to derive the average vehicle fuel economy. This is then used to determine the estimated annual fuel consumption associated with vehicle usage during Project construction and operations. EPA's EMFAC2021 is a mathematical model that was developed to calculate emission rates, fuel consumption, and VMT from motor vehicles that operate on highways, freeways, and local roads in California. The 2024 and 2025 analysis years were utilized to determine the average vehicle fuel economy used throughout the duration of the Project.

Construction

Short-term energy use occurs primarily from the construction phase of a project. Construction of the Project would result in energy use associated with electricity consumption, fuel consumption in off-road construction equipment, and fuel consumption in on-road vendor trucks and worker vehicles.

Construction emissions were estimated under the assumption that construction would commence in January 2024 and last through December 2025. This construction schedule represents a worst-case analysis scenario as construction equipment technology and fuel efficiency improve over time; therefore, energy use totals are conservative and reflect a reasonable and legally sufficient estimate of potential impacts.

Gasoline and diesel fuel would be supplied by existing industrial fuel providers serving the Project area and region. Project construction would represent a "single-event" energy demand and would not require ongoing or permanent commitment of energy resources for this purpose.

Electricity Usage

Construction electricity usage for the Project was determined based on the estimated total construction power cost and the electricity cost for the Project's utility provider, PG&E. Construction power cost was estimated based on the combined area of the two warehouse buildings, parking lot, and landscaping, the construction duration, and the typical power cost. A typical power cost of $2.66 per 1,000 square feet of construction per month, taken from the 2024 National Construction Estimator, was used to calculate the Project's total construction power cost (Pray 2024). PG&E's general service rate for industrial services as of January 1, 2024, $0.28 per kWh of electricity, was used (PG&E 2024b).

Off-Road Equipment Fuel Consumption

Off-road equipment fuel consumption was calculated based on construction activity duration estimates, equipment schedules, equipment power ratings, load factors, and fuel consumption rates. Construction equipment information and counts were provided by the Project proponent and supplemented with default CalEEMod equipment lists for the Project's land use type and development intensity for each phase. All construction equipment assumed activity levels of up to a total of 8 hours per day for each piece of equipment. An aggregate fuel consumption rate of 18.5 horsepower hour per gallon (hp-hr/gal), obtained from CARB 2018 Emissions Factors Tables and cited fuel consumption rate factors presented in Table D-24 of the Carl Moyer Program Guidelines, was used for all equipment (CARB 2018b). The calculations are based on all construction equipment being diesel-powered, consistent with industry standards.

On-Road Vehicle Fuel Consumption

Construction of the Project would require fuel consumption associated with vehicle usage for workers and vendors commuting to and from the site. Project-related construction worker trip counts were based on CalEEMod defaults. Vendor trip counts were based on CalEEMod defaults, adjusted to reflect that vendor trips would likely occur during all phases of construction, not just building construction. Fleet mix for worker vehicles and vendor vehicles were based on CalEEMod defaults. As described above, vehicle fuel efficiencies were estimated using information generated within the EMFAC2021 model.

Operations

Energy consumption in support of, or related to, Project operations would include transportation fuel demands (fuel consumed by passenger car and truck vehicles accessing the Project site), fuel demands from operational equipment, and facilities energy demands (energy consumed by building operations and site maintenance activities).

Transportation Energy Demands

Energy that would be consumed by Project-generated traffic is a function of total VMT and estimated vehicle fuel economies of vehicles accessing the Project site. The VMT per vehicle class can be determined by evaluating the vehicle fleet mix and the total VMT. As with construction worker and vendors trips, operational vehicle fuel efficiencies were estimated using information generated within EMFAC2021.

To account for the possibility of refrigerated uses (cold storage), it is conservatively assumed that all trucks accessing this land use are presumed to also have transport refrigeration units (TRUs). Accordingly, for modeling purposes, 51 trucks (resulting from 102 two-way truck trips) were assumed to be trucks with TRUs. TRUs are also accounted for during on- and off-site travel. The TRU calculations are based on EMFAC2021.

On-Site Cargo-Handling Equipment Fuel Demands

It is common for industrial buildings to require the operation of exterior cargo handling equipment in the building's truck court areas. For the Project, on-site modeled operational equipment includes up to two 175-horsepower (hp), natural gas-powered cargo handling equipment – port tractors operating 4 hours a day for 365 days of the year.

Project operational activity estimates and associated fuel consumption estimates are based on the annual EMFAC2021 offroad emissions for the 2025 operational year and were used to derive the total annual fuel consumption associated with on-site cargo handling equipment.

Emergency Engine Fuel Demands

It is anticipated that the Project would utilize two 300-hp, diesel-powered emergency fire pumps. For analytical purposes, each fire pump was assumed to operate for a maximum of 1 hour per day and 50 hours per year for maintenance and testing purposes.

Microturbine Fuel Demands

It is anticipated that the Project would utilize two natural gas-powered microturbines. For analysis, each microturbine was assumed to operate for a maximum of 1 hour per day and 100 hours per year for maintenance and testing purposes.

Facility Energy Demands

Project building operations activities would result in the consumption of natural gas and electricity, which would be supplied by PG&E. Electricity and natural gas usage associated with the Project was calculated based on CalEEMod defaults.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist—following the Environmental Checklist Form, Appendix G to the Statewide CEQA Guidelines as amended by the California Natural Resources Agency and effective on December 28, 2018 (14 CCR 15000, et seq.)—states that a project would have a significant energy impact if it does the following:

- Results in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation; or
- Conflicts with or obstruct a state or local plan for renewable energy or energy efficiency.

Project Impacts

Impact 4.6-1: The Project would result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.

Construction Energy Demand (Short-Term)

Construction of the Project would result in energy use associated with electricity consumption, fuel consumption in off-road construction equipment, and fuel consumption in on-road vendor trucks and worker vehicles. Construction was assumed to begin in January 2024 and conclude in December 2025, however this schedule serves as a conservative estimate only. Should construction occur after these dates, construction emissions would likely decrease due to improvements in technology and more stringent regulatory requirements as older, less-efficient equipment is replaced by newer and cleaner equipment.

Electricity consumption during construction of the Project was estimated to be 470,939 kWh. Off-road equipment use for construction of the Project would result in consumption of an estimated 92,973 gallons of diesel fuel. Worker trips associated with construction of the Project would result in consumption of an estimated 58,216 gallons of gasoline. Diesel fuel consumption from construction vendor trips would total approximately 42,288 gallons.

Gasoline and diesel fuel would be supplied by existing industrial fuel providers serving the Project area and region. Project construction would represent a “single-event” energy demand and would not require ongoing or permanent commitment of energy resources for this purpose.

The Project does not include any unusual design characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at comparable construction sites in the region or state. Construction contractors would be required to comply with applicable CARB regulations regarding retrofitting, repowering, or replacement of diesel off-road construction equipment. These requirements ensure that fleets gradually turn over the oldest and dirtiest equipment to newer, cleaner models and prevent fleets from adding older, dirtier equipment.

Additionally, CARB has adopted the Airborne Toxic Control Measure to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel particulate matter and other toxic air contaminants. **Mitigation Measure MM 4.3-3** (Section 4.3, *Air Quality*), aimed at reducing air pollutant emissions, would also serve to reduce energy consumption by requiring proper equipment maintenance, setting equipment use and idling limits, and requiring use of equipment meeting Tier 3 engine standards (compliant with CARB engine emissions standards) or utilizing alternative fuel. Compliance with anti-idling and emissions regulations would result in a more efficient use of construction-related energy and the minimization or elimination of wasteful or unnecessary consumption of energy. Idling restrictions and the use of newer engines and equipment would result in less fuel combustion and energy consumption.

Additionally, given the cost of fuel, contractors and owners have a strong financial incentive to avoid wasteful, inefficient, and unnecessary consumption of energy during construction.

Due to the temporary nature of construction, compliance with State and federal requirements, and financial incentives for contractors and owners to use energy-consuming resources in an efficient manner, the construction phase of the Project would not result in wasteful, inefficient, and unnecessary consumption of energy. Impacts would be less than significant.

Operational Energy Demand

Operation of the proposed Project would consume energy as part of building operations and transportation activities. **Table 4.6.1** and **Table 4.6.2** summarize the Project's estimated energy consumption.

Table 4.6.1: Estimated Annual Operational Energy Consumption

Energy Consumption Activity	Annual Quantity
Electricity	
High-Cube Transload Warehouse	7,931,354 kWh
High-Cube Cold Storage Warehouse	4,533,803 kWh
Parking Lot	764,698 kWh
Natural Gas	
High-Cube Transload Warehouse	3,939,270 kBTU
High-Cube Cold Storage Warehouse	692,950 kBTU
Microturbines	1,140,000 kBTU
Cargo Handling Equipment[1]	9,284 gallons
Diesel Fuel	
Emergency Fire Pumps	1,130 gallons
Transportation Fuel: Gasoline and Diesel	
On-Road Mobile Sources	1,045,808 gallons

Source: Airport Drive Warehouse Energy Analysis (Appendix E of this EIR)

Notes:

[1] Quantity of natural gas reported in units of gallons instead of kBTU due to use in mobile cargo handling equipment.

kWh = kilowatt-hour

kBTU = kilo-British Thermal Unit

Table 4.6.2: Project Annual Operational Energy Demand Summary

Land Use	Natural Gas Demand (kBTU/year)	Electricity Demand (kWH/year)
High-Cube Transload Warehouse	3,939,270	7,931,354
High-Cube Cold Storage Warehouse	692,950	4,533,803
Parking Lot	0	764,698
Microturbines	1,140,000	0
Project Energy Demand	5,772,220	13,229,854

Source: Airport Drive Warehouse Energy Analysis (Appendix E of this EIR)
kWh = kilowatt-hour
kBTU = kilo-British Thermal Unit

As noted above in **Table 4.6.2**, operation of the proposed warehouse buildings would consume an estimated 5,772,220 kilo-British Thermal Units (kBTU) per year of natural gas and 13,229,854 kWh/year of electricity. Small amounts of natural gas and diesel fuel would also be consumed through operation of cargo handling equipment and emergency fire pumps. The Project buildings would be designed and constructed in accordance with the County's latest adopted energy efficiency standards, which are based on the California Title 24 Building Energy Efficiency Standards. Title 24 standards include a broad set of energy conservation requirements that apply to the structural, mechanical, electrical, and plumbing systems in a building.

These standards are widely regarded as the most advanced building energy efficiency standards and compliance would ensure that building energy consumption would not be wasteful, inefficient, or unnecessary. Additionally, **Mitigation Measures MM 4.6-1** and **MM 4.6-2**, described below, would require that the Project incorporates energy efficient building design standards and green building measures into overall Project design. These design elements would need to be included in all plans prior to issuance of building and grading permits.

Project-related vehicle trips would consume an estimated 1,045,808 gallons of gasoline and diesel annually and would involve activities and travel routes typical of a warehouse-type project. Over the lifetime of the Project, the fuel efficiency of trucks and employee vehicles is expected to increase due to federal and State regulatory actions, as is the percentage of zero-emission electric vehicles (EVs). **Mitigation Measure MM 4.3-3** (Section 4.3, *Air Quality*), aimed at reducing air pollutant emissions, would also serve to reduce operational energy consumption by limiting idling to 5 minutes and requiring use of equipment meeting CARB engine emissions standards or utilizing alternative fuel. As such, the quantity of petroleum consumed as a result of vehicular trips to and from the Project site during operation would decrease over time. Additionally, the Project would provide parking and EV infrastructure that would further promote fuel efficient vehicles. Thus, transportation fuel consumption would not be wasteful, inefficient, or unnecessary.

Based on the above analysis, energy consumption associated with operation of the Project would not be inefficient, wasteful, or unnecessary. Impacts would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.3-3** (**Section 4.3**, *Air Quality*) would be required.

MM 4.6-1 Prior to the issuance of grading, the project proponent shall provide a report and summary of all energy efficient building design standards incorporated into the project design and operations to reduce the level of energy consumption of the project. The following measures shall be included in the project design, as applicable. Explanations for feasibility and implementation shall be included in the report:

a. Within one year of the first day of project operations, solar photovoltaics mounted on proposed structure's roofs to provide a portion of the future electrical demand and offset emissions from fossil fuel fired power plants;

b. Incorporate green building measures that contribute to reducing energy use by at least 10 percent and up to 25 percent less than Title 24 requirements;

c. Provide solar water heating for non-industrial water heating;

d. If needed, in addition to roof mounted solar, provide ground mounted solar photovoltaics arrays to provide a portion of the estimated electrical demand for the proposed project;

e. Commercial buildings shall be designed to meet LEED® certification standards;

f. Roofs on all buildings shall be of a light color to reduce heat generation;

g. Portions of parking lots (drive aisles) may be paved with concrete versus asphalt, based on structural determinations, to reduce initial solar reflectance;

h. Within two years of the first day of project operations, up to 20% of employee parking stalls shall be covered. If feasible for electrical demand, the parking stall roofs shall contain solar photovoltaics;

i. LED lighting fixtures shall be used on all indoor and exterior site lighting;

j. LED lighting fixtures shall be used on all public streets and site lighting;

k. Electric forklifts and other material handling vehicles to reduce usage of fossil fuels shall be implemented, based on feasibility of operations;

l. Consult with Kern County Public Works and Golden Empire Transit (GET) on feasible design circulation features for transit related public street improvements adjacent to the project for implementation of **MM 4.17-3** Transportation Demand Management Program;

m. Provide bicycle friendly features, such as onsite bike lanes, bike racks, and bike lockers, to reduce vehicle miles traveled and to encourage non-vehicular transportation;

n. Where feasible design operations to incorporate the usage of high efficiency electric motors for industrial uses.

MM 4.6-2 Prior to the issuance of building permits, the project proponent shall provide evidence that the project is designed to include the green building measures specified as mandatory in the application checklists contained in the current California Green Building Standards. In addition to the number of electric vehicle-capable spaces provided with electric vehicle supply equipment required by the current California Green Building Standards, the project shall provide an additional two percent of electric vehicle-capable spaces with electrical vehicle supply equipment.

Level of Significance after Mitigation

With implementation of **Mitigation Measures MM 4.3-3**, **MM 4.6-1** and **MM 4.6-2**, impacts would be less than significant after mitigation.

Impact 4.6-2: The Project would conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

Kern County does not have an adopted Energy Plan. Kern County does have an Energy Element in the Kern County General Plan but focuses primarily on the County's energy resources and municipal measures such as encouraging the County to seek State and federal energy grants, have discussions with various energy industries, and develop long-term compensation for wildlife habitat unavoidably damaged by energy exploration and development activities to name a few. The Project is within the jurisdictional boundaries of the MBGP, thereby superseding the provisions set forth in the Kern County General Plan. The MBGP includes Air Quality Element policies, goals, and implementation measures that aim to reduce VMT and vehicular emissions and increase the use of alternative fuels, which would indirectly result in reduced fuel consumption and increased energy efficiency.

Construction

As discussed under Impact 4.6-1, above, the Project would result in energy consumption through the combustion of fossil fuels in construction vehicles, worker commute vehicles, and construction equipment, and the use of electricity for temporary buildings, lighting, and other sources. During construction, off-road equipment and on-road vehicles would comply with all applicable federal and State requirements. All off-road equipment would be required to comply with the latest EPA and CARB engine emissions standards, which require efficient engines that would minimize unnecessary fuel consumption. On-road vehicles used during construction of the Project would comply with the EPA and NHTSA's Federal Vehicle Standards, which require higher fuel efficiency over time for new vehicles. Project on-road vehicle fuel consumption would decrease over time as construction staff purchase newer model trucks and turn over their fleet. Moreover, heavy-duty trucks would be required to comply with CARB's 5-minute idling limits, which would reduce fuel consumption. Although these regulations were primarily designed to reduce air quality emissions, they would also result in an increase in energy efficiency during construction.

As a result, construction of the Project would be consistent with the MBGP and would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing energy use or increasing the use of renewable energy.

Operation

Operation of the proposed Project would consume electricity, natural gas, diesel fuel, and gasoline as part of building operations and transportation activities associated with the operation of a high cube transload warehouse storage to facilitate material handling equipment, storage and logistics uses, with up to 20% of the facility used for cold storage. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized handling, storage, and distribution for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, and tools that are typically found in a modern distribution/logistics facility.

California adopted the RPS to increase the amount of renewable energy supplied by utilities within the State. PG&E, the utility supplier for the Project, would be required to meet the future objective of 60% of electricity from renewable energy sources by 2030. In addition, all new structures developed as part of the project would comply with federal, State, and local regulations aimed at reducing energy consumption, including the Building Energy Efficiency Standards (CCR Title 24, Part 6) and the California Green Building Standards (CCR Title 24, Part 11). The incorporation of the Title 24 standards and the mitigation measures in this EIR into the design of the Project would ensure that the Project would not result in the use of energy in a wasteful manner.

As described above for construction, all off-road equipment (for example, yard trucks) and on-road vehicles used for Project operation would comply with all applicable federal and state emission and idling requirements. As a result, operation of the Project would be consistent with the MBGP.

The Project would not conflict with or obstruct the implementation of any state or local plan for renewable or energy efficiency. Project implementation would not conflict with existing energy standards, including standards for energy conservation. Impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance

Impacts would be less than significant.

4.6.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

Cumulative impacts occur when the incremental effects of a project are significant when combined with similar impacts from other past, present, or reasonably foreseeable projects in a similar

geographic area. The geographic scope for cumulative impacts to energy resources is Kern County. Cumulative projects considered as part of this cumulative analysis include the Project, other cumulative projects identified in Chapter 3, *Project Description*, **Table 3-8**, Cumulative Projects of this Draft EIR, and other past, present, and reasonably foreseeable future projects within the incorporated and unincorporated areas of Kern County.

Cumulative impacts would be significant if the incremental effects of an individual project are considerable when combined with the effects of other past, present, or reasonably foreseeable projects in a similar geographic area. As described above, the project-specific impacts associated with construction and operation of the Project would be less than significant with implementation of **Mitigation Measures MM 4.3-3** (Section 4.3, *Air Quality*), **MM 4.6-1**, and **MM 4.6-2**.

As with the Project, cumulative projects would be required to evaluate electricity and natural gas conservation features and compliance with applicable energy efficiency plans and standards including the Title 24 Building Energy Efficiency Standards and CALGreen Code. Each cumulative project would require separate discretionary approval and CEQA assessment, which would address potential energy consumption impacts and identify necessary mitigation measures, where appropriate. Cumulative projects, as with the Project, would also be required to evaluate potential impacts related to conflicts with State and local plans for renewable energy or energy efficiency.

PG&E, the electricity supplier for the Project site and vicinity, would be required by SB 100 to incrementally increase the proportion of renewable electricity generation supplying its in-state retail sales until it reaches 100% carbon-free electricity generation by 2045. Electricity consumed during construction of the Project and cumulative projects would be subject to the renewable electricity generation requirements established by SB 100. The State's transition away from fossil fuel-generated electricity to increased renewable energy would also decrease cumulative project demand for natural gas.

The Project's energy use would be limited to that which is necessary for construction and operation, as required through the implementation of **Mitigation Measures MM 4.3-3** (Section 4.3, *Air Quality*), **MM 4.8-1 and MM 4.8-2** (*Greenhouse Gas Emissions*) and **MM 4.6-1** and **MM 4.6-2**. As discussed above, the Project would be required to comply with applicable statewide and local policies and standards pertaining to energy efficiency and can reasonably be assumed to pursue greater energy efficiencies to the extent commercially practicable in its operation, in the interest of reducing operating costs. As such, the Project's incremental contribution to the less than significant cumulative impact would not be considerable with respect to energy consumption in the form of electricity and natural gas.

Cumulative projects would be required to comply with CCR Title 13, Sections 2449(d)(3) and 2485, which limit idling from both on- and off-road diesel-powered equipment and are enforced by CARB. Additionally, various federal and State regulations, including the LCFS, Pavley Clean Car Standards, and Federal Vehicle Standards, would serve to reduce the transportation fuel demand of cumulative projects.

Compliance with the aforementioned regulations by the cumulative projects would ensure that they would not result in the inefficient, unnecessary, or wasteful consumption of fuel and their cumulative impact would be less than significant. As discussed in more detail above, the Project would consume vehicle fuel during both construction and operations. And the Project would be required to use fuels which conform to various federal and State regulations, such as the LCFS, Pavley Clean Car Standards, and Federal Vehicle Standards. Further, the Project would consume fuels in an amount necessary for construction and operation and would not consume excessive amounts of fuel beyond what is necessary in the interest of avoiding unnecessary construction or operation costs. Therefore, the Project's incremental contribution to the less than significant cumulative impact would not be considerable with respect to the wasteful or inefficient use of energy.

Considering the information provided above, the Project would not have a cumulatively considerable impact on energy consumption and would not conflict with any renewable energy plans. Cumulative impacts would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.3-3** (Section 4.3, *Air Quality*), **MM 4.6-1**, **MM 4.6-2**, **MM 4.8-1**, and **MM 4.8-2** would be required.

Level of Significance after Mitigation

With implementation of **Mitigation Measures MM 4.3-3**, **MM 4.6-1**, **MM 4.6-2, MM 4.8-1** and **MM 4.8-2**, impacts would be less than significant after mitigation.

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Section 4.7

Geology and Soils

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Section 4.7

Geology and Soils

4.7.1 Introduction

This section of the Draft Environmental Impact Report (Draft EIR) describes the affected environment, and regulatory setting regarding geology and soil resources. It also evaluates the impacts on geologic and soil resources resulting from implementing the proposed IPG Industrial Project (Project), and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the 2022 Preliminary Geotechnical Evaluation, Proposed Industrial Development, Southwest of the Intersection of Boughton Drive and Airport Drive, Kern County, California prepared by LGC Geotechnical, Inc. (LGC) (Appendix F.1), and the 2023 Paleontological Resources Assessment Report prepared by CRM TECH (CRM) (Appendix F.2).

4.7.2 Environmental Setting

Regional Geologic Setting

The Project site is in the southwestern portion of the Great Valley Geomorphic Province of California. The following discussion regarding the Geomorphic Province is from the California Geological Survey Note 36. The Great Valley is an alluvial plain approximately 50 miles wide and 400 miles long in central California. The Great Valley is a trough in which sediments have been deposited almost continuously since the Jurassic (about 160 million years ago). The Sierra Nevada Mountains lie along the eastern side of the trough while the Coastal Ranges lie along the trough's western side. The northern part of the Great Valley is the Sacramento Valley, while the southern part is the San Joaquin Valley. The site is near the southern end of the San Joaquin Valley. Great oil fields have been found in the southernmost San Joaquin Valley and along anticlinal uplifts on its southwestern margin (Appendix F.1).

Paleontological Resources

Paleontological resources (that is, fossils) are the buried remains or traces, or both, of prehistoric organisms (that is, animals, plants, and microbes). Resources can persist for many years if undisturbed or may be destroyed through natural or human disturbances such as construction. Body fossils (for example, bones, teeth, shells leaves, and wood) and trace fossils (for example, tracks, trails, burrows, and footprints) are found in the geologic units/formations within which they were originally buried. The primary factor determining if an object is a fossil is the age of the organic remain or trace. Typically, fossils must be older than approximately 11,700 years, but materials as young as 5,000 years can be considered. One other consideration is the geologic units in which a project occurs because some localities and the geologic units are considered to have a greater paleontological sensitivity, or potential to contain fossils. Accordingly, paleontological resources

include these localities and the geologic units in which the resources may be located. Ultimately, the paleontological potential is determined based on known fossil localities within a given geologic unit, or the potential for future fossil discoveries, or both, given the age and depositional environment of a particular geologic unit, and are discussed in more detail in this section.

High Potential Areas

Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered have a high potential to contain additional significant paleontological resources. Rocks units classified as having high potential for containing paleontological resources include sedimentary formations and some volcaniclastic formations (for example, ashes or tephras), low-grade metamorphic rocks that contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (for example, middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, and fine-grained marine sandstones).

Undetermined Potential

Rock units with little available information concerning their paleontological content, geologic age and depositional environment are considered to have undetermined potential. Additional study is necessary to determine if these rock units have a high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.

Low Potential

Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow for a determination that some rock units have a low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus, only preserve fossils in rare circumstances. The presence of fossils is the exception, not the rule (for example, basalt flows or Recent colluvium). Rock units with low potential typically will not require impact mitigation measures to protect fossils.

No Potential

Some rock units have no potential to contain significant paleontological resources, for instance, high-grade metamorphic rocks (for example, gneisses and schists) and plutonic igneous rocks (for example, granites and diorites). Rock units with no potential require no protection nor impact mitigation measures relative to paleontological resources.

Existing Paleontological Resources

Records Search

A search of the University of California Museum of Paleontology (UCMP) online paleontological database yielded negative results for fossil localities within the U.S. Geological Survey (USGS) Oildale 7.5′ quadrangle but revealed at least one Pleistocene fossil locality in the general vicinity. According to UCMP records, Locality No. V65247 produced a specimen of Rancholabrean Equus occidentalis, fossil horse. The soils within the Project area consist primarily of Pleistocene-age alluvial sediments, which are known to be fossiliferous at depth. Based on this assessment, the presence of fossil material in near-surface soils is unlikely but any fossil specimen discovered at depth in the Project vicinity would be considered scientifically significant.

Literature Review

Based on the literature review conducted by CRM, the surface geology within the Project area has been previously mapped as Qc, described as Pleistocene nonmarine sediments. The surface sediments in and near the Project area have been identified as Qyf, namely Holocene to late Pleistocene-age alluvial fan deposits, which consist of boulder, cobble, gravel, sand, and silt deposits. Qyf is further described as "unconsolidated to slightly consolidated, undissected to slightly dissected, issued from a confined valley or canyon" (Appendix F.2). The surface geology within the Project area is Qoa2, older alluvium of Pleistocene age, which is described as "sand, gravel, silt, and clay underlying terraces removed from modern streams, and in dissected alluvial fans."

Local Geologic Setting

Locally, the site is situated on a broad, nearly flat alluvial plain that descends to the southwest. The southwest-flowing Kern River is approximately 2 miles southeast of the site. Foothills of the Sierra Nevada Mountains rise approximately 1 to 2 miles northeast of the site, and an approximately 3-mile-wide by 11-mile-long oil field is in these foothills.

Soils and Topography

Based on a review of regional geologic mapping in the vicinity of the site, the Project area is underlain by Quaternary old alluvial deposits. Previous regional mapping identifies the deposits at the site as Pleistocene (Quaternary) Non-Marine (continental) deposits. The deposits were identified as Quaternary old alluvium (Qoa) in the geotechnical evaluation prepared by LGC (Appendix F.1, Preliminary Geotechnical Investigation). Undocumented artificial fills (afu) consisting of berms and stockpiles are located across large portions of the site. The undocumented fill is interpreted to be dry and loose. The Quaternary-aged old alluvium consisted mostly of silty sand and sandy silt with scattered discontinuous beds of sandy clay and clayey sand. The upper 5 feet of the alluvium was generally found to be dry and loose to medium dense, however, at depth it was generally found to be dense to very dense or very stiff to hard and slightly moist to moist in-place.

Groundwater

Historical high groundwater is anticipated to be deeper than 50 feet below the existing ground surface. The California Department of Water Resources Water Data Library indicates several wells existed within approximately 2.5 miles to the northwest and southwest of the site; however, the wells were not frequently monitored. Between approximately 1969 and 2011, groundwater ranged from approximately 130 to 500 feet below the ground surface according to the data. The nearest point of the Kern River is approximately 2 miles southeast of the site, at an elevation approximately 100 feet lower than the lowest point on the site.

Seasonal fluctuations of groundwater elevations should be expected over time. In general, groundwater levels fluctuate with the seasons and local zones of perched groundwater may be present within the near-surface deposits due to local seepage or during rainy seasons. Groundwater conditions below the site may be variable and depend on numerous factors including seasonal rainfall, local irrigation, and groundwater pumping.

Fault Rupture

Ground surface rupture along an earthquake fault may cause damage to aboveground infrastructure and other features. The State has mapped known active faults that may cause surface fault rupture in inhabited areas as part of the Alquist-Priolo Earthquake Fault Zoning Act. Fault rupture typically occurs when movement on a fault breaks through to the ground surface and almost always follows preexisting faults that are zones of weakness. Rupture may occur suddenly during an earthquake or slowly in the form of fault creep. Sudden displacements are more damaging to structures because they are accompanied by shaking. Accordingly, ground surface rupture along an earthquake fault may cause damage to aboveground infrastructure and other features and occurs when movement on a fault deep within the earth breaks through to the surface. Active faults are defined as faults with evidence of displacement in the last 11,000 years. The subject site is not within a State of California Fault Rupture Hazard Zone. The major faults of the San Andreas Fault and Garlock Fault are approximately 40 miles southwest and 40 miles southeast of the site, respectively. The nearest Holoceneactive faults identified by California Geological Survey are the Kern Front Fault approximately 1 mile northeast of the site and the Premier Fault approximately 3 miles to the northwest of the site. No Holocene-active faults are known to cross the site, therefore, the possibility of damage due to ground rupture is considered low.

Ground Shaking

Faults within the Project site vicinity have the potential to cause ground shaking at the Project site; the magnitude of ground shaking experienced on site is dependent on the distance to causative faults and the earthquake magnitude (or measure of the amount of energy released during an earthquake event). Strong ground shaking from an earthquake can result in damage associated with landslides, ground lurching, structural damage, and liquefaction. The Southern California region is characterized by, and has a history of, fault stress and associated seismic activity. Earthquakes are classified by their magnitude, a measure of energy released during an event. During a seismic event, the Project site may be subjected to high levels of ground shaking due to active faults in the area. The largest fault in the area is the San Andreas Fault, which is considered active. Strong ground

shaking can be expected at the site during moderate to severe earthquakes in the general region. However, this phenomenon is common to most areas in Southern California.

Landslides

The topography of the site and surrounding area is generally flat. Research and field observations do not indicate the presence of landslides on the site or in the immediate vicinity. Regional geologic maps of the area do not indicate the presence of known or suspected landslides in the vicinity of the site. Therefore, the possibility of landslides within the Project area as a result of Project implementation is considered nil.

Liquefaction

Liquefaction is the phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced strong ground shaking. Liquefaction can produce excessive settlement, ground rupture, lateral spreading, or failure of shallow bearing foundations. The following major factors must be analyzed to determine the liquefaction susceptibility of a region: (1) the density and textural characteristics of the alluvial sediments; (2) the intensity and duration of ground shaking; and (3) the depth to groundwater. Zones of Required Evaluation referred to as "Seismic Hazard Zones" in California Code of Regulations Article 10, Section 3722, are areas shown on Seismic Hazard Zone maps where site evaluations are required to determine the need for mitigation of potential liquefaction and/or earthquake-induced landslide ground displacements. There are no mapped areas with Seismic Hazard Zones for liquefaction or landslide displacements within the Project area.

Due to the depth of groundwater greater than 50 feet, and the generally dense/hard nature of underlying native soils, the potential for liquefaction and liquefaction-induced settlement within the Project area as a result of Project implementation is considered very low.

Lateral Spreading

Lateral spreading is a potential hazard commonly associated with liquefaction where extensional ground cracking and settlement occur following lateral migration of subsurface liquefiable material. These phenomena typically occur adjacent to free faces, such as slopes and creek channels.

Due to the very low potential for liquefaction, the potential for lateral spreading within the Project area as a result of Project implementation is considered very low.

Soil Erosion

Soil erosion occurs when surface materials are worn away from the earth's surface due to land disturbance and/or natural factors such as wind and precipitation. Characteristics such as texture and content, surface roughness, vegetation cover, and slope grade and length determine the potential for soil erosion. Wind erosion typically occurs when fine-grained, noncohesive soils are exposed to high-velocity winds, while water erosion tends to occur when loose soils on moderate and steep slopes are exposed to high-intensity storm events.

As previously discussed, the Project site is underlain by Quaternary old alluvial deposits (Qoa). Previous regional mapping identifies the deposits at the site as Pleistocene (Quaternary) Non-Marine (continental) deposits. The Quaternary-aged old alluvium was found to consist mostly of silty sand and sandy silt with scattered discontinuous beds of sandy clay and clayey sand.

The Project site mostly consists of sands, and the on-site soils are generally well drained. The Project site is relatively flat and vegetation primarily consists of a moderate growth of weeds. Typically, long slope length and high slope steepness contribute to higher erosion rates. Thus, since the site is relatively flat, erosion potential related to slope length and slope steepness within the Project area as a result of Project implementation is low.

Subsidence

Subsidence is the settlement of the ground surface over large areas (typically on the order of square miles) typically due to the lowering of the groundwater table. Mitigation against such a large-scale groundwater drawdown cannot be performed on a site-specific level, but instead "requires regional cooperation among numerous agencies" and, therefore, is not a site-specific geotechnical consideration. The soils at the Project site do not generally indicate the presence of soils susceptible to collapse or excessive settlement. Based on the local site geologic conditions, the potential for subsidence in the site development area as a result of Project implementation is considered low.

Soil Collapse

Collapsible soils consist of loose, dry, low-density materials that collapse, compact, and change in settlement under the addition of water or excessive loading, often resulting in severe damage to structures. The settlement of soils is characterized by sinking or descending soils that occurs as the result of a heavy load placed on underlying sediments and may be triggered by seismic events. Seismically induced settlement is dependent on the relative density of the subsurface soils. Based on the local site geologic conditions, the potential for soil collapse in the site development area as a result of Project implementation is considered low.

Expansive Soils

Soils that expand and contract in volume ("shrink–swell" pattern) are considered expansive and may cause damage to aboveground infrastructure as a result of density changes that shift overlying materials. Fine-grain clay sediments are likely to exhibit shrink–swell patterns in response to changing moisture levels. Based on laboratory testing results, site soils are anticipated to have a "Very Low" expansion potential. The final expansion potential of site soils should be determined when grading is complete.

4.7.3 Regulatory Setting

Geologic and soil resources and geotechnical hazards are governed primarily by local jurisdictions. The conservation and seismic safety elements of City and County general plans contain policies to protect geologic features and avoid hazards.

California Environmental Quality Act (CEQA) is the major environmental statute that guides the design and construction of projects on nonfederal lands in California. This statute sets forth a specific process for environmental impact analysis and public review. In addition, the Project proponent must comply with other applicable State and local statutes, regulations, and policies. Relevant and potentially relevant statutes, regulations, and policies are discussed below.

Federal

Clean Water Act (Erosion Control)

The Clean Water Act (CWA) (33 United States Code [USC] Section 1251 et seq.) was enacted to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. The CWA requires states to set standards to protect, maintain, and restore water quality by regulating point source and certain nonpoint-source discharges to surface water. Those discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). Projects that disturb 1 acre or more of land are required to obtain NPDES coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, State Water Resources Control Board Order No. 2022-0057-DWQ. The General Permit requires developing and implementing a stormwater pollution prevention plan (SWPPP) that includes best management practices (BMPs) to protect stormwater runoff.

The CWA's requirements and associated SWPPP requirements are described in Section 4.10, *Hydrology and Water Quality*.

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1997 to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." To accomplish this, the Act established the National Earthquake Hazards Reduction Program (NEHRP). This program was significantly amended in November 1990 by NEHRP, which refined the description of agency responsibilities, program goals, and objectives.

NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. NEHRP designated the Federal Emergency Management Agency (FEMA) as the program's lead agency and assigned several planning, coordinating, and reporting responsibilities. Programs under NEHRP inform and guide planning and building code requirements including emergency evacuation responsibilities and seismic code standards such as those to which the Project would be required to adhere.

Paleontological Resources

A variety of federal statutes specifically address paleontological resources. They are applicable to a project if the project includes federally owned or managed lands or involves a federal agency license, permit, approval, or funding. The first statute is the Antiquities Act of 1906 (54 USC 320301-320303 and 18 USC 1866(b)), which calls for the protection of historic landmarks, historic and prehistoric structures, as well as other objects of historic or scientific interest on federally administered lands, the latter of which would include fossils. The Antiquities Act both establishes a permit system for the disturbance of any object of antiquity on federal land and sets criminal sanctions for violation of these requirements. The Antiquities Act was extended to specifically apply to paleontological resources by the Federal-Aid Highways Act of 1958. More recent federal statutes that address the preservation of paleontological resources include the National Environmental Policy Act, which requires the consideration of important natural aspects of national heritage when assessing the environmental impacts of a project (Public Law [PL] 91-190, 31 Stat. 852, 42 USC 4321–4327). The Federal Land Policy Management Act of 1976 (PL 94-579; 90 Stat. 2743, USC 1701–1782) requires that public lands be managed in a manner that will protect the quality of their scientific values, while Title 40 Code of Federal Regulations Section 1508.2 identifies paleontological resources as a subset of scientific resources. The Paleontological Resources Preservation Act (Title VI, Subtitle D, of the Omnibus Land Management Act of 2009) is the primary piece of federal legislation.

Paleontological Resources Preservation Act

The Paleontological Resources Preservation Act offers provisions for paleontological resources identified on federal, Native American, or state lands and guidance for their management and protection, and promotes public awareness and scientific education regarding vertebrate fossils. The law requires federal agencies to develop plans for inventory, collection, and monitoring of paleontological resources and establishes stronger criminal and civil penalties for the removal of scientifically significant fossils on federal lands.

State

Alquist-Priolo Earthquake Fault Zoning Act of 1972

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 regulates development and construction of buildings intended for human occupancy to avoid the hazard of surface fault rupture. In accordance with this law, the California Geological Survey maps active faults and designates Earthquake Fault Zones along mapped faults. The Alquist-Priolo Earthquake Fault Zoning Act categorizes faults into active, potentially active, and inactive. Historic- and Holocene-age faults are considered active, Late Quaternary- and Quaternary-age faults are considered potentially active, and pre-Quaternary-age faults are considered inactive. These classifications are qualified by the conditions that a fault must be shown to be “sufficiently active” and “well defined” by detailed site-specific geologic explorations to determine whether building setbacks should be established. Any project that involves the construction of buildings or structures for human occupancy is subject to

review under the Alquist-Priolo Earthquake Fault Zoning Act, and any structures for human occupancy must be at least 50 feet from any active fault.

Seismic Hazards Mapping Act of 1990

In accordance with Public Resources Code, Chapter 7.8, Division 2, the California Geological Survey delineates Seismic Hazard Zones through the Seismic Hazards Zonation Program. The purpose of the Seismic Hazards Mapping Act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards, such as those associated with strong ground shaking, liquefaction, landslides, other ground failures, or other hazards caused by earthquakes. Cities, counties, and State agencies are directed to use Seismic Hazard Zone Maps developed by the California Geological Survey in their land use planning and permitting processes. In accordance with the Seismic Hazards Mapping Act, site-specific geotechnical investigations must be performed before permitting most urban development Projects within Seismic Hazard Zones.

California Integrated Seismic Network

The California Integrated Seismic Network (CISN) was formed in November 2000 to operate a reliable, modern, statewide system for earthquake monitoring, research, archiving, and distribution of information to benefit public safety, emergency response, and loss mitigation. The CISN seeks to mitigate the impact of future earthquakes by collecting, processing, and disseminating critical earthquake information in a timely manner.

Six organizations collaborate in the CISN to monitor earthquakes and collect data to support improvements to earthquake resilience. Core members of the CISN are the California Geological Survey, California Institute of Technology Seismological Laboratory, University of California–Berkeley Seismological Laboratory, USGS Menlo Park, USGS Pasadena, and California Governor's Office of Emergency Services. The CISN has three management centers with different responsibilities:

- Southern California Earthquake Management Center: California Institute of Technology and USGS Pasadena
- Northern California Earthquake Management Center: University of California– Berkeley and USGS Menlo Park
- Center for Engineering Strong Motion Data

The Northern and Southern California Earthquake Management Centers are twin earthquake processing centers. The engineering earthquake management center is primarily responsible for producing engineering data products.

California Building Code

The California Building Code (CBC) (2022) is codified in Title 24 of the California Code of Regulations, Part 2, and contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance. CBC provisions provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design; construction; quality of materials; use and occupancy; location; and maintenance of all buildings, structures, and certain equipment. Every three years the national model codes and standards are published and, by law, California is required to incorporate specific model codes and standards into Title 24. The 2022 edition of the CBC was published by the California Building Standards Commission in 2022 and took effect starting January 1, 2023.

The 2022 CBC contains California amendments based on the American Society of Civil Engineers (ASCE) Minimum Design Standard ASCE/SEI 7-16, Minimum Design Loads for Buildings and Other Structures, provides requirements for general structural design and includes means for determining earthquake loads (which is defined as the overall force to which a structure is subjected to support a weight or mass, or in resisting externally applied forces. Excess load or overloading may cause structural failure) as well as other loads (such as wind loads) for inclusion into building codes. Seismic design provisions of the building code generally prescribe minimum lateral forces applied statically to the structure, combined with the gravity forces of the dead and live loads on the structure that the structure must be designed to withstand. The prescribed lateral forces are generally smaller than the actual peak forces associated with a major earthquake. Consequently, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse, but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake. However, it is reasonable to expect that a structure designed in accordance with the seismic requirements of the CBC should not collapse in a major earthquake. The earthquake design requirements consider the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, all of which are used to determine a seismic design category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site; SDC ranges from A (very small seismic vulnerability) to E/F (very high seismic vulnerability and near a major fault). Seismic design specifications are determined according to the SDC in accordance with CBC Chapter 16.

In accordance with CBC Chapter 18, Soils and Foundations, geotechnical investigations shall be conducted in accordance with Section 1803.2 and reported in accordance with Section 1803.6. Where required by the building official or where geotechnical investigations involve in situ testing, laboratory testing, or engineering calculations, such investigations shall be conducted by a registered design professional. For Seismic Design Categories D, E, and F, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading, plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also addresses measures to be considered in structural design, which may include stabilizing the ground,

selecting appropriate foundation types and depths, selecting appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions.

Chapter 18 describes the analysis of expansive soils and the determination of the depth to groundwater table. Expansive soils are defined in the CBC as follows:

> ***1803.5.3 Expansive Soil.*** *In areas likely to have expansive soil, the building official shall require soil tests to determine where such soils do exist. Soils meeting all four of the following provisions shall be considered expansive, except that tests to show compliance with Items 1,2 and 3 shall not be required if the test prescribed in Item 4 is conducted:*
>
> *1. Plasticity index (PI) of 15 or greater, determined in accordance with ASTM D 4318.*
>
> *2. More than 10 percent of the soil particles pass a No. 200 sieve (75 micrometers), determined in accordance with ASTM D 422.*
>
> *3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D 422.*
>
> *4. Expansion index greater than 20, determined in accordance with ASTM D 4829.*

Porter-Cologne Water Quality Control Act (Erosion Control)

The Porter-Cologne Water Quality Control Act, in cooperation with the CWA, established the California State Water Resources Control Board (SWRCB). The SWRCB and the nine regional water quality control boards (RWQCBs) protect California's surface water and groundwater supplies. Section 13000 of the act directs each RWQCB to develop Water Quality Control Plans for all areas in its region, to designate the beneficial uses of California's rivers and groundwater basins; these plans are the basis for each board's regulatory program. The Basin Plan provides direction on the beneficial uses of state waters in Region 6, describes the water quality that must be maintained to support such uses, and includes programs, Projects, and other actions necessary to achieve the standards established in the Basin Plan. The Lahontan RWQCB implements the Basin Plan by issuing and enforcing waste discharge requirements to individuals, communities, or businesses whose waste discharges may affect water quality. These requirements are State Waste Discharge Requirements for discharge to land or federally delegated NPDES permits for discharges to surface water. Responsibility for implementing CWA Sections 401–402 and Section 303(d) is outlined in the Porter-Cologne Water Quality Control Act.

State Regional Water Quality Control Board, Stormwater General Construction Permit

The five-member SWRCB allocates water rights, adjudicates water rights disputes, develops Statewide water protection plans, establishes water quality standards, and guides the nine RWQCBs in the major watersheds of the State. The joint authority of water allocation and water quality protection enables the SWRCB to provide comprehensive protection for California's waters. In 1999, the State adopted the NPDES General Permit for Stormwater Discharges Associated with Construction Activities (Construction Activities General Permit) (SWRCB Order No. 2012-0006-DWQ, NPDES No. CAS000002). The General Construction Permit generally requires that construction sites with 1 acre or greater of soil disturbance, or less than 1 acre but part of a greater common plan of development, apply for coverage for discharges under the General Construction Permit by submitting a Notice of Intent for coverage, developing a SWPPP, and implementing BMPs to address construction site pollutants if the Project is deemed to discharge into a water of the United States. However, as the Project site is in a terminal drainage area of Kern County (for example, does not drain to waters of the United States), NPDES coverage is not expected to be required as described in detail in Section 4.10, *Hydrology and Water Quality*.

The SWPPP should contain a site map(s) that shows the construction site perimeter, existing and proposed buildings, lots, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the Project. The SWPPP must list the BMP the discharger will use to protect stormwater runoff and the placement of those BMPs. The SWPPP must contain a visual monitoring program, a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs, and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Section A of the Construction General Permit describes the elements that must be contained in a SWPPP. Enrollment under the General Construction Permit is through the Stormwater Multiple Application and Report Tracking System. The SWRCB is responsible for implementing the CWA and issues NPDES permits to cities and counties through the individual regional boards.

Local

Metropolitan Bakersfield General Plan

Bakersfield is the largest incorporated area in Kern County. Bakersfield is the county seat and the focus of much of the business activity in the County. Accordingly, Kern County and the City of Bakersfield have separately adopted a coordinated general plan for the metropolitan area (Metropolitan Bakersfield General Plan) that provides information on planned land uses, policies, and implementation programs for the unincorporated portions of the metropolitan plan area. The 409 square miles included in the plan are the City of Bakersfield's adopted Sphere of Influence. The policies, goals, and implementation measures in the Metropolitan Bakersfield General Plan for geology and soils applicable to the Project are provided below.

Chapter II. Land Use Element

Policies

Policy 104. As part of the environmental review procedure, an evaluation of the significance of paleontological, archaeological, and historical resources and the impact of proposed development on those resources shall be conducted and appropriate mitigation and monitoring included for development Projects.

Implementation

Implementation 7. Environmental Review. Local guidelines for Project processing shall reflect CEQA Guidelines which state that the environmental effects of a Project must be taken into account as part of Project consideration.

Chapter V. Conservation Element/Soils and Agriculture

Policies

Policy 6. Continue implementing land grading ordinances that reduce soil erosion/siltation commonly associated with land development.

Policy 7. Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible.

Policy 12. Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction.

Policy 13. Minimize the alteration of natural drainage and require development plans to include necessary construction to stabilize runoff and silt deposition through enforcement of grading and flood protection ordinances.

Implementation

Implementation 4. Periodically review and update grading ordinances that take into account the potential of soil erosion.

Chapter VIII. Safety Element

Safety/Seismic

Goals

Goal 4. Prevent loss of life from the failure of critical facilities in an earthquake and ensure the continued functioning of essential facilities following a disaster.

Policies

Policy 10. Prohibit development designed for human occupancy within 50 feet of a known active fault and prohibit any building from being placed astride an active fault.

Policy 11. Require site-specific studies to locate and characterize specific fault traces within an Alquist-Priolo Earthquake Fault Zone for all construction designed for human occupancy.

Policy 13. Determine the liquefaction potential at sites in areas of high groundwater prior to development and determine specific mitigation to be incorporated into the foundation design, as necessary to prevent or reduce damage from liquefaction in an earthquake.

Policy 15. Compile information on areas of potential hazards and field information developed as part of CEQA investigations and geo-logic reports and keep geologic reviews and policy development current and accessible for use in report preparation.

Implementation

Implementation 2. Require detailed site studies for ground shaking characteristics, liquefaction potential, dam failure inundation and flooding potential, and fault rupture potential, as background to the design process for critical facilities under city and county discretionary approval.

Implementation 3. Require structures that are within the plan area and are subject to Building Department review to adhere to the most current seismic standards adopted as part of the Uniform Building Code.

Implementation 13. Detailed geologic investigations shall be conducted, in conformance with guidelines of the California Division of Mines and Geology, for all construction designed for human occupancy in an Alquist-Priolo Earthquake Fault Study Zone.

Implementation 17. Require liquefaction investigations in all areas of high groundwater potential and appropriate foundation designs to mitigate potential damage to buildings on sites with liquefaction potential.

Implementation 21. Compile maps showing the location of all geologic hazards, including: active faults, Alquist-Priolo Earthquake Fault Zones, 100-year flood hazard, extent of Projected dam failure inundation and time arcs, depth of inundation, land subsidence, slope failure and earthquake-induced landslides, high groundwater and liquefaction potential.

Implementation 22. Compile information on areas of potential hazard. Field information developed as part of CEQA investigations and geologic reports by the city/county geologists should be kept current and accessible for use in report preparation, geologic reviews and policy development.

Kern County Zoning Ordinance

Construction and operation of the Project are subject to regulations contained within the Kern County Zoning Ordinance, which includes Special Development Standards (Chapter 19.80) for the avoidance of geologic hazards and/or the protection of unique geologic features, as well as for the preservation of paleontological resources.

Kern County Code of Building Regulations – (Title 17 of the Ordinance Code of Kern County)

Chapter 17.08 Building Code

All construction in the county is required to conform to the Kern County Building Code (Chapter 17.08, Building Code, of the Kern County Code of Regulations). Kern County has adopted the California Building Code, 2022 Edition, with some modifications and amendments. The entire County is in Seismic Zone 4, a designation previously used in the Uniform Building Code to denote the areas of highest risk to earthquake ground motion. California has established an Unreinforced Masonry program that details seismic safety requirements for Zone 4. Seismic provisions associated with Seismic Zone 4 have been adopted.

Chapter 17.28 of Kern County Grading Code

The Kern County Grading Code sets forth rules and regulations to control excavation, grading and earthwork construction, including fills and embankments; establishes the administrative procedure for issuance of permits; and provides for approval of plans and inspection of grading construction. All Kern County Grading Code requirements would be applied during Project implementation. All required grading permit(s) would be obtained prior to the commencement of construction activities. Sections of the Grading Code that are particularly relevant to geology and soils are provided below.

Section 17.28.140 Erosion Control

A. Slopes. The faces of cut and fill slopes shall be prepared and maintained to control against erosion. This control may consist of effective planting. The protection for the slopes shall be installed as soon as practicable and prior to calling for final approval. Where cut slopes are not subject to erosion due to the erosion-resistant character of the materials, such protection may be omitted.

B. Other Devices. Where necessary, check dams, cribbing, riprap or other devices or methods shall be employed to control erosion and provide safety.

C. Temporary Devices. Temporary drainage and erosion control shall be provided as needed at the end of each workday during grading operations, such that existing drainage channels would not be blocked. Dust control shall be applied to all graded areas and materials and shall consist of applying water or another approved dust palliative for the alleviation or prevention of dust nuisance. Deposition of rocks, earth materials, or debris onto adjacent property, public roads, or drainage channels shall not be allowed.

Section 17.28.170 Grading Inspection

1. General. All grading operations for which a permit is required shall be subject to inspection by the building official. Professional inspection of grading operations and testing shall be provided by the civil engineer, soils engineer, and the engineering geologist retained to provide such services in accordance with Subsection 17.28.170(E) for engineered grading and as required by the building official for regular grading.

2. Civil Engineer. The civil engineer shall provide professional inspection within such engineer's area of technical specialty, which shall consist of observation and review as to the establishment of line, grade, and surface drainage of the development area. If revised plans are required during the course of the work, they shall be prepared by the civil engineer.
3. Soils Engineer. The soils engineer shall provide professional inspection within such engineer's area of technical specialty, which shall include observation during grading and testing for required compaction. The soils engineer shall provide sufficient observation during the preparation of the natural ground and placement and compaction of the fill to verify that such work is being performed in accordance with the conditions of the approved plan and the appropriate requirements of this chapter. Revised recommendations relating to conditions differing from the approved soils engineering and engineering geology reports shall be submitted to the permittee, the building official and the civil engineer.
4. Engineering Geologist. The engineering geologist shall provide professional inspection within such engineer's area of technical specialty, which shall include professional inspection of the bedrock excavation to determine if conditions encountered are in conformance with the approved report. Revised recommendations relating to conditions differing from the approved engineering geology report shall be submitted to the soils engineer.
5. Permittee. The permittee shall be responsible for the work to be performed in accordance with the approved plans and specifications and in conformance with the provisions of this Code, and the permittee shall engage consultants, if required, to provide professional inspections on a timely basis. The permittee shall act as a coordinator between the consultants, the contractor and the building official. In the event of changed conditions, the permittee shall be responsible for informing the building official of such change and shall provide revised plans for approval.
6. Building Official. The building official may inspect the Project at the various stages of the work requiring approval to determine that adequate control is being exercised by the professional consultants.
7. Notification of Noncompliance. If, in the course of fulfilling their responsibility under this chapter, the civil engineer, the soils engineer, or the engineering geologist finds that the work is not being done in conformance with this chapter or the approved grading plans, the discrepancies shall be reported immediately in writing to the permittee and to the building official. Recommendations for corrective measures, if necessary, shall also be submitted.
8. Transfer of Responsibility. If the civil engineer, the soils engineer, or the engineering geologist of record is changed during the course of the work, the work shall be stopped until:

    1. The civil engineer, soils engineer, or engineering geologist has notified the building official in writing that they will no longer be responsible for the work and that a qualified replacement has been found who will assume responsibility.

    2. The replacement civil engineer, soils engineer, or engineering geologist notifies the building official in writing that they have agreed to accept responsibility for the work.

Kern County Water Control Plan

Each of the nine RWQCBs adopts a Water Quality Control Plan that recognizes and reflects regional differences in existing water quality, the beneficial uses of the region's groundwater and surface waters, and local water quality conditions and problems. Water quality problems in the regions are listed in these plans, along with the causes, if they are known. Each RWQCB is to set water quality objectives that would ensure the reasonable protection of beneficial uses and the prevention of nuisance, with the understanding that water quality can be changed somewhat without unreasonably affecting beneficial uses. Kern County is within the Central Valley Regional Water Quality Control Board.

The Kern County Engineering and Survey Services Department requires the completion of an NPDES applicability form for projects with construction disturbing 1 acre or more within Kern County. This form requires the applicant to provide background information on construction activities and identify if stormwater runoff could potentially discharge into waters of the United States, be contained on site, or discharge indirectly off site to a river, lake, stream, or off-site drainage facility. Should stormwater runoff be contained on-site and not discharged into any waters, no special actions are required. Should stormwater runoff discharge into waters of the United States, compliance with the State Water Board Construction General Permit is required, which requires the preparation of a SWPPP. Should stormwater runoff not drain to waters of the United States (for example, drains to a terminal drainage facility), the applicant would be required to develop a SWPPP and BMPs. Projects disturbing at least 1 acre of soil in Kern County are required to apply for a County NPDES Stormwater Program Permit. Prior to issuance of the permit, Kern County Engineering, Surveying and Permit Services must verify the applicant's stormwater plans. Applicants must apply for the permit under one of the following four conditions:

- All stormwater is retained on site and no stormwater runoff, sediment, or pollutants from onsite construction activity can discharge directly or indirectly offsite or to a river, lake, stream, municipal storm drain, or offsite drainage facilities.
- All stormwater runoff is not retained on site, but does not discharge to a water of the United States (that is, drains to a terminal drainage facility). Therefore, a SWPPP has been developed and BMPs must be implemented.
- All stormwater runoff is not retained on site, and the discharge is to a water of the United States. Therefore, a Notice of Intent must be filed with the State Regional Water Resources Control Board, Central Valley Region, prior to issuance of the building permit. Also, a SWPPP has been developed and BMPs must be implemented.
- Construction activity is between 1 and 5 acres and an Erosivity Waiver was granted by the SWRCB. BMPs must be implemented.

4.7.4 Impacts and Mitigation Measures

This section describes the methodology used in conducting the CEQA impact analysis for geology and soils; the thresholds of significance used in assessing impacts on geology and soils; and the assessment of impacts on geology and soils, including relevant mitigation measures.

Methodology

The analysis in this section is largely based on the Preliminary Geotechnical Evaluation, Proposed Industrial Development, Southwest of the Intersection of Boughton Drive and Airport Drive, Kern County, California (Appendix F.1), and the Paleontological Resources Assessment Report (Appendix F.2) prepared for the Project.

The loss of any identifiable fossil that could yield information important to prehistory, or that embodies the distinctive characteristics of a type of organism, environment, time period, or geographic region, would be a significant environmental impact. Direct impacts on paleontological resources primarily concern the potential destruction of nonrenewable paleontological resources and the loss of information associated with these resources. This includes the unauthorized collection of fossil remains. If potentially fossiliferous bedrock or surficial sediments are disturbed, the disturbance could destroy paleontological resources and subsequent loss of information (significant impact). At the project-specific level, direct impacts can be mitigated to a less than significant level through implementing paleontological mitigation.

The CEQA threshold of significance for a significant impact on paleontological resources is reached when a project is determined to "directly or indirectly destroy a significant paleontological resource or unique geologic feature." In general, for projects that are underlain by paleontologically sensitive geologic units, the greater the amount of ground disturbance, the higher the potential for significant impacts to paleontological resources. For projects that are directly underlain by geologic units with no paleontological sensitivity, there is no potential for impacts on paleontological resources unless sensitive geologic units that underlie the nonsensitive unit are also affected.

This section describes the potential geology and soils impacts associated with Project development. This analysis first established baseline conditions for the affected environment relevant to geology and soils, as presented in Section 4.7.2.

Thresholds of Significance

The County CEQA Implementation Document and Environmental Checklist state that a Project would have a significant impact on geology and soils if it would:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the state geologist for the area or based on other substantial evidence of a known fault

  - Strong seismic ground shaking
  - Seismic-related ground failure, including liquefaction
  - Landslides
- Result in substantial soil erosion or the loss of topsoil
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature

Project Impacts

Impact 4.7-1: The Project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo earthquake fault zoning map issued by the state geologist for the area or based on other substantial evidence of a known fault.

Primary ground rupture is ground deformation that occurs along the surface trace of the causative fault during an earthquake. The Project would introduce structures and people to the Project site (construction workers and full-time operational employees) and could thus expose people and structures to seismic risks.

The Project site is within the highly seismic southern California region that is influenced by multiple faults, but it is not located within or near a State of California Alquist-Priolo Earthquake Fault Zone. The two largest faults in the region are the San Andreas Fault Zone (approximately 40 miles to the southwest) and the Garlock Fault (40 miles to the southeast). The nearest Holocene active faults identified by CGS are the Kern Front Fault approximately 1 mile northeast of the site and the Premier Fault approximately 3 miles to the northwest of the site. Due to the distance from the nearest active fault to the Project site, the potential for surface fault rupture is considered low.

Development would include two single-story logistics warehouses for a facility of approximately 923,130 square feet and associated improvements. The proposed facility would operate 24 hours a day, 365 days a year. The overall Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage, and logistics uses, up to 20% of the facility would be used for cold storage. The warehouses would serve trucks exclusively and

would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate any specialized storage, handling and distribution equipment for the various goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, tools, etc. that are typically found in a modern distribution/logistics facility and consistent with M-1 PD-H Zone District. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. building code, fire code, plumbing code, etc.). Outdoor storage is not proposed as part of this Project. Due to operations and product-handling occurring within the warehouse or on entirely paved surfaces that would have undergone sufficient geological surveying prior to buildout, Project-level impacts are not expected to increase impacts to a significant level and additional mitigation measures specific to product-type are not warranted.

Construction of the Project would be subject to all applicable ordinances of the Kern County Building Code (Chapter 17.08). Kern County has adopted the CBC 2016 Edition (California Code of Regulations Title 24). Adherence to all applicable regulations would ensure that Project structures comply with minimum standards related to structural strength and general stability. Based on the absence of any known active faults that cross or come anywhere near the Project site, and the Project's compliance with applicable ordinances of the Kern County Building Code, impacts related to fault rupture would be less than significant.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

Impacts would be less than significant.

Impact 4.7-2: The Project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking.

As stated previously, the Project is in a highly seismic region that could experience one or more substantive seismic events. The region is influenced by several fault systems, most notably the San Andreas and Garlock Fault systems, capable of generating strong ground motions that could affect the Project site and surrounding areas. Depending on the magnitude, distance to the source, and duration of shaking, damage to the buildings and injury to workers or visitors could result. Although the Project site is within a highly seismic region, it is unlikely the Project would directly or indirectly cause substantial adverse effects involving strong seismic ground shaking.

As stated previously, the Project is not on nor near a State of California Alquist-Priolo Earthquake Fault Zone. The nearest active faults, the San Andreas and Garlock Faults, are 40 miles southwest and 40 miles southeast away, respectively.

To mitigate any potential impacts, such as the risk of loss, injury, or death stemming from the Project, **Mitigation Measures 4.7-1** through **4.7-7** would be implemented along with Project compliance with applicable ordinances of the Kern County Building Code and the CBC.

Mitigation Measure MM 4.7-1 requires the Project proponent to limit grading to the minimum area necessary for construction. Prior to the initiation of construction, the Project proponent shall retain a California-registered professional engineer to approve the final grading of earthwork and foundation plans prior to construction. For **Mitigation Measure MM 4.7-2**, prior to the issuance of building or grading permits, the Project proponent shall conduct a full geotechnical study to evaluate soil conditions and submit the study to the Kern County Public Works Department for review and approval. **Mitigation Measure MM 4.7-3**, will require the Project proponent to retain a California-registered engineer to design the Project facilities to withstand probable seismically induced ground shaking at the site; the final design will need to be approved by the Kern County Inspection Department.

For **Mitigation Measure MM 4.7-4**, the building location will need to be stabilized against liquefication by dynamic compaction or another accepted soil stabilization method. **Mitigation Measure MM 4.7-5** will require a geotechnical evaluation to be approved by the Kern County Public Works Department prior to grading permits being issued to determine the appropriate engineering for foundations and support structures as well as building requirements. **Mitigation Measure MM 4.7-6** requires the Project proponent to minimize erosion to the greatest extent possible by using existing roads. Lastly, **Mitigation Measure MM 4.7-7** requires that the Project proponent's final grading plans include BMPs to limit on-site and off-site erosion, a water plan to treat disturbed areas during construction and reduce dust, and a plan for the disposal of drainage waters originating on site and from adjacent rights-of-way.

The buildings and additional site components would be constructed following all other applicable codes, such as those that require property line and public roadway setbacks to protect the public and on-site staff from potential hazards associated with the facilities that could result from an earthquake. Thus, adherence to Kern County Building Code requirements, the CBC, and **Mitigation Measures MM 4.7-1** through **MM 4.7-7** would ensure that seismic hazards would be minimized; impacts related to ground shaking would be less than significant.

Mitigation Measures

MM 4.7-1 The Project proponent shall limit grading to the minimum area necessary for construction. Prior to the initiation of construction, the project proponent shall retain a California registered professional engineer to approve the final grading earthwork and foundation plans prior to construction.

MM 4.7-2 Prior to the issuance of grading permits for the project, the Project proponent shall conduct a full geotechnical study to evaluate soil conditions on the Project site and submit it to the Kern County Public Works Department for review and approval.

The geotechnical study must be signed and stamped by a California-registered professional engineer and must, at minimum, identify the following:

a. Maximum considered earthquake and associated ground acceleration;

b. Potential for seismically induced liquefaction, landslides, differential settlement, and mudflows;

c. Stability of any existing or proposed cut-and-fill slopes; collapsible or expansive soils;

d. Foundation material type;

e. Recommendations for placement and design of facilities, foundations, and remediation of unstable ground.

f. The project proponent shall determine the final siting of project facilities based on the results of the geotechnical study and implement recommended measures to minimize geologic hazards. The project proponent shall not locate project facilities on or immediately adjacent to a fault trace. All structures shall be offset at least 100-feet from any mapped fault trace. Alternatively, a detailed fault trenching investigation may be performed to accurately locate the fault trace(s) to avoid sighting improvements on or close to these fault structures and to evaluate the risk of fault rupture. After locating the fault, accurate setback distances can be proposed.

g. The Kern County Public Works Department shall evaluate any final facility siting design developed prior to the issuance of any building permits to verify that geological constraints have been avoided.

MM 4.7-3 Prior to the issuance of grading permits, the project proponent shall retain a California registered engineer to design the project facilities to withstand probable seismically induced ground shaking at the site. All grading and construction on-site shall adhere to the specifications, procedures, and site conditions contained in the final design plans, which shall be fully compliant with the seismic recommendations of the California-registered professional engineer. The procedures and site conditions shall encompass site preparation, foundation specifications, and protection measures for buried metal. The final structural design shall be subject to approval and follow-up inspection by the Kern County Building Inspection Department. Final design requirements shall be provided to the on-site construction supervisor and the Kern County Building Inspector to ensure compliance.

MM 4.7-4 Building locations shall be stabilized against the occurrence of liquefaction by dynamic compaction, or other accepted soil stabilization method approved by the County Building official.

MM 4.7-5 Prior to the issuance of grading permits, a geotechnical evaluation, consisting of field exploration (drilling and soil sampling), laboratory testing of soil samples, and engineering analysis, shall be prepared to determine soil properties related, but not limited, to ground-motion acceleration parameters, the amplification properties of the subsurface units at the specific site, the potential for hydrocompaction to

affect the proposed facilities, and the potential for collapsible, subsiding, or expansive soils to affect the proposed facilities.

These studies shall be used to determine the appropriate engineering for foundations and support structures as well as building requirements to minimize geotechnical hazard impacts. Copies of all analyses shall be submitted to the Kern County Public Works Department for review and approval. An approved copy of the evaluation shall be submitted to the Kern County Planning and Natural Resources Department.

MM 4.7-6 The Project proponent shall use existing roads to the greatest extent feasible to minimize erosion.

Prior to approval of the grading permit, final plans shall be reviewed and approved by the Kern County Public Works Department to confirm existing roads were used to the greatest extent feasible.

MM 4.7-7 The project proponent shall limit grading to the minimum area necessary for construction and operation of the project. Final grading plans shall include best management practices (BMPs) to limit on-site and off-site erosion, a water plan to treat disturbed areas during construction and reduce dust, and a plan for the disposal of drainage waters originating on-site and from adjacent rights-of-ways (if required).

The plans shall be submitted to the Kern County Public Works Department for review and approval.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.7-1** through **MM 4.7-7** impacts would be less than significant after mitigation.

Impact 4.7-3: The Project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death, involving seismic-related ground failure, including liquefaction.

Seismically induced ground failure and liquefaction occur when loose, water-saturated sediments of relatively low density are subjected to cyclic shaking that causes soils to lose strength or stiffness because of increased pore water pressure. Liquefaction generally occurs when the depth to groundwater is less than 50 feet. Based on a review of the available groundwater level data between approximately 1969 and 2011, groundwater ranged from approximately 130 to 500 feet below the ground surface. Furthermore, the Project is not in a current, mapped California Liquefaction Hazard Zone. Structures constructed as part of the Project would be required by State law to be constructed in accordance with all applicable CBC earthquake construction standards, including those relating to soil characteristics.

Due to the existing geotechnical conditions and the historical depth to groundwater, the potential for liquefaction is considered unlikely according to the geotechnical evaluation undertaken for the Project (Appendix F.1). Project conformance with building code requirements would reduce the potential for liquefaction to affect the Project.

The overall Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage, and logistics uses, with a secondary application of cold storage occupying up to 20% of the facility. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage and distribution for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, and tools typically found in a modern distribution/logistics facility consistent with the M-1 PD-H Zone District. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (for example, building code, fire code, and plumbing code). Outdoor storage is not proposed as part of this Project. Due to operations and product handling occurring within the warehouse or on entirely paved surfaces that would have undergone sufficient geological surveying for the potential of liquefaction prior to occupancy, Project-level impacts are not expected to increase impacts to a significant level and additional mitigation measures specific to product-type are not warranted. Therefore, impacts would be less than significant.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

Less than significant.

Impact 4.7-4: The Project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death, involving landslides.

As noted previously, the Project site lies within the central portion of unincorporated Kern County, California. The Project site is approximately 1.7 miles north of the incorporated City of Bakersfield and approximately 3.1 miles east of the incorporated City of Shafter. Most of the site is relatively flat with topographic relief on the order of approximately 50 feet. The elevation of the Project site ranges between approximately 495 feet above mean sea level to approximately 540 feet with a gentle northeasterly slope. Given the relatively flat terrain for Project components, the potential for landslides on the Project site is considered low.

The overall Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage, and logistics uses, with a secondary application of cold storage occupying up to 20% of the facility. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage and distribution for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts,

materials, tires, tools, etc. typically found in a modern distribution/logistics facility consistent with M-1 PD-H Zone District. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (for example, building code, fire code, and plumbing code). Outdoor storage of bulk and wholesale materials is not proposed as part of this Project. Due to operations and product-handling occurring within the warehouse or on entirely paved surfaces that would have undergone sufficient geological surveying for the potential of landslides prior to buildout, Project-level impacts are not expected to increase impacts to a significant level and additional mitigation measures specific to product-type are not warranted.

Therefore, adverse effects related to landslides are not anticipated to occur or pose a hazard to the Project or surrounding area, and there would be no impact.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

No impact.

Impact 4.7-5: The Project would result in substantial soil erosion or the loss of topsoil.

Site preparation activities for the Project would include grading activities that would disturb surface soils. Construction of the Project sites would involve earth-disturbing activities that could expose soils to the effects of wind or water erosion. Although the Project site consists of relatively flat topography and would not involve substantive cut and fill operations, earthmoving and construction activities could loosen soil, and removing existing minimal vegetation could contribute to soil loss and erosion.

Vegetation clearing and grading activities could lead to exposed or stockpiled soils susceptible to peak stormwater runoff flows and wind forces. During rainfall events, particularly during construction activities when surface soils are exposed, there is the potential for increased surface erosion and sediment transport and subsequent deposition to off-site areas. Project grading would be minimized to the extent feasible to reduce unnecessary soil movement that may result in the increased loss of topsoil. Scrapers, excavators, dozers, water trucks, haul vehicles, and/or graders may be used in site preparation and some trenching would be required for installation of the underground cables and circuits on-site. These activities would increase the potential for erosion to occur.

Project operations regarding the facility are not expected to contribute to soil erosion because most operations will be performed in one of the two buildings on-site. The overall Project's primary function would be high cube transload warehouse storage to facilitate material handling equipment, storage and logistics uses, with a secondary application of cold storage occupying up to 20% of the facility. The warehouses would serve trucks exclusively and would require truck doors of various

types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage and distribution for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, tools typically found in a modern distribution/logistics facility consistent with M-1 PD-H Zone District. Outdoor storage of bulk and wholesale materials is not proposed as part of this Project. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (that is, building code, fire code, and plumbing code, etc.). Due to operations and product handling occurring within the warehouse or on entirely paved surfaces that would have undergone sufficient geological surveying for the potential of soil erosion prior to buildout, Project-level impacts are not expected to increase impacts to a significant level and additional mitigation measures specific to product-type are not warranted. Project operations would not entail on-going ground disturbance.

While construction would have the potential to increase erosion, as discussed in Section 4.10, *Hydrology and Water Quality*, the Project would implement **Mitigation Measure MM 4.10-1,** that requires preparation of a SWPPP. The development of required SWPPP and BMPs, would be informed by the final hydrologic study and drainage plan. The SWPPP would be prepared and implemented per the requirements of Kern County for Projects that disturb more than 1 acre of soil. The SWPPP would detail that existing vegetation and topography are to be preserved to the maximum extent possible. These documents would include drainage and erosion controls designed to minimize potential increases in runoff from the Project site following Project implementation. This would include an evaluation and recommendation to minimize the potential for erosion and sedimentation to carry materials off site. Engineering recommendations would include measures to offset increases in stormwater runoff, as well as identification of design measures to minimize or manage potential flow concentrations or changes in flow depths or velocity so as to minimize erosion, sedimentation, and flooding potential on site or off site.

The SWPPP would also specify various types of BMPs including erosion control BMPs to prevent soil from moving off site; all temporary erosion control measures required by the Kern County Grading Code (Chapter 17.28.140) would be incorporated into the SWPPP. Preparation of the erosion control plans would be informed by the geotechnical report that would include evaluation of soils. This information would be used to prepare the grading plans and perform drainage calculations pursuant to the Kern County Grading Code (Section 17.28.070). All materials related to the SWPPP would be submitted to the Kern County Engineering and Survey Services Department prior to approval and obtaining required grading permits.

The Project would implement **Mitigation Measure MM 4.7-7**, as described above, and **Mitigation Measure MM 4.7-8**, which requires the preparation of a Soil Erosion and Sedimentation Control Plan to mitigate potential loss of soil and erosion. As a result, Project construction would have less than significant impacts related to erosion.

Mitigation Measures

Implement **Mitigation Measure MM 4.10-1** (Section 4.10, *Hydrology and Water Quality*), **Mitigation Measure MM 4.7-7**, and:

MM 4.7-8 The Project proponent shall prepare a Soil Erosion and Sedimentation Control Plan to mitigate potential loss of soil and erosion. The plan shall be prepared by a California registered civil engineer or other professional approved to prepare said Plan and submitted for review and approval by the Kern County Public Works Department prior to issuance of grading permits. The Soil Erosion and Sedimentation Control Plan shall include, but is not limited to, the following:

a. Best Management Practices to minimize soil erosion consistent with Kern County grading requirements and the California Regional Water Quality Control Board requirements pertaining to the preparation and approval of a Stormwater Pollution Prevention Plan (Best Management Practices recommended by the Kern County Public Works Department shall be reviewed for applicability).

b. Sediment collection facilities as may be required by the Kern County Public Works Department;

c. A timetable for full implementation, estimated costs, and a surety bond or other security as approved by the County; and

d. Other measures required by the County during permitting, including long-term monitoring (post-construction) of erosion control measures until site stabilization is achieved.

e. Provisions to comply with local and state codes relating to drainage and runoff, including use of pervious pavements, and/or other methods to the extent feasible, to increase stormwater infiltration and reduce runoff onto agricultural lands.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.7-8**, impacts would be less than significant.

Impact 4.7-6: The Project would be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse.

Landslides

As described above, the Project is in a relatively flat-lying plain where landslides are not anticipated due to the absence of steep slopes. Therefore, adverse effects related to landslides would not pose a hazard to the Project or surrounding area and there would be no impact.

Lateral Spreading

Due to the low potential for liquefaction, the depth of groundwater, and because the Project site is not near free faces or bodies of water, the potential for impacts due to lateral spreading is considered low but will be evaluated in the geotechnical report to be prepared for the Project.

This site-specific exploration would be included as part of the design level geotechnical investigation. The subsurface data would be used to complete the final design of the Project and associated structures in consultation with the County in a manner that meets applicable State and County building, grading and construction codes, ordinances, and standards. Therefore, as required, the geologic hazards, including liquefaction, collapse and subsidence, would be fully evaluated and based on the conclusions of the report, site-specific design would be implemented that would minimize geologic hazard-related impacts. Impacts would be less than significant.

Subsidence

As discussed previously, the soils at the Project site did not generally indicate the presence of soils susceptible to collapse or excessive settlement. Furthermore, based on the geotechnical evaluation (Appendix F.1) and based on the local site geologic conditions, the potential for subsidence in the site development area is considered low. The full geotechnical study required by **Mitigation Measure MM 4.7-2** would be prepared for the Project to identify and resolve any soil conditions including subsidence. Based on the conclusions of the report, recommended mitigation measures would be implemented to minimize this geologic hazard-related impact. Impacts would be less than significant.

Liquefaction

As discussed in **Impact 4.7-3**, above, liquefaction potential is anticipated to be low, but this would be formally evaluated in the subsequent geotechnical report. Based on the conclusions of the report, recommended mitigation measures would be implemented to minimize this geologic hazard. Impacts would be less than significant.

The overall Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage, and logistics uses, with a secondary application of cold storage occupying up to 20% of the facility. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage and distribution for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, and tools typically found in a modern distribution/logistics facility consistent with M-1 PD-H Zone District. Outdoor storage of bulk and wholesale materials is not proposed as part of this Project. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (that is, building code, fire code, and plumbing code, etc.). Due to operations and product handling occurring within the warehouse or on entirely paved surfaces that would have undergone sufficient geological surveying prior to occupancy, Project-level impacts are not expected to increase impacts to a significant level and additional mitigation measures specific to product type are not warranted.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

Impacts would be less than significant.

Impact 4.7-7: The Project would be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

Expansive soils are fine-grained soils (generally high plasticity clays) that can undergo a significant increase in volume with an increase in water content and a significant decrease in volume with a decrease in water content. Changes in the water content of a highly expansive soil can result in severe distress to structures constructed on or against the soil. The shrink–swell patterns of expansive soils can damage Project improvements over time if not addressed appropriately before construction.

To understand the soil types on the Project site, LGC excavated 15 small-diameter borings ranging in depth from approximately 5 feet to 50 feet below existing grade; performed in situ field infiltration tests within Borings I-5 through I-18; and performed laboratory testing of select samples. The subsurface evaluations indicated that the site primarily contains medium-dense to dense sands with varying amounts of silts and stiff to hard silts and clays to the maximum explored depth of approximately 50 feet below the existing grade. Based on laboratory testing results, site soils are anticipated to have a "Very Low" expansion potential. It is recommended that the final expansion potential of site soils should be determined when grading is complete. Results of expansion testing at finish grades will be used to confirm the final foundation design.

Mitigation Measure MM 4.7-2 requires that a geotechnical study to evaluate soil conditions and geologic hazards including an evaluation for expansive soils and provide recommendations consistent with CBC requirements to reduce potential adverse effects from expansive soils and the shrink–swell pattern potential be performed by a qualified geotechnical engineer on the Project site. All grading and construction on site would adhere to the specifications, procedures, and site conditions contained in the final design plans, which would be fully compliant with the recommendations provided by the California-registered professional engineer in accordance with California and Kern County Building Code requirements. The required measures would encompass site preparation such as treatment of expansive soils or replacement with engineered fill.

The final designs would be subject to approval and follow-up inspection by the Kern County Building Inspection Department. Final design requirements would be provided to the onsite construction supervisor and the Kern County Building Inspector to ensure compliance. Therefore, with implementation of **Mitigation Measure MM 4.7-2**, impacts would be less than significant.

Mitigation Measures

Implement **Mitigation Measure MM 4.7-2**, as described above.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.7-2**, impacts would be less than significant.

Impact 4.7-8: The Project would have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater.

Development of septic systems or alternative wastewater disposal systems is not proposed as a part of the Project. The Project proponent has secured a will serve letter from the North of River Sanitary District confirming the Project site can connect to the District's sewer system (Appendix H.3). Furthermore, the Project's primary function as a warehouse and distribution facility may require modifications to the interior design and would be subject to tenant improvements in order to accommodate specialized storage for a variety of products as described above. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (that is, building code, fire code, and plumbing code, etc.) as outdoor storage is not proposed as part of this Project. The installation of septic tanks or alternative wastewater disposal systems is not expected to be part of the proposal to accommodate specific goods and materials. Thus, no impact would occur.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

No impact would occur.

Impact 4.7-9: The Project would directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, as defined in CEQA Guidelines Section 15064.

The results of the records search and the literature review indicate that the Project area is situated upon exposures of Pleistocene-age alluvium, which has a high potential to contain significant, nonrenewable fossil remains, especially in undisturbed subsurface sediments (Appendix F.2). Similar sediments are known to have yielded significant fossils elsewhere in Southern California. Past agricultural activities and earth-moving operations in the Project area have left the surface sediments extensively disturbed, but earth-moving operations at depth may potentially disrupt paleontological remains. The high paleontological resource potential of the Tulare Formation suggests that construction of the Project may result in impacts on paleontological resources.

If encountered, disturbance of significant fossils would result in a potentially significant impact on paleontological resources. However, the implementation of **Mitigation Measure MM 4.7-9** through **MM 4.7-11** would require the Project proponent to retain a qualified paleontologist to carry out all mitigation measures related to paleontological resources. A qualified paleontological monitor would be required during all ground-disturbing activity that occurs at a depth of 5 feet or

deeper below ground surface, and appropriate treatment of accidentally uncovered paleontological resources. Therefore, impacts on paleontological resources would be reduced to less than significant.

Mitigation Measures

MM 4.7-9 Prior to the issuance of grading permits, the project proponent shall retain a qualified Paleontologist, defined as a Paleontologist meeting the Society for Vertebrate Paleontology's Professional Standards (Society for Vertebrate Paleontology 2010), to carry out all mitigation measures related to paleontological resources. The qualified Paleontologist and the Lead Archaeologist may be the same individual:

a. Prior to the start of any ground-disturbing activities, the qualified paleontologist shall prepare a Paleontological Resources Awareness Training program for all construction personnel working on the proposed project. A Paleontological Resources Awareness Training Guide approved by the qualified paleontologist shall be provided to all personnel. A copy of the Paleontological Resources Awareness Training Guide shall be submitted to the Kern County Planning and Natural Resources Department. The training guide may be presented in video form.

b. Paleontological Resources Awareness Training may be conducted in conjunction with the archaeological resources training.

c. The training shall include an overview of potential paleontological resources that could be encountered during ground-disturbing activities to facilitate worker recognition, avoidance, and subsequent immediate notification to the qualified Paleontologist for further evaluation and action, as appropriate; and penalties for unauthorized fossil collecting or intentional disturbance of paleontological resources.

d. The project applicant shall ensure all new on-site construction personnel who have not participated in earlier Paleontological Resources Awareness Trainings shall meet the provisions specified above.

e. The Paleontological Resources Awareness Training Guides shall be kept available for all personnel to review and be familiar with as necessary.

MM 4.7-10 During construction the qualified Paleontologist or designated monitor shall monitor all ground-disturbing activity (with the exception of vibratory or hydraulic installation of tracking or mounting structures and foundations or supports) that occurs at a depth of 5 feet or deeper below ground surface:

a. The duration and timing of monitoring shall be determined by the qualified Paleontologist in consultation with the Kern County Planning and Natural Resources Department and shall be based on a review of geologic maps and grading plans.

1. During the course of monitoring, if the paleontologist can demonstrate based on observations of subsurface conditions that the level of monitoring should be reduced, the Paleontologist, in consultation with the Kern County Planning and Natural Resources Department, may adjust the level of monitoring to circumstances, as warranted.

b. Paleontological monitoring shall include inspection of exposed rock units during active excavations within sensitive geologic sediments. The qualified Paleontologist shall have authority to temporarily divert excavation operations away from exposed fossils to collect associated data and recover the fossil specimens if deemed necessary.

c. Following the completion of monitoring, the paleontologist shall prepare a report documenting the absence or discovery of fossil resources on-site. If fossils are found, the report shall summarize the results of the inspection program, identify those fossils encountered, recovery and curation efforts, and the methods used in these efforts, as well as describe the fossils collected and their significance. A copy of the report shall be provided to the Kern County Planning and Natural Resources Department and to an appropriate repository such as the Natural History Museum of Los Angeles County.

MM 4.7-11 If a paleontological resource is found, the project contractor shall cease ground-disturbing activities within 50 feet of the find. The qualified Paleontologist shall evaluate the significance of the resources and recommend appropriate treatment measures. At each fossil locality, field data forms shall be used to record pertinent geologic data, stratigraphic sections shall be measured, and appropriate sediment samples shall be collected and submitted for analysis. Any fossils encountered and recovered shall be cataloged and donated to a public, non-profit institution with a research interest in the materials. Accompanying notes, maps, and photographs shall also be filed at the repository.

Level of Significance After Mitigation

With the implementation of **Mitigation Measure MM 4.7-9** through **MM 4.7-11,** impacts would be less than significant.

4.7.5 Cumulative Setting Impacts and Mitigation Measures

Cumulative Setting

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects in the vicinity of the Project site. Cumulative projects listed in **Table 3-4**, Cumulative

Projects List, would be subject to relatively similar seismic hazards of the Project. However, the effects of these Projects are not of a nature to cause cumulatively significant effects from geologic impacts or on soils because such impacts are site-specific and would only have the potential to combine with impacts of the Project if they occurred in the same location as the Project.

Development of the Project, with the implementation of the regulatory requirements discussed above, would result in less than significant impacts related to exposing persons or structures to geology, soils, or seismic hazards.

Although the entire region is a seismically active area, geologic and soil conditions vary widely within a short distance, making the cumulative context for potential impacts resulting from exposing people and structures to related risks one that is more localized or even site-specific. Similar to the Project, other projects in the area would be required to adhere to the same California and Kern County building codes, which would reduce the risk to people and property to less-than-significant levels. While future seismic events cannot be predicted, adherence to all federal, State, and local programs, requirements, and policies pertaining to building safety and construction would limit the potential for injury or damage to a less than significant level. Therefore, the Project, combined with past, present, and other foreseeable development in the area, would not result in a cumulatively significant impact by exposing people or structures to risk related to geologic hazards, soils, and/or seismic conditions. The Project would result in less than significant cumulative impacts related to geology and soils.

Mitigation Measure MM 4.7-1 requires the Project proponent to limit grading to the minimum area necessary for construction. Prior to the initiation of construction, the Project proponent shall retain a California-registered professional engineer to approve the final grading earthwork and foundation plans before construction. **Mitigation Measure MM 4.7-2** requires a geotechnical study to evaluate soil conditions and geologic hazards to be performed by a qualified geotechnical engineer on the Project site and to design the Project facilities to withstand probable seismically induced ground shaking, liquefaction and subsidence. Surficial deposits, namely erosion and sediment deposition, can be cumulative in nature, depending on the type and amount of development proposed in a given geographical area. The cumulative setting for soil erosion consists of existing, planned, proposed, and reasonably foreseeable land use conditions in the region. However, construction constraints are primarily based on specific sites within a proposed development and soil characteristics and topography of each site. Erosion impacts of the Project during construction would be mitigated through the implementation of a SWPPP and appropriate BMPs, as required by **Mitigation Measure MM 4.10-1**, as discussed in Section 4.10, *Hydrology and Water Quality*. Other individual Projects also would be required to comply with applicable codes, standards, and permitting requirements (for example, preparation of a SWPPP) to mitigate erosion impacts. Other cumulative Projects would be required to adhere to similar requirements, thereby minimizing cumulative erosion impacts. Specifically, all planned Projects in the vicinity of the Project are subject to environmental review and would be required to conform to the Kern County General Plan and Building Code and would implement additional mitigation of seismic hazards to ensure soil stability, especially related to seismically induced erosion. With the implementation of **Mitigation Measures MM 4.7-2** and **MM 4.10-1** (Section 4.10, *Hydrology and Water Quality*), the Project would not contribute to any cumulative impacts for geologic, seismic

hazards or related events. Cumulative impacts related to geology and soils would be less than significant.

The geographic scope for cumulative effects to paleontological resources includes the southern portion of the San Joaquin Valley. Given similarities in geologic formations, this area is expected to contain similar paleontological resources. There is no temporal scope because direct impacts on paleontological resources are permanent. Cumulative impacts on paleontological resources in the study area could occur if other related projects, in conjunction with the Project, had or would have impacts on paleontological resources that, when considered together, would be significant. Development of the Project, in combination with other projects in the area, has the potential to contribute to a cumulatively significant paleontological resources impact due to the potential loss of paleontological resources unique to the region.

However, **Mitigation Measures MM 4.7-9** through **4.7-11** are included in this Draft EIR to reduce potentially significant Project impacts on paleontological resources during construction of the Project. Implementation of **Mitigation Measure MM 4.7-2** requires a final engineering design-specific geotechnical study to be prepared. Implementation of **Mitigation Measure MM 4.7-3** requires a California-registered engineer to design the Project facilities to withstand probable seismically induced ground shaking at the site. **Mitigation Measure MM 4.7-4** would require all building locations to be stabilized against the occurrence of liquefaction, **Mitigation Measure MM 4.7-5** would require a geotechnical evaluation to determine appropriate engineering for foundations and support structures, **Mitigation Measure MM 4.7-6** would require the use of existing roads to the greatest extent possible, **Mitigation Measure MM 4.7-7** would require the Project to limit grading and incorporate BMPs to reduce erosion, and **Mitigation Measure MM 4.7-8** would require the preparation of a Soil Erosion and Sedimentation Control Plan. Given the above mitigation measures and the requirement for similar mitigation for other Projects in the San Joaquin Valley, cumulative impacts on geology would be less than significant.

Mitigation Measures

Implement **Mitigation Measures MM 4.7-1** through **4.7-11**, as described above, and **Mitigation Measure MM 4.10-1**, see Section 4.10, *Hydrology and Water Quality*.

Level of Significance after Mitigation

Cumulative impacts would be less than significant with the implementation of **Mitigation Measures MM 4.7-1** through **4.7-11**, as described above, and **Mitigation Measure MM 4.10-1**.

Section 4.8

Greenhouse Gas Emissions

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Section 4.8

Greenhouse Gas Emissions

4.8.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding greenhouse gas (GHG) emissions and global climate change. It also evaluates the impacts on GHG that would result from the implementation of the proposed IPG Industrial Project (Project), and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the May 23, 2024, Airport Drive Warehouse Greenhouse Gas Analysis prepared by Urban Crossroads, Inc. (Appendix B.3).

4.8.2 Environmental Setting

GHGs and climate change are a cumulative global issue. The California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA) regulate GHG emissions within the State of California and the United States, respectively. While CARB has the primary regulatory responsibility within California for GHG emissions, local agencies can also adopt policies for GHG emission reduction. CARB has divided California into regional air basins. The Project is located within Kern County's (County's) portion of the San Joaquin Valley Air Basin (SJVAB). Kern County is included among the eight counties that make up the San Joaquin Valley Air Pollution Control District (SJVAPCD).

Global Climate Change

"Global climate change," often used interchangeably with "global warming," refers to changes in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation, and storms, lasting for decades or longer. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF_3), and sulfur hexafluoride (SF_6). These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the earth's atmosphere, but prevent radiative heat from escaping, thus warming the earth's atmosphere. Global climate change can occur naturally as it has in the past with the previous ice ages.

Gases that trap heat in the atmosphere are often referred to as GHGs. GHGs are released into the atmosphere by both natural and anthropogenic activity. According to the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report, the global surface temperature in 2011–2020 increased 1.1 degrees Celsius (°C) above the 1850–1900 temperature (IPCC 2023). Global GHG emissions continued to increase over 2010–2019, with unequal historical and ongoing contributions

arising from unsustainable energy use, land use and land use change, lifestyles and patterns of consumption and production across regions, between and within countries, and between individuals. The IPCC's *Sixth Assessment Report* states that it is unequivocal that human influence has warmed the atmosphere, ocean and land, resulting in widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere (IPCC 2023).

An individual project, like the Project, cannot generate enough GHG emissions to affect a discernible change in global climate. However, the Project may participate in the potential for global climate change by its incremental contribution of GHGs combined with the cumulative increase of all other sources of GHGs, which when taken together constitute potential influences on global climate change.

Greenhouse Gases

Constituent gases that trap heat in the earth's atmosphere are called GHGs, analogous to the way a greenhouse retains heat. GHGs play a critical role in Earth's radiation budget by trapping infrared radiation emitted from the Earth's surface, which would otherwise escape into space. This natural phenomenon, known as the "greenhouse effect," is therefore responsible for maintaining a habitable climate.

The standard definition of GHGs includes six substances identified in the Kyoto Protocol – CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6—plus chlorofluorocarbons (CFCs) and other chlorine or bromine-containing gases phased out under the Montreal Protocol.

Some GHGs, including CO_2, CH_4, and N_2O, are present in the atmosphere naturally, released by natural sources, or formed from secondary reactions taking place in the atmosphere. In the last 200 years, substantial quantities of GHGs have been released into the atmosphere, primarily from fossil fuel combustion. These human-induced emissions are increasing GHG concentrations in the atmosphere, therefore enhancing the natural greenhouse effect. The GHGs resulting from human activity are believed to be causing global climate change. While human-made GHGs include naturally present substances like CO_2, CH_4, and N_2O, some (like CFCs) are completely new to the atmosphere.

GHGs vary considerably in terms of global warming potential (GWP), the comparative ability of each GHG to trap heat in the atmosphere. The GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and the length of time that the gas remains in the atmosphere (atmospheric lifetime). The GWP of each gas is measured relative to CO_2, the most abundant GHG. The definition of GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to the ratio of heat trapped by one unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of pounds or tons of "CO_2 equivalents" (CO_2e).

The principal GHGs resulting from human activity that enter and accumulate in the atmosphere are described below.

- **Carbon Dioxide (CO_2)** is a colorless, odorless gas emitted from natural and human-made sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include: the burning of coal, oil, natural gas, and wood. CO_2 is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks. Since the Industrial Revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution.
- **Methane (CH_4)** is a colorless, odorless nontoxic gas with both natural and human-made sources. CH_4 is combustible, and it is the main constituent of natural gas—a fossil fuel. CH_4 is also released when organic matter decomposes in low oxygen environments. Natural sources include wetlands, swamps and marshes, termites, and oceans. Human sources include the mining of fossil fuels and transportation of natural gas, digestive processes in ruminant animals such as cattle, rice paddies, and the buried waste in landfills. Over the last 50 years, human activities, such as growing rice, raising cattle, using natural gas, and mining coal, have added to the atmospheric concentration of CH_4. Other anthropogenic sources include fossil fuel combustion and biomass burning.
- **Nitrous Oxide (N_2O)** is a colorless, nonflammable gas with a sweetish odor, commonly known as "laughing gas," and sometimes used as an anesthetic. N_2O is naturally produced in the oceans and in rainforests. Human-made sources of N_2O include the use of fertilizers in agriculture, nylon and nitric acid production, cars with catalytic converters, and the burning of organic matter. Concentrations of N_2O also began to rise at the beginning of the Industrial Revolution.
- **Chlorofluorocarbons (CFCs)** are gases formed synthetically by replacing all hydrogen atoms in CH_4 or ethane with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface). CFCs have no natural source but were first synthesized in 1928. They were used for refrigerants, aerosol propellants, and cleaning solvents. Because of the discovery that they can destroy stratospheric ozone, an ongoing global effort to halt their production was undertaken and has been extremely successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.
- **Sulfur Hexafluoride (SF_6)** is an inorganic, odorless, colorless, nontoxic, nonflammable gas and extremely potent GHG. SF_6 is very persistent, with an atmospheric lifetime of more than a thousand years. Thus, a relatively small amount of SF_6 can have a significant long-term impact on global climate change. SF_6 is human-made, and the primary user of SF_6 is the electric power industry. Because of its inertness and dielectric properties, it is the industry's preferred gas for electrical insulation, current interruption, and arc quenching (to

prevent fires) in the transmission and distribution of electricity. SF_6 is used extensively in high-voltage circuit breakers and switchgear, and in the magnesium metal casting industry.

- **Hydrofluorocarbons (HFCs)** are synthesized chemicals that are used as a substitute for CFCs. Out of all of the GHGs, HFCs are one of three groups with the highest GWP. HFCs are synthesized for applications such as automobile air conditioners and refrigerants.
- **Perfluorocarbons (PFCs)** have stable molecular structures and do not break down through the chemical processes in the lower atmosphere. Because of their molecular stability, PFCs have very long lifetimes, between 10,000 and 50,000 years. The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

CO_2, CH_4, and N_2O are the primary contributors to global climate change from development projects, such as the Project. The potential health effects from exposure to CO_2, CH_4, and N_2O as they relate to development projects are still being debated in the scientific community. Their cumulative effects on global climate change have the potential to cause adverse effects to human health.

Greenhouse Gas Emissions Sources and Inventories

History

In the first part of the twentieth century, it was suspected that the concentration of atmospheric CO_2 might be increasing in the atmosphere due to fossil fuel combustion. However, there were relatively few measurements of this gas and the measurements varied widely.

In 1953 Charles (Dave) David Keeling began a postdoctoral position at Caltech, Pasadena, California under Professor Harrison Brown. His initial project was aimed at extracting uranium from granite rock with applications in the nuclear power industry. He never really started this project but with encouragement from Professor Brown became involved in another project investigating the equilibria between carbonate in surface waters, limestone, and atmospheric CO_2. This involved the construction of a precision gas manometer to measure CO_2 extracted from the air as well as acidified samples of water.

Dave Keeling found significant variations in CO_2 concentration in Pasadena, probably due to industry, and later took his sampling equipment to Big Sur near Monterey. There he began to take air samples throughout the day and night and soon detected an intriguing diurnal pattern. The air contained more CO_2 at night than during the day and after correcting for the effects of water vapor, had about the same amount of CO_2 every afternoon, 310 parts per million (ppm). He used stable isotope ratio mass spectrometry measurements of the CO_2 he extracted to show that the 13C/12C ratio in CO_2 at night was smaller than during the day and a function of plant respiration.

He repeated these measurements in the rainforests of the Olympic peninsula and high mountain forests in Arizona. Everywhere the data were the same: strong diurnal behavior with steady values of about 310 ppm in the afternoon. The explanation for the results came from a book on meteorology describing diurnal patterns in turbulence in the atmosphere. In the afternoon Dave Keeling was measuring CO_2 concentrations representative of the “free atmosphere,” concentrations

that prevailed over a large part of the Northern Hemisphere. At nighttime with a lower boundary layer, the CO_2 concentration was heavily influenced by respiration from local plants and soils.

Little did Dave Keeling know then that he had laid the basis for his notable career investigating the global behavior of atmospheric CO_2.

In 1956 Dave Keeling's measurements came to the attention of Harry Wexler at the U.S. Weather Bureau and Roger Revelle at Scripps Institution of Oceanography. To both these organizations he proposed a global program based on infrared gas analyzers to measure the atmospheric CO_2 concentration at several remote locations around the world including the South Pole station and at Mauna Loa in Hawaii. The proposal was supported by and became one of the features of the International Geophysical Year (IGY) beginning in July 1957 and ending in December 1958.

Using IGY funds from the Weather Bureau, Dave Keeling bought four infrared gas analyzers from the Applied Physics Corporation. One of these was installed at Mauna Loa in March 1958 and on the first day of operation recorded an atmospheric CO_2 concentration of 313 ppm.

To Dave Keeling's surprise, however, the CO_2 concentration at Mauna Loa had risen by 1ppm in April 1958 to a maximum in May when it began to decline reaching a minimum in October. After this, the concentration increased again and repeated the same seasonal pattern in 1959. In Dave Keeling's words, "We were witnessing for the first time nature's withdrawing CO_2 from the air for plant growth during summer and returning it each succeeding winter." In 1959 the average concentration had increased and increased still further in 1960 as shown in the graph.

Dave Keeling's analytical skills and dedication had paid off with two dramatic discoveries: First, the natural seasonal "breathing" of the planet, and second, the rise in atmospheric CO_2 due to the combustion of fossil fuels by industry and land use changes. Published in the 1960 Tellus Article, "The concentration and isotopic abundances of carbon dioxide in the atmosphere" (Keeling 1960), these significant findings marked the beginning of the now world-famous "Keeling Curve" which extends for 55 years and represents one of the most important geophysical records ever made.

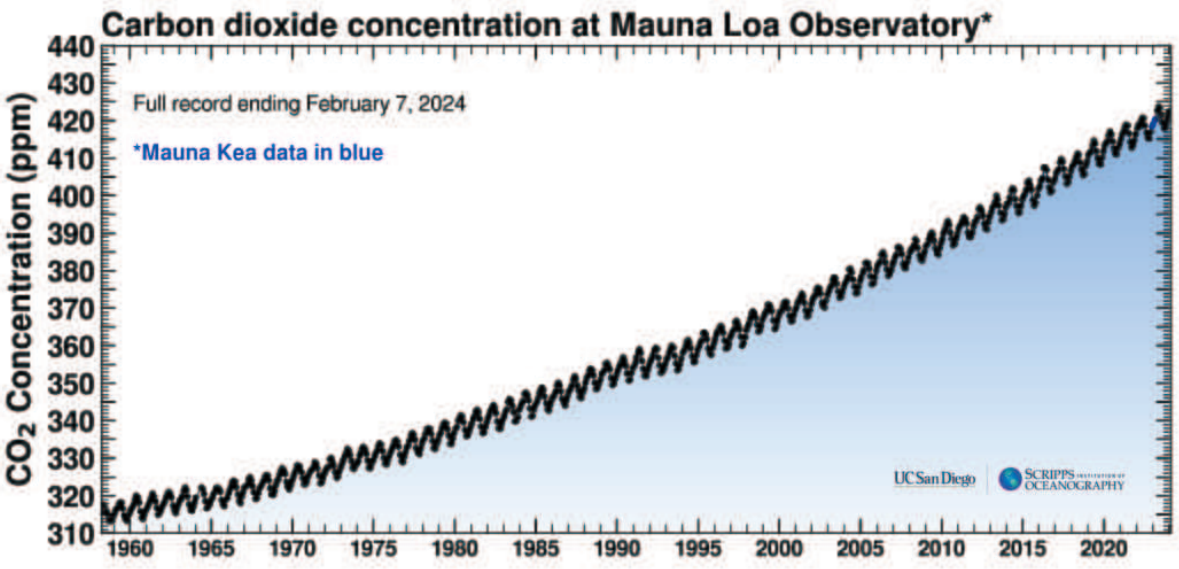
By the early 1970s, this curve was getting serious attention and played a key role in launching a research program into the effect of rising CO_2 on climate. Since then, the rise has been relentless and shows a remarkably constant relationship with fossil fuel burning and can be well accounted for based on the simple premise that 57% of fossil fuel emissions remain airborne.

The Mauna Loa record can now be placed in the context of the variations in CO_2 over the past 400,000 years, based on reconstructions from polar ice cores. During ice ages, the CO_2 levels were around 200 ppm, and during the warmer interglacial periods, the levels were around 280 ppm.

Looking ahead, if the rate of fossil fuel burning continues to rise on a business-as-usual trajectory, such that humanity exhausts the reserves over the next few centuries, CO_2 will continue to rise to levels of order 1,500 ppm. The atmosphere will not return to preindustrial levels even tens of thousands of years into the future. Based on this trend, it is clear that humanity is on the threshold of a new era of geologic history, one with a climate very different from that of humanity's ancestors. These curves not only demonstrate the implications of rising CO_2 levels but also illustrate the power

of continuous time series to communicate and clarify the essential science as shown on **Figure 4.8-1**.

Figure 4.8-1: Keeling Curve Diagram



Sources and Emissions

On a global scale, GHG emissions are predominantly associated with activities related to energy production; changes in land use, such as deforestation and land clearing; industrial sources; agricultural activities; transportation; waste and wastewater generation; and commercial and residential land uses. Worldwide, energy production including the burning of coal, natural gas, and oil for electricity and heat is the largest single source of global GHG emissions.

The EPA releases an annual GHG inventory that tracks U.S. GHG emissions and sinks by source, economic sector, and GHG going back to 1990. In 2022, U.S. GHG emissions totaled 6,343.2 million metric tons (MMT) of CO_2e, or 5,489.0 MMT CO_2e after accounting for sequestration (also referred to as "storage"; these terms are used synonymously throughout the regulatory landscape) from the land sector. Overall, net emissions increased by 1.3% from 2021 to 2022 and decreased by 16.7% from 2005 levels. In 2022, CO_2 emissions from fossil fuel combustion were 4,699.4 MMT CO_2e, or 1.1% below emissions in 1990. The transportation sector accounted for 28.4% of 2022 GHG emissions, the electric power industry accounted for 24.9%, the industrial sector accounted for 22.9%, commercial and residential accounted for 13.5%, and agriculture accounted for 10% (EPA 2024).

CARB is responsible for developing and maintaining the California GHG emissions inventory. This inventory estimates the amount of GHG emitted into and removed from the atmosphere by human activities within the state of California and supports the Assembly Bill (AB) 32 Climate Change Program. CARB's current GHG emission inventory covers the years 2000 through 2021 and is based on fuel use, equipment activity, industrial processes, and other relevant data (for example, housing, landfill activity, and agricultural lands).

In 2021, statewide GHG emissions (in-state sources and imported electricity) were 381.3 MMT CO_2e, which is 12.6 MMT CO_2e higher than 2020 levels and 49.7 MMT CO_2e below the 2020 GHG Limit of 431 MMT CO_2e (CARB 2023). Per capita GHG emissions in California have decreased by 30.0% from a 2001 peak of 13.8 metric tons (MT) per person to 9.7 MT per person in 2021. CARB noted that the 2019 to 2020 decrease and the 2020 to 2021 increase in emissions is likely due in large part to the impacts of the COVID-19 pandemic, and economic recovery may result in emissions increases over the next few years. As such, emissions levels in 2020 are anomalous to the long-term trend, and the one-year increase from 2020 to 2021 should be considered in the broader context of the pandemic and subsequent economic recovery that took place in 2021.

CARB's inventory shows that the transportation sector was the source of approximately 38% of California's GHG emissions in 2021, followed by industrial sources at 19% and electricity generation at 16%. Other sources of GHG emissions were residential plus commercial activities at 10%, agriculture at 8%, high GWP gases at 6%, and recycling and waste at 2% (CARB 2023).

A community-wide GHG emissions inventory for the County was prepared by SJVAPCD in 2012. The *Kern County Community-wide GHG Emissions Inventory 2005 Baseline Year – 2020 Forecast* estimated GHG emissions for the base year 2005 and forecast year 2020 for nine primary sectors: electricity production and consumption, residential/commercial/industrial combustion, transportation, fossil fuels industry, industrial processes, waste management, agriculture, forestry and land use, and other sources (SJVAPCD 2012). The base year 2005 GHG emissions for the County were estimated at 27.0 MMT CO_2e. The Fossil Fuel Industry sector was the largest contributor, representing 40% of emissions, followed by the Electricity Consumption sector at 22%. GHG emissions in 2020 were forecast to be 27.3 MMT CO_2e, with the largest contribution from the Electricity Consumption sector at 31% followed by the Fossil Fuel Industry sector at 26%.

Effects of Global Climate Change

As described in the IPCC's *Sixth Assessment Report*, climate change is already affecting weather and climate extremes in every region across the globe. The direct effects of global warming vary regionally, but generally include the following (IPCC 2023):

- Higher maximum temperatures and more hot days over nearly all land areas
- Higher minimum temperatures, fewer cold days and frost days over nearly all land areas
- Higher ocean temperatures
- Higher levels of ocean acidification
- Glacial retreat and reduction in ice coverage
- Sea level rise
- Observed changes in weather extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones

Additionally, many secondary effects result from global warming. Secondary effects to the environment include biodiversity loss, heat stress and desertification, increased wildfire events, worsened air pollution events, impacts to agriculture, changes in disease vectors, and changes in habitat. Humans also experience secondary effects from climate change, including displacement and involuntary migration, reduced water and food security, adverse impacts on physical and mental health, and increased incidence of food-borne, waterborne, and vector-borne diseases. As a result, overall economic and societal impacts attributable to climate change are also increasing, such as the destruction of homes and infrastructure, loss of property and income, and adverse effects on gender and social equity.

Additional warming will increase the magnitude of these changes. IPCC near-term projections predict that every region in the world will face further increases in climate hazards, increasing multiple risks to ecosystems and humans. Hazards and associated risks expected in the near term include an increase in heat-related human mortality and morbidity, food-borne, waterborne, and vector-borne diseases, mental health challenges, flooding in coastal and other low-lying cities and regions, biodiversity loss in land, freshwater, and ocean ecosystems and a decrease in food production in some regions (IPCC 2023).

According to CARB, potential impacts specific to California due to global climate change may include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems (CARB 2018).

4.8.3 Regulatory Setting

In 1988, the IPCC was established to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail global climate change. In 1992, an agreement with the goal of controlling GHG emissions was established by the United Nations Framework Convention on Climate Change. As a result, the Climate Change Action Plan was developed to address the reduction of GHGs in the United States. The plan consists of more than 50 voluntary programs. Additionally, the Montreal Protocol was originally signed in 1987 and substantially amended in 1990 and 1992. The Montreal Protocol stipulates that the production and consumption of compounds that deplete ozone in the stratosphere (CFCs, halons, carbon tetrachloride, and methyl chloroform) be phased out by 2000 (methyl chloroform was phased out by 2005).

In addition to these voluntary commitments and programs, many regulations have been adopted at the federal, state, and local levels to quantify and reduce GHG emissions. Descriptions of those relevant to the Project are presented in the following sections.

Although global warming and climate change have received substantial public attention for more than 20 years, the analytical tools have not been developed to determine the effect of worldwide global warming from a particular increase in GHG emissions, or the resulting effects on climate

change in a particular locale. The scientific tools needed to evaluate the impacts that a specific project may have on the environment are even further in the future.

Federal

U.S. Environmental Protection Agency

The principal air quality regulatory mechanism at the federal level is the Clean Air Act (CAA) and in particular, the 1990 amendments to the CAA and the National Ambient Air Quality Standards that it establishes. The EPA is responsible for implementing federal policy to address GHGs. On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the CAA. The EPA adopted a Final Endangerment Finding for the six defined GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6), which was required before the EPA could regulate GHG emissions under Section 202(a)(1) of the CAA. The EPA also adopted a Cause or Contribute Finding in which the EPA Administrator found that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. These findings do not themselves impose any requirements on industry or other entities. However, these actions were a prerequisite for implementing GHG emissions standards for vehicles. There are currently no federal regulations that set ambient air quality standards for GHGs.

Mandatory Reporting of Greenhouse Gases Rule (40 CFR Part 98)

This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 MT CO_2e emissions per year (40 Code of Federal Regulations [CFR] Part 98). The Project would not be expected to trigger GHG reporting according to the rule.

Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule (40 CFR Part 52)

GHG emissions from the largest stationary sources were, for the first time, covered by the Prevention of Significant Deterioration (PSD) and Title V Operating Permit Programs beginning on January 2, 2011. The EPA's GHG Tailoring Rule, issued in May 2010, established a common sense approach to permitting GHG emissions under PSD and Title V. In June 2014, the U.S. Supreme Court ruled that the EPA cannot classify a facility as a major PSD or Title V source based solely on its GHG emissions meeting the major source threshold. However, the Supreme Court said that the EPA could continue to require that PSD permits, required due to criteria pollutant emissions, contain limitations on GHG emissions based on the application of Best Available Control Technology (EPA 2023a). The Project would not be expected to trigger PSD permitting as required by this regulation.

National Climate Action Plan

In 2021, EPA released its "US EPA's Climate Action Plan: October 2021" in response to Executive Order (EO) 14008 (EPA 2021). EO 14008, entitled "Tackling the Climate Crisis at Home and Abroad" (January 2021) calls for a government-wide approach to the climate crisis that reduces climate pollution in every sector of the economy; increases resilience to the impacts of climate

change; protects public health; conserves our lands, waters, and biodiversity; delivers environmental justice; and spurs well-paying jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure. The EPA intends to formalize its policy on adaptation with the revision of Department Manual Part 523 – Climate Change Adaptation. The policy will provide guidance to Bureaus and Offices for addressing climate change impacts on the EPA's mission, programs, operations, and personnel.

Fuel Efficiency Standards for Construction Equipment

The federal government sets fuel efficiency standards for non-road diesel engines that are used in construction equipment. The regulations, contained in 40 CFR Parts 1039, 1065, and 1068, include multiple tiers of emission standards. Most recently, the EPA adopted a comprehensive national program to reduce emissions from non-road diesel engines by integrating engine and fuel controls as a system to gain the greatest reductions. To meet these Tier 4 emission standards, engine manufacturers will produce new engines with advanced control technologies.

Phase 1 and Phase 2 Heavy-Duty Vehicle GHG Standards

In 2011, the EPA and the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) jointly adopted the first federal GHG emission standards and fuel economy standards for heavy-duty engines and vehicles, referred to as the federal Heavy-Duty GHG Phase 1 regulation. The Phase 1 regulation required both engine and vehicle manufacturers to employ more efficient components and systems for model year 2014 and later tractors, vocational vehicles, heavy-duty pickup trucks and vans, and the engines powering such vehicles.

In 2016, the EPA and NHTSA jointly adopted federal Phase 2 standards that built on the Phase 1 standards, achieving additional GHG reductions. Phase 2 GHG emission standards are set for tractors, vocational vehicles, pickup trucks and vans, and trailers hauled by heavy-duty tractors. Separate engine standards are also established for the engines used in tractors and vocational vehicles. The progressively more stringent federal Phase 2 standards are phased-in from model years 2021 to 2027 for tractors, vocational vehicles, and pickup trucks and vans. For trailers, the standards are phased in from 2018 (2020 in California) through 2027.

SmartWay Program

The SmartWay Program is a public-private initiative between the EPA, large and small trucking companies, rail carriers, logistics companies, commercial manufacturers, retailers, and other federal and state agencies. Its purpose is to improve fuel efficiency and the environmental performance (reduction of both GHG emissions and air pollution) of the goods movement supply chains.

SmartWay effectively refers to requirements geared toward reducing fuel consumption. Most large trucking fleets driving newer vehicles are compliant with SmartWay design requirements. Moreover, over time, all heavy-duty trucks would have to comply with the CARB GHG Regulation which is designed with the SmartWay Program in mind, to reduce GHG emissions through increased fuel efficiency (EPA 2017).

Inflation Reduction Act of 2022

The Inflation Reduction Act of 2022 is considered the most ambitious climate law in U.S. history and is intended to reduce GHG emissions, help build a clean economy, reduce energy costs for Americans, and advance environmental justice. With funding from the act, the EPA has launched a network of clean energy financing and provided grant funding for climate pollution reduction programs (EPA 2023b).

State

A variety of statewide rules and regulations have been implemented or are in development in California that mandate the quantification or reduction of GHGs. Several gubernatorial EOs establish statewide GHG reduction goals. As a result of Senate Bill (SB) 97, the California Environmental Quality Act (CEQA) requires analysis and mitigation of GHG emissions and climate change in relation to a Project, where a project will result in a significant increase in GHG emissions. Certain Air Pollution Control Districts have proposed their own levels of significance. See the discussion of SJVAPCD significance thresholds in Section 4.8.4.

California Renewables Portfolio Standard (SB 100)

California's Renewables Portfolio Standard (RPS) was initially established in 2002 by SB 1078 and requires electricity providers (that is, utilities, cooperatives, and community choice aggregators) to provide a specified minimum portion of their electricity supply from eligible renewable resources by milestone target years. State legislative actions have since modified and accelerated the RPS several times, resulting in one of the most ambitious renewable energy standards in the country. In October 2015, SB 350 increased the state's renewable electricity procurement goal from 33% by 2020 to 50% by 2030. In addition, the state is required to double statewide energy efficiency savings in electricity and natural gas end uses by 2030.

In December 2021, SB 100 increased the renewable electricity procurement goal set by SB 350 from 50% to 60% by 2030 with new interim targets of 44% by 2024 and 52% by 2027. Additionally, SB 100 requires renewable energy and zero-carbon electricity systems to supply 100% of electric retail sales by 2045 (CPUC 2024).

Executive Order S-1-07

EO S-1-07 recognizes that the main source of GHG emissions in California is the transportation sector and establishes a goal to reduce the carbon intensity of transportation fuels sold in California by at least 10% by 2020. As a result of EO S-1-07, CARB approved a proposed regulation to implement the Low Carbon Fuel Standard (LCFS) to reduce GHG emissions from the transportation sector in California by approximately 16 MMT CO_2e by 2020. The LCFS is designed to reduce California's dependence on petroleum, create a lasting market for clean transportation technology, and stimulate the production and use of alternative, low carbon fuels in California. It provides a durable framework that establishes performance standards that fuel producers and importers must meet each year beginning in 2011.

Executive Orders S-3-05 and B-30-15 – Statewide Emission Reduction Targets

EO S-3-05 was established by Governor Arnold Schwarzenegger in June 2005 and sets statewide emission reduction targets through the year 2050:

- by 2010, reduce GHG emissions to 2000 levels;
- by 2020, reduce GHG emissions to 1990 levels; and
- by 2050, reduce GHG emissions to 80% below 1990 levels.

EO B-30-15 sets a target date of 2030 to reduce GHG emissions to 40% below 1990 levels. EOs S-3-05 and B-30-15 are only applicable to "State agencies with jurisdiction over sources of greenhouse gas emissions" (Order 4-29-2015 Section 2), and Kern County is not a State agency. Furthermore, there is currently no implementation strategy for these EOs (that is, a plan that apportions GHG reductions by economic sector/activity/region, similar to CARB's Climate Change Scoping Plan).

Senate Bill 97

SB 97 was enacted requiring the Office of Planning and Research to develop guidelines for the mitigation of GHG emissions, or the effects related to releases of GHG emissions. The Office of Planning and Research submitted proposed amendments to the Natural Resources Agency in accordance with SB 97 regarding the analysis and mitigation of GHG emissions. As directed by SB 97, the Natural Resources Agency adopted amendments to the CEQA Guidelines for GHG emissions, which became effective in 2010.

Senate Bill 375

SB 375 establishes mechanisms for the development of regional targets for reducing passenger vehicle and light-duty truck GHG emissions. CARB adopted the vehicular GHG emissions reduction targets, in consultation with the metropolitan planning organizations (MPOs), which require a 7 to 8% reduction by 2020 and a 13 to 16% reduction by 2035, for each MPO. SB 375 recognizes the importance of achieving significant GHG reductions by working with cities and counties to change land use patterns and improve transportation alternatives. Through the SB 375 process, MPOs, such as the Kern Council of Governments (KCOG), will work with local jurisdictions to develop sustainable community strategies (SCS) designed to integrate development patterns and the transportation network in a way that reduces GHG emissions while meeting housing needs and other regional planning objectives. While SB 375 does not require local governments to amend their general plans to implement the SCS, it provides incentives for them to do so. KCOG's current reduction target for per capita vehicular emissions from passenger vehicles and light-duty trucks is 9% by 2020 and 15% by 2035 compared to 2005 (KCOG 2022).

KCOG most recently adopted the 2022 Regional Transportation Plan (RTP), which includes an SCS component in accordance with SB 375. The 2022 RTP is a 24-year blueprint that establishes a set of regional transportation goals, policies, and actions intended to guide the development of the planned multimodal transportation systems in Kern County. The SCS component strives to

reduce polluting tailpipe emissions from passenger vehicle and light-duty truck travel by better coordinating transportation expenditures with forecasted development patterns to help meet CARB GHG targets for the region.

Assembly Bill 32 and Senate Bill 32

In 2006, the California State Legislature adopted AB 32 (codified in the California Health and Safety Code [HSC], Division 25.5 – California Global Warming Solutions Act of 2006), which focuses on reducing GHG emissions in California to 1990 levels by 2020. AB 32 defines GHGs as CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 (NF_3 has since been added to California HSC Division 25.5) and represents the first enforceable statewide program to limit emissions of these GHGs from all major industries with penalties for noncompliance. The law further requires that reduction measures be technologically feasible and cost effective. Under California HSC Division 25.5, CARB has the primary responsibility for reducing GHG emissions. CARB is required to adopt rules and regulations directing State actions that would achieve GHG emissions reductions equivalent to 1990 statewide levels by 2020.

While acknowledging that national and international actions will be necessary to fully address the issue of global warming, AB 32 lays out a program to inventory and reduce GHG emissions in California and from power generation facilities located outside the state that serve California residents and businesses. CARB adopted a list of discrete early action measures for implementation to reduce GHG emissions in accordance with its responsibility per AB 32. The 1990 baseline emissions inventory for California was also adopted for the 2020 statewide emissions cap.

Subsequent legislation has included SB 32, which expanded upon AB 32 to reduce GHG emissions to 40% below the 1990 levels by 2030; AB 197, which increased CARB's legislative oversight by adding two legislatively appointed non-voting members to the CARB Board and provided additional protection to disadvantaged communities; SB 350, which increased California's renewable energy electricity procurement goal and required the state to increase statewide energy efficiency savings by 2030; and SB 100, which established a landmark policy requiring renewable energy and zero-carbon resources to supply 100% of electrical retail sales to end-use customers and 100% of electricity procured to serve state agencies by 2045.

Assembly Bill 1279

The California Climate Crisis Act (AB 1279) establishes the policy of the state to achieve carbon neutrality as soon as possible, but no later than 2045; to maintain net negative GHG emissions thereafter; and to ensure that by 2045 statewide anthropogenic GHG emissions are reduced at least 85% below 1990 levels. AB 1279 requires CARB to ensure that Scoping Plan updates identify and recommend measures to achieve carbon neutrality.

California Air Resources Board 2022 Climate Change Scoping Plan

As required by AB 32, CARB developed an initial Climate Change Scoping Plan containing strategies to achieve the 2020 emissions cap in 2008. CARB released updates to the Climate Change Scoping Plan in 2014, 2017, and 2022.

The CARB 2022 Scoping Plan for Achieving Carbon Neutrality lays out a path to achieve targets for carbon neutrality and reduce anthropogenic GHG emissions by 85% below 1990 levels no later than 2045, as directed by AB 1279 (CARB 2022). It outlines an aggressive approach that advocates for compliance with a local GHG reduction strategy (CAP) consistent with CEQA Guidelines Section 15183.5, replacing the CARB 2017 Scoping Plan's numeric per capita threshold. The CARB 2022 Scoping Plan also includes CARB-recommended GHG reductions for each emissions sector of the State's GHG inventory.

The key elements of the CARB 2022 Scoping Plan focus on transportation - the regulations that will impact this sector are adopted and enforced by CARB on vehicle manufacturers and outside the jurisdiction and control of local governments.

Mandatory Greenhouse Gas Reporting Regulation (17 CCR 95100-95158)

Statewide reporting of GHG emissions by major sources is required by AB 32. The Regulation for the Mandatory Reporting of Greenhouse Gas Emissions is applicable to industrial facilities, fuel suppliers, and electricity importers. The Project would not be expected to trigger GHG reporting according to the rule.

Cap-and-Trade Program (17 CCR 95800 to 96022)

On October 20, 2011, CARB approved the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation (Cap-and-Trade Program) as part of the AB 32 implementation measures. The final regulation order was updated in 2018 and became effective as of April 1, 2019.

Cap-and-trade is a market-based regulation that is designed to reduce GHGs from multiple sources. Cap-and-trade sets a firm limit, or cap, on GHG emissions from all sources in the Cap-and-Trade Program which declines approximately 3% each year. In the market, a price on carbon is established for GHGs. Trading and market forces create incentives to reduce GHGs below allowable levels through investments in technological innovation in clean technologies. Covered entities that emit more than 25,000 MT CO_2e per year must comply with the Cap-and-Trade Program. The Project would not be expected to directly trigger participation in the Cap-and-Trade Program.

The Cap-and-Trade Program covers the GHG emissions associated with electricity consumed in California, whether generated in-state or imported. Accordingly, GHG emissions associated with CEQA projects' electricity usage are covered by the Cap-and-Trade Program. The Cap-and-Trade Program also covers fuel suppliers (natural gas and propane fuel providers and transportation fuel providers) to address emissions from such fuels and from the combustion of other fossil fuels not directly covered at large sources, whether refined in-state or imported.

Short-Lived Climate Pollutants – Senate Bill 605 and Senate Bill 1383

Short-lived climate pollutants (SLCP) (that is, black carbon, fluorinated gases, and CH_4) are powerful climate forcers that remain in the atmosphere for a much shorter period of time than longer-lived climate pollutants. Their relative potency, when measured in terms of how they heat

the atmosphere, can be tens, hundreds, or even thousands of times greater than that of CO_2. The impacts of SLCP are especially strong over the short term. Reducing these emissions can make an immediate beneficial impact on climate change.

SLCP emissions reductions will support achieving AB 32 and SB 32 GHG emission reduction targets. SB 605 directed CARB, in coordination with other State agencies and local air districts, to develop a comprehensive SLCP reduction strategy, and SB 1383 directed CARB to approve and begin implementing this strategy. This legislation also set statewide emissions reduction targets specifying a 40% reduction in CH_4, a 40% reduction in HFCs, and a 50% reduction in anthropogenic black carbon below 2013 levels by 2030. The bill also established specific targets for reducing organic waste in landfills and provided specific direction for CH_4 emissions reductions from dairy and livestock operations.

The SLCP Reduction Strategy, approved by the Board in March 2017, lays out a range of options to reduce SLCP emissions in California, including regulations, incentives, and other market-supporting activities. The SLCP Strategy also informed the CARB 2022 Scoping Plan.

Assembly Bill 1493 Pavley Regulations and Fuel Efficiency Standards

Enacted on July 22, 2002, AB 1493, also known as the Pavley Fuel Efficiency Standards, required CARB to develop and adopt regulations to reduce GHGs emissions from passenger vehicles and light duty trucks. Under this legislation, CARB adopted regulations to reduce GHG emissions from non-commercial passenger vehicles (cars and light-duty trucks) in 2004. A co-benefit of the Pavley standards is an improvement in fuel efficiency and consequently a reduction in fuel consumption.

Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles

In 2004, CARB adopted the Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling to reduce public exposure to diesel particulate matter emissions (Title 13 CCR Section 2485). The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than five minutes at any given location. While the goal of this measure is primarily to reduce public health impacts from diesel emissions, compliance with the regulation also results in energy savings in the form of reduced fuel consumption from unnecessary idling.

Advanced Clean Cars Program and Zero-Emission Vehicles

In 2012, EO B-16-2012 was issued, which called for the increased penetration of zero-emission vehicles (ZEVs) into California's vehicle fleet in order to help California achieve a reduction of GHG emissions from the transportation sector equaling 80% less than 1990 levels by 2050. ZEVs include plug-in electric vehicles, such as battery electric vehicles, plug-in hybrid electric vehicles, and hydrogen fuel cell electric vehicles. In furtherance of that statewide target for the transportation sector, the EO also required CARB, the California Energy Commission (CEC), and the California Public Utilities Commission to establish benchmarks that will: (1) allow over 1.5 million ZEVs to

be on California roadways by 2025, and (2) provide the State's residents with easy access to ZEV infrastructure.

In 2012, CARB approved the Advanced Clean Cars Program, a new emissions-control program for model years 2015–2025. The program combined the control of smog, soot, and GHGs with requirements that about 15% of new cars sold in California in 2025 be plug-in hybrid, battery electric, or fuel cell vehicles.

In 2018, EO B-48-18 was issued, which served to launch an eight-year initiative to accelerate the sale of ZEVs through a mix of rebate programs and infrastructure improvements. The EO also set a new ZEV target of five million EVs in California by 2030 and provided funding for multiple state agencies, including the CEC (in order to increase charging infrastructure) and CARB (in order to provide rebates for the purchase of new ZEVs and incentives for low-income customers).

In 2022, CARB approved the Advanced Clean Cars II rule, which codified the goals set out in EO N-79-20 and established a year-by-year roadmap such that by 2035, 100% of new cars and light trucks sold in California will be ZEVs. Under this regulation, automakers are required to accelerate deliveries of zero-emission light-duty vehicles, beginning with model year 2026. CARB estimates that the regulation would reduce GHG emissions from light-duty vehicles by 50% by 2040, and that from 2026 to 2040, GHG emissions would be reduced by a cumulative 395 MMT.

Tractor-Trailer Greenhouse Gas Regulation

In 2008, CARB adopted the Tractor-Trailer Greenhouse Gas Regulation requiring covered tractors and trailers to either be EPA SmartWay certified or retrofitted with SmartWay verified technologies. The regulation applies primarily to owners and drivers of 50-foot or longer box-type trailers, including both dry-van and refrigerated-van trailers, and owners and drivers of the HD tractors that pull them on California highways. These owners are responsible for replacing or retrofitting their affected vehicles with compliant aerodynamic technologies and low-rolling resistance tires.

Phase 1 and 2 Heavy-Duty Vehicle Greenhouse Gas Standards

In 2013, CARB adopted California Phase 1 GHG regulations that were substantially identical to the federal Phase 1 regulations. This provided California the authority to certify new California-certified engines and vehicles to the Phase 1 standards, as well as enforce them. CARB recognized that a second phase of GHG standards was needed to offset projected vehicle miles traveled (VMT) growth and keep heavy-duty truck GHG emissions declining. CARB staff worked closely with the EPA and NHTSA on the development of Phase 2 GHG standards.

In 2018, California aligned with the federal Phase 2 standards in structure, timing, and stringency, but with some minor California differences. This allowed manufacturers to continue building a single fleet of vehicles and engines for the U.S. market.

California Green Building Standards Code

California Code of Regulations (CCR) Title 24, Part 11: California Green Building Standards Code (CALGreen) is a comprehensive and uniform regulatory code for residential, commercial, and school buildings that went into effect on August 1, 2009, and is administered by the California Building Standards Commission.

CALGreen is updated on a regular basis, with the most recent approved update consisting of the 2022 California Green Building Code Standards that became effective on January 1, 2023. The CEC anticipates that the 2022 energy code will provide $1.5 billion in consumer benefits and reduce GHG emissions by 10 MMT (CEC 2021). The Project would be required to comply with the applicable standards in place at the time plan check submittals are made.

Warehouse Projects: Best Practices and Mitigation Measures to Comply with CEQA

There are several resources outlining Best Management Practices for warehouses, including the California Office of the Attorney General Guidance for Best Practices to comply with CEQA (California Office of the Attorney General 2022) and the CARB Concept Paper for the Freight Handbook (CARB 2019). Both guidance documents provide suggestions for mitigation measures, commitments to investments in zero-emission infrastructure at the project design stage; deployment of zero-emission technologies, and the incorporation of contractual language requiring tenants to utilize zero-emission technologies to the maximum extent possible.

Design features and best management strategies to minimize and reduce GHG emissions from a project include:

- Provisions for all ZEV material handling equipment (for example, forklifts and pallet jacks).
- Restrictions to dry storage, with provisions for Best Management Practices and mitigation measures should a future tenant utilize cold storage.
- Use of compliant low GWP refrigerants.
- Rooftop Solar Photovoltaic System With Battery Storage (Title 24 Part 6 §140.10(a)).
- Heat Pump for Space Conditioning in Single-Zoned Office Spaces (Title 24 Part 6 §140.4(a).2).
- Electrical infrastructure to support ZEV material handling equipment.
- Electrical Infrastructure ready to support future ZEV medium heavy-duty trucks and heavy heavy-duty trucks. (California Building Standards Code 5.106.5.4.1 Electric Vehicle Charging Readiness Requirements for Warehouses with Planned Off-street Loading Spaces).
- Water efficient landscaping.
- Low-flow water fixtures.

- Energy efficient light-emitting diode lighting.

Regional

Kern Council of Governments – 2022 Regional Transportation Plan/Sustainable Communities Strategy

KCOG is the designated RTP Agency and MPO for Kern County. In that capacity, KCOG develops air quality projections based on population projections in conjunction with current general plan designations and estimated VMT as well as the current RTP and the federal transportation plan for Kern County.

The latest RTP is the 2022 RTP, a 24-year blueprint that establishes a set of regional transportation goals, policies, and actions intended to guide the development of the planned multimodal transportation systems in Kern County (KCOG 2022). The 2022 RTP includes the SCS required by California's Sustainable Communities and Climate Protection Act of SB 375. The 2022 SCS includes land use planning strategies and policies to reduce air emissions from passenger and light-duty truck travel by better coordinating transportation expenditures with forecasted development patterns in order to meet the GHG emissions reduction target for the region by achieving a 9% reduction in per capita transportation GHG emissions by 2020 and a 15% reduction in per capita transportation emissions by 2035 compared to the 2005 level (KCOG 2022).

Local

San Joaquin Valley Air Pollution Control District

The Project area is located within Kern County's portion of the SJVAB. Kern County is included among the eight counties that comprise the SJVAPCD. The SJVAPCD acts as the regulatory agency for air pollution control in the SJVAB and is the local agency empowered to regulate emissions for the Project area. The SJVAPCD is a CEQA Trustee Agency for the Project.

In August 2008, the SJVAPCD adopted its Climate Change Action Plan. The Climate Change Action Plan directed the SJVAPCD to develop guidance to assist CEQA lead agencies, project proponents, permit applicants, and interested parties in assessing and reducing the impacts of project GHG emissions on global climate change (SJVAPCD 2008).

On December 17, 2009, the SJVAPCD adopted Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA (SJVAPCD 2009), which outlined the SJVAPCD's methodology for assessing a project's significance for GHGs under CEQA. The following criteria were outlined in the document to determine whether a project could have a significant impact:

- Projects determined to be exempt from the requirements of CEQA would be determined to have a less than significant individual and cumulative impact on GHG emissions and would not require further environmental review, including analysis of project-specific GHG emissions. Projects exempt under CEQA would be evaluated consistent with established

rules and regulations governing project approval and would not be required to implement Best Performance Standards (BPS).

- Projects complying with an approved GHG emission reduction plan or GHG mitigation program that avoids or substantially reduces GHG emissions within the geographic area in which the project is located would be determined to have a less than significant individual and cumulative impact for GHG emissions. Such plans or programs must be specified in law or approved by the lead agency with jurisdiction over the affected resource and supported by a CEQA-compliant environmental review document adopted by the lead agency. Projects complying with an approved GHG emission reduction plan or GHG mitigation program would not be required to implement BPS.
- Projects implementing BPS would not require quantification of project-specific GHG emissions. Consistent with CEQA Guidelines, such projects would be determined to have a less than significant individual and cumulative impact on GHG emissions.
- Projects not implementing BPS would require quantification of project-specific GHG emissions and demonstration that project-specific GHG emissions would be reduced or mitigated by at least 29%, compared to business as usual (BAU), including GHG emission reductions achieved since the 2002–2004 baseline period. Projects achieving at least a 29% GHG emission reduction compared to BAU would be determined to have a less than significant individual and cumulative impact for GHG.
- Notwithstanding any of the above provisions, projects requiring preparation of an EIR for any other reason would require quantification of project-specific GHG emissions. Projects implementing BPS or achieving at least a 29% GHG emission reduction compared to BAU would be determined to have a less than significant individual and cumulative impact for GHG.

The SJVAPCD determined BAU and baseline emissions have been established based on the years 2002–2004 and 2020, respectively. The 2020 projected baseline has passed, and at this time, no new guidance has been approved for determining BAU and projected baseline for the next target year. Therefore, the 29% reduction from BAU cannot be applied to the project to determine significance. Additionally, a BPS threshold has not been established.

Metropolitan Bakersfield General Plan

Kern County and the City of Bakersfield jointly prepared and separately adopted a general plan for the metropolitan area of Bakersfield, which includes the Project area. The GHG-related goals, policies, and implementation measures in the Metropolitan Bakersfield General Plan (MBGP) applicable to the Project are provided below. The MBGP contains additional policies, goals, and implementation measures that are more general in nature and not specific to development, such as the Project. These measures are not listed below, but as stated in Chapter 2, *Introduction*, all policies, goals, and implementation measures in the MBGP are incorporated by reference.

Chapter 5: Conservation/Air Quality

Goals

Goal 1. Promote air quality that is compatible with health, well-being, and enjoyment of life by controlling point sources and minimizing vehicular trips to reduce air pollutants.

Goal 2. Continue working toward attainment of Federal, State and Local standards as enforced by the San Joaquin Valley Unified Air Pollution Control District.

Goal 3. Reduce the amount of vehicular emissions in the planning area.

Policies

Policy 2. Encourage land uses and land use practices which do not contribute significantly to air quality degradation.

Policy 4. Consider air pollution impacts when evaluating discretionary permits for land use proposals. Considerations should include:

- Alternative access routes to reduce traffic congestion.
- Development phasing to match road capacities.
- Buffers including increased vegetation to increase emission dispersion and reduce impacts of gaseous or particulate matter on sensitive uses.

Policy 6. Participate in alternative fuel programs.

Policy 10. Implement the Transportation System Management Program (July 1984) for Metropolitan Bakersfield to improve traffic flow, reduce vehicle trips, and increase street capacity.

Policy 12. Encourage the use of mass transit, carpooling and other transportation options to reduce vehicle miles traveled.

Policy 13. Consider establishing priority parking areas for carpoolers in projects with relatively large numbers of employees to reduce vehicle miles traveled and improve air quality.

Policy 14. Establish park and ride facilities to encourage carpooling and the use of mass transit.

Policy 15. Promote the use of bicycles by providing attractive bicycle paths and requiring provision of storage facilities in commercial and industrial projects.

Policy 18. Encourage walking for short distance trips through the creation of pedestrian friendly sidewalks and street crossings.

Policy 19. Promote a pattern of land uses which locates residential uses in close proximity to employment and commercial services to minimize vehicular travel.

Policy 22. Require the provision of secure, convenient bike storage racks at shopping centers, office buildings, and other places of employment in the Bakersfield Metropolitan area.

Policy 23. Encourage the provision of shower and locker facilities by employers, for employees who bicycle or jog to work.

Policy 25. Require design of parking structures and ramps to provide adequate off- street storage for entering vehicles to minimize on-street congestion and avoid internal backup and idling of vehicles.

Policy 29. Encourage the use of alternative fuel and low or zero-emission vehicles.

Implementation Measures

Measure 5. Expand the use of alternative fuel and low or zero-emission vehicles in the metropolitan area for public and private use to achieve 10 percent usage.

Measure 6. Create the private and public infrastructure necessary to support alternative fuel vehicles.

4.8.4 Impacts and Mitigation Measures

This section describes the methodology used in conducting the CEQA impact analysis for GHG emissions; the thresholds of significance used in assessing impacts to GHG emissions; and the assessment of impacts to GHG emissions and global climate change, including relevant mitigation measures.

Methodology

This analysis addresses the Project's potential GHG impacts during construction and operation. Detailed Project data and assumptions, as well as model inputs, and the resulting outputs, are provided in the *Airport Drive Warehouse Greenhouse Gas Analysis* prepared for the Project (Appendix B.3). Potential GHG impacts associated with the Project were analyzed according to CEQA significance criteria described in the Thresholds of Significance section, below.

As stated previously, climate change is a cumulative and global issue causing global impacts. Thus, the study area for climate change and the impact analysis of GHG emissions is broad because climate change is influenced by global emissions and their associated effects. Those effects of climate change can also have localized impacts on resources and ecosystems in California. Despite climate change being a global issue, CEQA only requires that an EIR address indirect impacts that are not speculative.

Note that analytical tools have not been developed that can determine the effect of worldwide global warming from a particular project-specific increase in GHG emissions, or the effect of global GHG emissions on the climate at a particular location.

Modeling and Assumptions

California Emissions Estimator Model

In May 2022, the SJVAPCD, in conjunction with the California Air Pollution Control Officers Association and other California air districts, released the latest version of the California Emissions Estimator Model (CalEEMod): Version 2022.1. The purpose of this model is to calculate construction-source and operational-source criteria pollutant and GHG emissions from direct and indirect sources, as well as quantify applicable air quality and GHG reductions achieved from mitigation measures. CalEEMod includes GHG emissions from the following source categories: construction, area, energy, mobile, waste, water, refrigerants, stationary, on-site cargo equipment, and transport refrigeration units (TRU) emissions.

The latest version of CalEEMod was used to determine the Project's anticipated GHG emissions. Outputs from the model runs are provided in Appendix B.3 of this Draft EIR.

Construction

Short-term emissions are primarily from the construction phase of a project. CalEEMod Version 2022.1.1.21 was used to estimate emissions from site preparation, grading, building construction, paving, and architectural coating activities. Construction of the Project would result in GHG emissions primarily associated with the use of off-road construction equipment, on-road vendor trucks, and worker vehicles.

Construction equipment information and count were provided by the Project proponent and supplemented with default CalEEMod equipment lists for the Project's land use type and development intensity for each phase. Construction of the Project was modeled in CalEEMod assuming 738,500 square feet of Unrefrigerated Warehouse-No Rail space and 184,600 square feet of Refrigerated Warehouse-No Rail land space.

Construction emissions were estimated under the assumption that construction commenced in January 2024. The dates entered into the CalEEMod program represent worst-case emissions as construction equipment technology and emissions improve over time; therefore, all estimated emission totals are conservative and reflect a reasonable and legally sufficient estimate of potential impacts. All construction equipment assumed activity levels of up to 8 hours per day for each piece of equipment. Additionally, vendor trips were assumed for site prep, grading, and paving phases based on the length of the phase.

Operation

Long-term operational emissions associated with the Project were also calculated using CalEEMod Version 2022.1.1.21. During long-term operation of the Project, primary GHG emissions sources would include area sources; energy sources; mobile sources; water supply, treatment, and distribution; solid waste; refrigerants; emergency fire pumps; microturbines; on-site cargo equipment, and TRUs.

Operation of the Project was modeled in CalEEMod assuming 738,500 square feet of Unrefrigerated Warehouse-No Rail space and 184,600 square feet of Refrigerated Warehouse-No Rail land space. Additionally, the User Defined Industrial land use was used to separately model emissions that would occur as a result of Project truck trips. Passenger vehicle truck trips, as well as all other emission sources, were modeled under the Unrefrigerated Warehouse-No Rail and Refrigerated Warehouse-No Rail land uses.

The following sections provide a description of the operational activities included in each source and the methodology and assumptions used to calculate operational emissions for the Project.

Area Sources

Landscape maintenance equipment would generate area source emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chainsaws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in CalEEMod.

Energy Sources

GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits CO_2 and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions.

Mobile Sources

Project-related mobile source GHG emissions derive primarily from 1,430 vehicle trips generated by the Project, including employee trips to and from the site and truck trips associated with the proposed uses. Trip characteristics available from the *Traffic Impact and Vehicle Miles Traveled (VMT) Analysis Report* (located in Appendix J of this Draft EIR) were utilized in this analysis.

To determine emissions from passenger cars, CalEEMod defaults were utilized for trip length and trip purpose for the proposed uses. For the proposed industrial uses, it is important to note that although the *Traffic Impact and Vehicle Miles Traveled (VMT) Analysis Report* does not break down passenger cars by type, this analysis assumes that passenger cars include the Light-Duty-Auto (LDA), Light Duty Trucks (LDT1 and LDT2), medium-duty-vehicles (MDV), and motorcycle vehicle types. The Project-specific passenger car fleet mix used in this analysis is based on a proportional split utilizing the default CalEEMod percentages assigned to LDA, LDT1, LDT2, and MDV vehicle types.

Vehicle trip lengths for off-site truck trips were based on an average travel distance of 65 miles per one-way trip and an assumption of 100% primary trips. This truck trip length was calculated based on survey data derived from Fresno Council of Government's *Report for San Joaquin Valley I-5/SR-99 Good Movement Corridor Study* (Cambridge Systematics, Inc. 2017) to account for truck travel that would occur within the SJVAB. The Project-specific truck fleet mix used in this analysis

is based on the number of trips generated by each truck type (LHDT1, LHDT2, medium heavy-duty truck, and heavy heavy-duty truck) relative to the total number of truck trips. The truck fleet mix is based on the mix of 2-, 3-, and 4-axle trucks presented in the *Traffic Impact and Vehicle Miles Traveled (VMT) Analysis Report*.

Emergency Fire Pumps

The Project was conservatively assumed to include the installation of two 300-horsepower diesel-powered emergency generators/fire pumps. The emergency generators/fire pumps were estimated to operate for up to 1 hour per day, 1 day per week for up to 50 hours per year for maintenance and testing purposes. Emissions associated with the two stationary emergency diesel-powered emergency generators/fire pumps were calculated using CalEEMod.

On-Site Cargo Handling Equipment

It is common for industrial buildings to require the operation of exterior cargo handling equipment in the building's truck court areas. For this Project, on-site modeled operational equipment includes up to two 175 horsepower, natural gas-powered cargo handling equipment – port tractors operating 4 hours a day for 365 days of the year.

Microturbines

The Project was assumed to include two natural gas-powered microturbines rated to provide 1,000 kilowatts of electrical output each. Other than operation for maintenance and testing purposes (up to 50 hours per year each), the microturbines would be operated for emergency use only. GHG emissions were calculated based on emission factors obtained from the EPA's AP-42, Chapter 3.1 (EPA 2000).

Transport Refrigeration Units

In order to account for the possibility of refrigerated uses, trucks associated with the cold storage land use are assumed to also have TRUs. Therefore, for modeling purposes, 51 one-way truck trips have the potential to include TRUs. TRUs are accounted for during on-site and off-site travel. The TRU calculations are based on the EMFAC Off-road Emissions, developed by the CARB. EMFAC does not provide emission rates per hour or mile as with the on-road emission model and only provides emission inventories. Emission results are produced in tons per day while all activity, fuel consumption, and horsepower hours were reported at annual levels. The emission inventory is based on specific assumptions including the average horsepower rating of specific types of equipment and the hours of operation annually. These assumptions are not always consistent with assumptions used in the modeling of Project-level emissions. Therefore, the emissions inventory was converted into emission rates to accurately calculate emissions from TRU operations associated with Project-level details. This was accomplished by converting the annual horsepower hours to daily operational characteristics and converting the daily emission levels into hourly emission rates based on the total emission of each criterion pollutant by equipment type and the average daily hours of operation.

Water Supply, Treatment, and Distribution

Indirect GHG emissions result from the production of electricity used to convey, treat, and distribute water and wastewater. The amount of electricity required to convey, treat, and distribute water depends on the volume of water as well as the sources of the water. Unless otherwise noted, CalEEMod default parameters were used.

Solid Waste

Industrial land uses will result in the generation and disposal of solid waste. A percentage of this waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted will be disposed of at a landfill. GHG emissions from landfills are associated with the anaerobic breakdown of material. GHG emissions associated with the disposal of solid waste associated with the Project were calculated by CalEEMod using default parameters.

Refrigerants

Air conditioning equipment associated with the building is anticipated to generate GHG emissions. CalEEMod automatically generates a default air conditioning and refrigeration equipment inventory for each project land use subtype based on industry data from the EPA. CalEEMod quantifies refrigerant emissions from leaks during regular operation and routine servicing over the equipment lifetime and then derives average annual emissions from the lifetime estimate. Note that CalEEMod does not quantify emissions from the disposal of refrigeration and air conditioning equipment at the end of its lifetime. Per 17 CCR 95371, new facilities with refrigeration equipment containing more than 50 pounds of refrigerant are prohibited from utilizing refrigerants with a GWP of 150 or greater as of January 1, 2022. GHG emissions associated with refrigerants were calculated by CalEEMod using default parameters.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist, following the "Environmental Checklist Form," Appendix G to the Statewide *CEQA Guidelines* as amended by the California Natural Resources Agency and effective on December 28, 2018 (14 CCR 15000, et seq.), state that a project would have significant impacts on GHG emissions if it would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

The adopted *CEQA Guidelines* provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and global climate change impacts.

Additionally, Section 15064.4(b) of the *CEQA Guidelines* states that the lead agency may take into account the following considerations in addressing the significance of impacts resulting from GHG emissions:

- **Consideration 1**: The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting.
- **Consideration 2**: Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
- **Consideration 3**: The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions (see Section 15183.5(b)). Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of GHG emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project. In determining the significance of impacts, the lead agency may consider a project's consistency with the State's long-term climate goals or strategies, provided that substantial evidence supports the agency's analysis of how those goals or strategies address the project's incremental contribution to climate change and its conclusion that the project's incremental contribution is not cumulatively considerable.

A quantitative analysis was prepared for the Project to determine the extent to which it may increase or reduce GHG emissions as compared to the existing environmental setting to fulfill Consideration 1; however, this analysis was completed for informational purposes only.

For Consideration 2, although SJVAPCD has implemented a tiered approach for determining the significance of GHG emissions, in light of *Center for Biological Diversity v. California Department of Fish and Wildlife* and the requirements of SB 32, the quantitative threshold presented in the CAP is outdated and no longer appropriate for determining the significance of project-related GHG emissions. Additionally, because SJVAPCD's BAU threshold of 29% was developed for consistency with AB 32 2020 target reductions, this approach is no longer appropriate. Because SJVAPCD has not developed new inventories or reduction targets aligned with 2030 SB 32 GHG reductions, the use of SJVAPCD thresholds under Consideration 2 would not be appropriate and were not applied in this analysis.

Consideration 3 relies on a qualitative evaluation of the Project's consistency with state and local regulations adopted to reduce or mitigate GHG emissions. In the absence of a quantified significance threshold for GHG emissions, it is presumed that a project found to be consistent with the adopted implementation of the CARB 2022 Scoping Plan and progress toward 2030 goals would have a less than significant impact with regard to GHG emissions.

Project Impacts

As discussed previously, climate change impacts are inherently global and cumulative, and not project-specific. The SJVAPCD's March 2015 Guidance for Assessing and Mitigating Air Quality Impacts observes that:

> *It is widely recognized that no single project could generate sufficient GHG emissions to noticeably change global climate temperature. However, the combination of GHG emissions from past, present and future projects could contribute substantially to global climate change. Thus, project-specific GHG emissions should be evaluated in terms of whether or not they would result in a cumulatively significant impact on global climate change (SJVAPCD 2015, Section 8.9.) (SJVAPCD 2015).*

Impact 4.8-1: The Project Would Generate Greenhouse Gas Emissions, Either Directly or Indirectly, that may have a Significant Impact on the Environment.

GHG Emissions from the Project

The Project would generate GHG emissions during construction and operational activities. Construction of the Project would result in the temporary generation of GHG emissions associated with the use of off-road construction equipment, on-road vendor trucks, and worker vehicles as part of site preparation, grading, building construction, paving, and architectural coating activities. For purposes of analysis, construction of the Project was expected to commence in January 2024, and last through December 2025. The construction schedule utilized in the analysis represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as time passes and the analysis year increases due to emission regulations becoming more stringent. The estimated GHG emissions from construction activities associated with the Project are shown in **Table 4.8-1**.

The SJVAPCD and Kern County have not adopted thresholds that would apply to Project-generated construction emissions and the SJVAPCD does not recommend assessing the significance of construction-related emissions. However, other jurisdictions, including the South Coast Air Quality Management District, have concluded that construction emissions should be considered since they may remain in the atmosphere for years after construction is complete. The total emissions generated from construction were therefore amortized over the life of the development (30 years) and this annualized value was added to the operational emissions. Because there is no GHG threshold for construction-generated GHGs, the evaluation of significance is discussed in the analysis of operational GHG emissions.

Table 4.8-1: Estimated Construction GHG Emissions

Year	Emissions (Metric Tonnes per Year)				
	CO_2	CH_4	N_2O	Refrigerants	Total CO_2e
2024	905.00	0.03	0.03	0.49	917.00
2025	966.00	0.03	0.06	0.92	985.00
Total GHG Emissions	1,871.00	0.06	0.09	1.41	1,902.00
Amortized Construction Emissions	62.37	0.00	0.00	0.05	63.40

Source: Airport Drive Warehouse Greenhouse Gas Analysis (see Appendix B.3 of this Draft EIR)

Key: CH_4 = methane; CO_2 = carbon dioxide; CO_2e carbon dioxide equivalent; GHG = greenhouse gas; N_2O = nitrous oxide

Long-term operation of the Project would generate GHG emissions from area sources, energy use, mobile sources, water use and conveyance, waste generation, refrigerant use, emergency fire pumps, microturbines, on-site cargo equipment, and TRUs. The estimated GHG emissions from operational activities associated with the Project are shown in **Table 4.8-2**.

Table 4.8-2: Estimated Unmitigated Operational GHG Emissions

Emission Source	Emissions (Metric Tones per Year)				
	CO_2	CH_4	N_2O	Refrigerants	Total CO_2e
Annual Construction-Related Emissions Amortized Over 30 Years	62.37	0.00	0.00	0.05	63.40
Mobile Source	10,616.0	0.13	1.46	14.40	11,068.00
Area Source	13.50	0.00	0.00	0.00	13.50
Energy Source	1,470.00	0.22	0.02	0.00	1,483.00
Water Source	147.00	6.96	0.17	0.00	370.00
Waste Source	77.40	7.74	0.00	0.00	271.00
Refrigerants	0.00	0.00	0.00	31.2	31.20
Emergency Fire Pumps	11.40	0.00	0.00	0.00	11.50
Microturbines	56.88	0.00	0.00	0.00	57.43
On-Site Cargo Equipment	0.00	0.00	0.00	0.00	104.44
TRU Source	0.00	0.00	0.00	0.00	500.28
Total Project CO_2e (All Sources)	13,973.75				

Source: Airport Drive Warehouse Greenhouse Gas Analysis (see Appendix B.3 of this Draft EIR)

Key: CH_4 = methane; CO_2 = carbon dioxide; CO_2e carbon dioxide equivalent; GHG = greenhouse gas; N_2O = nitrous oxide; TRU = transport refrigeration unit

As shown in **Table 4.8-1**, the Project's total construction GHG emissions would be 1,902 Metric Tons of CO_2 emissions (MT CO_2e). shows that the Project's total GHG emissions, including operational emissions and annualized construction emissions, would be 13,974 MT CO_2e per year. Mobile sources are the largest contributor to Project GHG emissions, followed by energy use. As there are no applicable GHG emission thresholds, emissions are presented for informational purposes only.

Mitigation Measures identified for the Project would further reduce GHG emissions. The Project would use electric-powered off-road equipment and target a construction waste diversion rate of 80% as part of **Mitigation Measure MM 4.8-1** and would provide electrical hookups for TRUs as part of **Mitigation Measure MM 4.8-2**. **Mitigation Measure MM 4.3-3** (Section 4.3, *Air Quality*), aimed at reducing air pollutant emissions, would require proper equipment maintenance, set equipment use, and idling limits, and require the use of Tier 4 engines where available. **Mitigation Measure MM 4.3-5** (Section 4.3, *Air Quality*) includes a commitment to fully mitigate construction and operations criteria air emissions of project implementation for project vehicles and other mobile sources. **Mitigation Measures MM 4.6-1** and **MM 4.6-2** (see Section 4.6, *Energy*) require the incorporation of energy-efficient building design standards and CALGreen Standards into Project design and operations. **Mitigation Measure MM 4.17-3** (see Section 4.17, *Transportation and Traffic*) requires the preparation of a Transportation Demand Management program to reduce VMT associated with employee trips. Quantitative reductions associated with many of these measures are not available within the CalEEMod database, therefore emissions estimated for the Project are conservative.

Best Management Practices for Warehouses

In response to the increase in warehouse development in California, the California Attorney General's Bureau of Environmental Justice published a Memorandum entitled *Warehouse Projects: Best Practices and Mitigation Measures to Comply with the California Environmental Quality Act* (California Office of the Attorney General 2022).

The Memorandum encourages warehouse projects to implement certain best practices and mitigation measures including those related to community engagement, siting and design considerations, and air quality and GHG emissions. As demonstrated below, a vast majority of best practices have since become required by law or otherwise implemented as part of the project's Air Quality, GHG Emissions, and Transportation mitigation measures. These measures will be enforced by Kern County and will be incorporated into the Project's Mitigation Monitoring and Reporting Program.

A summary of the measures incorporated into the Project and the Draft EIR is provided below, in **Table 4.8-3**.

Table 4.8-3: Project Incorporation of Warehouse Best Practices

Best Practice Measure	Applicability and Incorporation
Community Engagement	
Posting information in hard copy in public gathering spaces and on a website about the project. The information should include a complete, accurate project description, maps and drawings of the project design, and information about how the public can provide input and be involved in the project approval process. The information should be in a format that is easy to navigate and understand for members of the	Incorporated. The Project's Notice of Preparation was published on November 16, 2023, which includes a complete and accurate project description, maps and drawings of the project design, and information about how the public can provide input and be involved in the project approval process. A public Scoping Meeting was held on December 6, 2023. Notices were mailed to reviewing agencies and to residents and owners within 1,000 feet of the

Best Practice Measure	Applicability and Incorporation
affected community.	Project site. Additionally, notices were available in person at the County and on the County's website.
Providing notice by mail to residents and schools within a certain radius of the project and along transportation corridors to be used by vehicles visiting the project, and by posting a prominent sign on the project site. The notice should include a brief project description and directions for accessing complete information about the project and for providing input on the project.	
Identifying a person to act as a community liaison concerning on-site construction activity and operations, and providing contact information for the community relations officer to the surrounding community.	Incorporated. Pursuant to Mitigation Measure MM 4.3-10, the Project applicant shall establish a construction coordinator who will respond to any local complaint about construction activities, ensure all appropriate construction notices have been made available to the public and all construction signs have been installed, and maintain an ongoing log of all construction-related complaints.
Warehouse Siting and Design Considerations	
Creating physical, structural, and/or vegetative buffers that adequately prevent or substantially reduce pollutant dispersal between warehouses and any areas where sensitive receptors are likely to be present, such as homes, schools, daycare centers, hospitals, community centers, and parks.	Incorporated. Pursuant to Mitigation Measure MM 4.1-3, the Project applicant shall submit a landscape plan that complies with the Kern County Zoning Ordinance requirements in Chapter 19.86– Landscaping. Specifically, the landscape plan requires a 20-foot-wide perimeter buffer along any visible boundary from the Boughton Drive and Airport Drive frontages consisting of ground cover, shrubs, and trees.
Providing adequate areas for on-site parking, on-site queuing, and truck check-in that prevent trucks and other vehicles from parking or idling on public streets.	Incorporated. Project plans have been reviewed by the County for adequate on-site parking and queuing in order to prevent trucks from parking or idling on public streets.
Screening dock doors and on-site areas with significant truck traffic with physical, structural, and/or vegetative barriers that adequately prevent or substantially reduce pollutant dispersal from the facility toward sensitive receptors.	Incorporated. Pursuant to Mitigation Measure MM 4.1-3, the Project applicant shall submit a landscape plan that complies with the Kern County Zoning Ordinance requirements in Chapter 19.86– Landscaping. Specifically, the landscape plan requires a 20-foot-wide perimeter buffer along any visible boundary from the Boughton Drive and Airport Drive frontages consisting of ground cover, shrubs, and trees.
Air Quality and Greenhouse Gas Emissions Analysis and Mitigation	
Requiring off-road construction equipment to be zero-emission, where available, and all diesel-fueled off-road construction equipment, to be equipped with CARB Tier IV-compliant engines or better, and including this requirement in applicable bid documents, purchase orders, and contracts, with successful contractors demonstrating the ability to supply the compliant construction equipment for use prior to any ground-disturbing and construction activities.	Largely incorporated. Pursuant to Mitigation Measure MM 4.3-3, on-road and off-road diesel equipment shall use diesel particulate filters (or the equivalent) if permitted under manufacturer's guidelines. In addition, Tier 4 engines shall be used on all equipment when available.
Prohibiting off-road diesel-powered equipment	Incorporated. As required by Mitigation Measure

Best Practice Measure	Applicability and Incorporation
from being in the "on" position for more than 10 hours per day.	MM 4.3-3c, construction equipment shall not operate longer than eight cumulative hours per day.
Providing electrical hook ups to the power grid, rather than use of diesel-fueled generators, for electric construction tools, such as saws, drills and compressors, and using electric tools whenever feasible.	Largely Incorporated. As required by Mitigation Measure MM 4.13-4, electric air compressors and similar power tools, rather than diesel equipment, shall be used where feasible.
Forbidding idling of heavy equipment for more than two minutes.	Largely Incorporated. California Air Resources Board's Regulation for In-Use Off-Road Diesel Vehicles currently limits idling to no more than five consecutive minutes.
Keeping on-site and furnishing to the lead agency or other regulators upon request, all equipment maintenance records and data sheets, including design specifications and emission control tier classifications.	Incorporated. As required by Mitigation Measure MM 4.3-3a, all equipment shall be maintained in accordance with the manufacturer's specifications.
Conducting an on-site inspection to verify compliance with construction mitigation and to identify other opportunities to further reduce construction impacts.	Incorporated. Pursuant to Mitigation Measure MM 4.3-3, the Lead Agency shall conduct an on-site inspection to verify compliance with construction mitigation.
Requiring on-site equipment, such as forklifts and yard trucks, to be electric with the necessary electrical charging stations provided.	Incorporated. As required by Mitigation Measure MM 4.8-1a, only electric-powered off-road equipment (for example, forklifts, indoor material handling equipment) shall be utilized on-site for daily warehouse and business operations.
Forbidding trucks from idling for more than two minutes and requiring operators to turn off engines when not in use.	Largely Incorporated. Title 13, California Code of Regulations, Section 2485, currently limits idling of diesel-fueled commercial motor vehicles with gross vehicle weight ratings greater than 10,000 pounds to no more than five consecutive minutes.
Constructing electric truck charging stations proportional to the number of dock doors at the project.	Incorporated. As required by Mitigation Measure MM 4.6-2, in addition to the number of electric vehicle capable spaces provided with electric vehicle supply equipment required by the current California Green Building Standards, the Project shall provide an additional 2% of electrical vehicle capable spaces with electrical vehicle supply equipment.
Constructing electric light-duty vehicle charging stations proportional to the number of parking spaces at the project.	
Unless the owner of the facility records a covenant on the title of the underlying property ensuring that the property cannot be used to provide refrigerated warehouse space, constructing electric plugs for electric transport refrigeration units at every dock door and requiring truck operators with transport refrigeration units to use the electric plugs when at loading docks.	Incorporated. Mitigation Measure MM 4.8-1 requires all TRUs entering the Project site be plug-in capable and electrical hookups to be provided at the loading bays for tenants requiring cold storage.
Installing solar photovoltaic systems on the project site of a specified electrical generation capacity, such as equal to the building's projected energy needs.	Incorporated. The 2022 Building Energy Efficiency Standards (Energy Code) has solar photovoltaic (PV) system requirements for all newly constructed nonresidential buildings. Pursuant to Energy Code Section 140.10, the required solar PV system is intended to offset the annual electrical consumption of a mixed-fuel building such that it will self-utilize

Best Practice Measure	Applicability and Incorporation
	about 80% of the annual solar PV generation without battery storage, and about 90% with battery storage, over a year.
Improving and maintaining vegetation and tree canopy for residents in and around the project area.	Incorporated. The project would include on-site and off-site landscaping, including trees having a minimum planting height of 6 feet.
Sweeping surrounding streets on a daily basis during construction to remove any construction-related debris and dirt.	Incorporated. Mitigation Measure MM 4.3-2c requires streets adjacent to the Project site to be kept clean, and project-related accumulated silt to be removed.
Directing all lighting at the facility into the interior of the site.	Incorporated. Pursuant to Mitigation Measure MM 4.1-4, all lighting shall be directed downward and shielded to focus illumination on the desired areas only and avoid light trespass into adjacent areas.
Using full cut-off light shields and/or anti-glare lighting.	Incorporated. Pursuant to Mitigation Measure MM 4.1-4, all outdoor lighting shall be directed downward and shielded to focus illumination on the desired areas only and avoid light trespass onto adjacent properties and roadways. Lenses and bulbs shall not extend below the shields.
Installing climate control in the warehouse facility to promote worker well-being.	Incorporated. Proposed building would be consistent with the requirements of the California Building Code, including installing required climate control and air infiltration.

Key: TRU = Transport Refrigeration Unit; PV = photovoltaic

In addition to the measures specifically related to the Warehouse Projects Best Practices Memorandum above, **Mitigation Measure MM 4.8-1** requires the use of only electric-powered off-road equipment (for example, forklifts, indoor material handling equipment) for daily warehouse operations, tracking and reporting of efforts to meet a construction waste diversion target of 80%, marking of equipment containing more than five pounds of refrigerant for identification, and use of automatic lights where feasible to do so.

Further, as part of **Mitigation Measure MM 4.3-5**, the Project proponent would pay fees to fully offset Project emissions of NO_X, ROG, PM_{10}, and $PM_{2.5}$ to avoid any net increase in these pollutants. The payment would fund SJVAPCD's emission reduction programs. Types of emission reduction projects that have been funded in the past include electrification of stationary internal combustion engines (such as agricultural irrigation pumps), replacing diesel school buses, and replacement of old farm tractors. A full analysis of the SJVAPCD Emission reduction program is found in Appendix B.3. These emission offsets and emission reduction projects would further reduce GHG emissions within SJVAB.

Statewide GHG Reduction Measures

Since GHG emissions from the Project would primarily result from off-site mobile vehicle travel and indirect electricity use, emissions would continue to decline rapidly for future buildout years based on statewide regulations aimed at reducing GHG emissions from these sectors. Strategies

currently being implemented by CARB that may help in reducing the Project's GHG emissions and are summarized in **Table 4.8-4.**

Table 4.8-4: Select CARB GHG Emission Reduction Strategies

Strategy	Description
California Renewables Portfolio Standard	Sets a renewable electricity procurement goal of 60% by 2030 with interim targets of 44% by 2024 and 52% by 2027. Requires renewable energy and zero-carbon electricity system to supply 100% of electric retail sales by 2045.
Low Carbon Fuel Standard	Reduces the carbon intensity of transportation fuels sold in California by establishing performance standards that fuel producers and importers must meet each year beginning in 2011.
Light-Duty Vehicle Emissions Standards	Regulations adopted to reduce GHGs emissions from passenger vehicles and light duty trucks include Pavley Fuel Efficiency Standards, Advanced Clean Cars, and Advanced Clean Cars II.
Zero-Emission Vehicles	The Advanced Clean Cars II rule establishes a year-by-year roadmap such that by 2035, 100% of new cars and light trucks sold in California will be ZEVs.
Diesel Anti-Idling	Limits idling of diesel-fueled commercial vehicles to no more than five minutes at any given location.
Heavy-Duty Vehicle Emission Reduction Measures	Regulations adopted to reduce GHGs emissions from heavy-duty vehicles include the California Phase 1 GHG regulations, California Phase 2 GHG regulations, and Tractor-Trailer GHG Regulation.
Cap-and-Trade Program	Sets a firm limit on covered GHG emissions that decreases each year. GHG emissions associated with electricity consumed in California, whether generated in-state or imported, are covered. The Cap-and-Trade Program also covers fuel suppliers, whether the supplied fuel is refined in-state or imported.

Key: GHG = greenhouse gas; ZEV = zero-emission vehicle

These measures do not apply at the individual project level such as the Project; rather, they are statewide strategies that in some cases have resulted in legislation that would apply to the project but in other cases have not. While future legislation could further reduce the Project's GHG footprint, it would be speculative to try to analyze how unknown and/or currently unadopted future legislation might reduce GHG emissions, especially at the level of an individual project. Therefore, in accordance with *CEQA Guidelines* Section 15145 (which states that if, after a thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact), the impact of potential future legislation will not be further evaluated in this Draft EIR.

Conclusions

Due to the cumulative and global nature of climate change, without implementation of the mitigation measures, the impact related to the generation of GHG emissions, either directly or indirectly, that may have a significant impact on the environment would be potentially significant.

CEQA Guidelines Section 15130 notes that sometimes the only feasible mitigation for cumulative impacts may involve the adoption of ordinances or regulations rather than the imposition of conditions on a project-by-project basis. Global climate change is this type of issue. The causes and effects may not be just regional or statewide, they may also be worldwide. Given the uncertainties in identifying, let alone quantifying the impact of any single project on global warming and climate

change; the efforts made to reduce emissions of GHGs from the Project through design; and implementation of **Mitigation Measures MM 4.8-1** through **MM 4.8-3** listed below, **MM 4.3-3** and **MM 4.3-5** in Section 4.3, *Air Quality*, **MM 4.6-1** and **MM 4.6-2** in Section 4.6, *Energy*, and **MM 4.17-3** in Section 4.17, *Transportation and Traffic*; in accordance with *CEQA Guidelines* Section 15130, any further feasible emissions reductions would be accomplished through CARB regulations adopted pursuant to AB 32.

Mitigation Measures Considered and Rejected

The Office of the California Attorney General maintains a website with a list of CEQA mitigation measures for global climate change impacts. The Attorney General has listed some examples of types of mitigation measures that local agencies may consider offsetting or reducing global climate change impacts from a project.

More recently, the Attorney General published the Warehouse Projects Best Practices Memorandum discussed above. The Attorney General ensures that the presented lists are examples and not intended to be exhaustive but instead provide measures and policies that could be undertaken. Moreover, the measures cited may not be appropriate for every project, so the Attorney General suggests that the lead agency should use its own informed judgment in deciding which measures it would analyze, and which measures it would require, for a given project.

As discussed fully in Impacts 4.8-1 and 4.8-2, the Project has implemented all feasible and applicable measures to reduce air quality and GHG emissions. Either through regulatory compliance or mitigation measures, the Project would implement a vast majority of the recommended measures from the Attorney General's Warehouse Projects Best Practices Memorandum, carry out other state-of-the-art efficiency measures, and fully offset Project emissions of NO_X, ROG, PM_{10}, and $PM_{2.5}$ to avoid any net increase in these pollutants. The payment would fund SJVAPCD's emission reduction programs and further reduce GHG emissions within SJVAB.

CEQA does not require the County to utilize achieving net-zero GHG emissions as a significance threshold to evaluate the Project. Moreover, Lead Agencies have the discretion to formulate their own significance thresholds (State *CEQA Guidelines* Section 15064.7(b)). The determination by a lead agency of whether a project may have a significant effect on the environment calls for careful judgment, based to the extent possible, on scientific and factual data (State *CEQA Guidelines* Section 15064(b)(1)). Thus, establishing a single threshold of significance, while desirable in certain instances, may not be possible for every environmental impact, because the significance of an impact may vary with the setting. The final determination of whether a project is significant is within the purview of the County, as lead agency pursuant to Section 15064(b) of the CEQA Guidelines.

Here, the County has chosen to evaluate the Project against applicable State and regional GHG reduction plans, including the CARB 2022 Scoping Plan and KCOG 2022 RTP/SCS. As discussed under Impact 4.8-2, the Project would be consistent with the applicable plans; therefore, impacts would be less than significant, and no additional mitigation would be required.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.3-3 and MM 4.3-5** (Section 4.3, *Air Quality)*, **MM 4.6-1 and MM 4.6-2** (Section 4.6, *Energy*), and **MM 4.17-3** (Section 4.17, *Transportation and Traffic*) would be required, and

MM 4.8-1

a. Prior to issuance of occupancy permits, the project developer shall disclose to all tenants/business entities that only electric-powered off-road equipment (e.g. forklifts, material handling equipment, etc.) shall be utilized for all indoor activities for daily warehouse and business operations and a copy of disclosure documents shall be submitted to the Planning and Natural Resources Department to be kept on file.

b. Prior to issuance of grading permits, the project construction's General Contractor shall target a construction waste diversion rate of 80 percent. A monthly construction report shall be provided to the County documenting total waste generated, types of waste streams, and total waste recycled.

c. During operation and to the extent feasible for safe warehouse operations, automatic light switches shall be incorporated into the project.

d. During operation, any equipment containing greater than five pounds of refrigerant, procured or installed, shall be tagged so that project applicant and tenant can identify and verify all installed equipment.

MM 4.8-2 If tenant/business will utilize cold storage in the project, the project developer shall provide a disclosure to that user that requires all Transport Refrigeration Units (TRUs) entering the project site to be plug-in capable. The building systems shall be upgraded to provide electrical hookups as part of the tenant improvements for any tenant that requires cold storage. The electrical hookups shall be provided at loading bays for truckers to plug in any onboard auxiliary equipment and power refrigeration units while their truck is stopped. A copy of this required disclosure shall be provided to the Planning and Natural Resources Department prior to the issuance of occupancy permit for this specific user.

Level of Significance After Mitigation

With the implementation of **Mitigation Measures MM 4.3-3 and MM 4.3-5** (Section 4.3, *Air Quality)*, **MM 4.6-1 and MM 4.6-2** (Section 4.6, *Energy*), **MM 4.8-1, MM 4.8-2** and **MM 4.17-3** (Section 4.17, *Transportation and Traffic*), impacts would be less than significant after mitigation.

Impact 4.8-2: Conflict with any Applicable Plan, Policy, or Regulation Adopted for the Purpose of Reducing the Emissions of Greenhouse Gas.

The Project regulatory setting (Section 4.8.3, *Regulatory Setting*) describes the applicable plans, policies, and regulations adopted at federal, state, and local levels for the purpose of reducing GHG emissions in Kern County. As discussed above, impacts were evaluated based on whether the project would be consistent with the State's applicable GHG reduction goals, plans, policies, and regulatory requirements as well as other federal, state, and local policies, as provided in the following analyses.

KCOG 2022 RTP/SCS

As discussed above in Section 4.8.3, CARB set KCOG's targets for GHG emissions reductions from passenger vehicles and light-duty trucks at 9% per capita by 2020 and 15% per capita by 2035 as compared to 2005. These reduction targets are reflected in KCOG's 2022 RTP/SCS (KCOG 2022). Because emissions in the transportation sector are closely related to passenger vehicle travel, a mandated reduction essentially requires KCOG to devise a regional plan and a series of strategies that will produce a per capita reduction in passenger vehicle VMT.

To determine whether the Project would conflict with the GHG emissions reduction targets in the KCOG RTP/SCS, the VMT associated with the Project was compared to the KCOG targets. VMT was analyzed as part of the transportation and traffic analysis completed for the project (see *Traffic Impact and Vehicle Miles Traveled (VMT) Analysis Report,* in Appendix J of this Draft EIR), discussed in Section 4.17.4, *Transportation and Traffic, Impacts and Mitigation Measures.* The VMT analysis summarized in Impact 4.17-2 determined that the Project generated home-based work VMT per employee would be less than the significance threshold for both baseline conditions (2020) and future cumulative conditions (2046). Therefore, the Project would be consistent with KCOG's VMT reduction targets and associated GHG emissions reduction targets and would not conflict with the KCOG 2022 RTP/SCS.

CARB 2022 Scoping Plan

The CARB 2022 Scoping Plan describes the approach California will take to meet its AB 32 GHG reduction targets of at least 40% below 1990 emissions by 2030 and at least 85% below 1990 levels by 2045, assesses progress toward the statutory 2030 target, and lays out a path to achieve carbon neutrality no later than 2045. Unlike previous Scoping Plans that separated out individual economic sectors, the CARB 2022 Scoping Plan focuses on the accelerated deployment of clean technology and energy within every sector and approaches decarbonization from two perspectives: (1) managing a phasedown of existing energy sources and technology and (2) ramping up, developing, and deploying alternative clean energy sources and technology over time.

The CARB 2022 Scoping Plan calls for an aggressive reduction of fossil fuels wherever they are currently used in California. That means rapidly moving to zero-emission transportation; phasing out the use of fossil gas for heating homes and buildings; providing communities with sustainable options for walking, biking, and public transit to reduce reliance on cars; and continuing to build out clean, renewable energy generation to displace fossil fuel fired electrical generation.

Successfully achieving the outcomes called for in this Scoping Plan would reduce demand for liquid petroleum by 94% and total fossil fuel by 86% in 2045 relative to 2022.

The CARB 2022 Scoping Plan identifies strategies to reduce California's GHG emissions in support of AB 32. Many of the strategies identified in the Scoping Plan are more programmatic and are not applicable to individual development projects. **Table 4.8-5**, summarizes the Project's consistency with applicable strategies in the CARB 2022 Scoping Plan.

Table 4.8-5: Summary of Project Consistency with CARB 2022 Scoping Plan

Strategies for Achieving Success	Project Consistency
Transportation Sustainability	
Achieve 100% ZEV sales of light-duty vehicles by 2035 and medium- and heavy-duty vehicles by 2040.	**Not Applicable.** These are statewide measures that apply to vehicle manufacturers. However, the Project would benefit indirectly given that light-duty vehicles, medium heavy trucks and heavy heavy-duty trucks associated with the Project would be compliant with ZEV transition requirements.
Develop a rapid and robust network of ZEV refueling infrastructure to support the needed transition to ZEVs.	**Consistent.** Infrastructure for the Project would be designed to support the transition to ZEV as per CALGreen Standards. **MM 4.6-2** requires electric vehicle capable spaces with electric vehicle supply equipment in excess of the CALGreen requirements.
Accelerate the reduction and replacement of fossil fuel production and consumption in California.	**Not Applicable.** This action is directed at State agencies. The Project will comply with any applicable regulations developed to reduce fossil fuel consumption in California.
Achieve a per capita VMT reduction of at least 25% below 2019 levels by 2030 and 30% below 2019 levels by 2045.	**Consistent.** As explained above, based on the Transportation and Traffic analysis prepared for the Project, the Project's VMT would not exceed the VMT per capita target set for KCOG and reflected in the RTP/SCS. As a result, the Project would be consistent with efforts to reduce per capita VMT.
Biomass supply is used to produce conventional and advanced biofuels, as well as hydrogen.	**Consistent.** Off-road construction equipment would utilize renewable diesel in compliance with CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation. On-road diesel trucks would also utilize these fuels consistent with the LCFS.
Clean Electricity Grid	
Per SB 350, double statewide energy efficiency savings in electricity and fossil gas end uses by 2030, through a combination of energy efficiency and fuel substitution actions.	**Not applicable.** This measure would apply to utilities and not to individual development projects. The Project would benefit indirectly by purchasing electricity from a utility subject to the SB 350 Renewable Mandate and RPS requirements.
Per SB 100 and SB 1020, achieve 90%, 95%, and 100% renewable and zero-carbon retail sales by 2035, 2040, and 2045, respectively.	**Not applicable.** This measure would apply to utilities and not to individual development projects. The Project would benefit indirectly by purchasing electricity from a utility subject to the SB 100 and RPS requirements.
Construction Equipment: 25% of energy demand electrified by 2030 and 75% electrified by 2045.	**Consistent**. Construction equipment used for the Project would comply with CARB off-road regulation milestones for electrification and use of renewable

Strategies for Achieving Success	Project Consistency
	fuels. As required by **MM 4.13-4**, electric air compressors and similar power tools, rather than diesel equipment, shall be used for construction where feasible. Per **MM 4.3-3f**, all on-site off-road equipment and on-road vehicles shall meet the CARB engine emission standards or be alternatively fueled equipment, such as compressed natural gas, liquefied natural gas, or electric, as appropriate.
Sustainable Manufacturing and Buildings	
All electric appliances beginning 2026 (residential buildings) and 2029 (commercial buildings), contributing to 6 million heat pumps installed statewide by 2030.	**Consistent.** The Project will comply with State Building Energy Efficiency Standards, appliance efficiency regulations, and CALGreen Standards in effect at the time building permits are received.
End fossil gas infrastructure expansion for newly constructed buildings.	**Consistent.** The Project would not require or result in the relocation or construction of new or expanded natural gas facilities.
In 2030s renewable natural gas (RNG) blended in pipeline, ramping up to 2040. Dedicated hydrogen pipelines constructed to serve certain industrial clusters.	**Not applicable.** This measure applies to natural gas suppliers. The Project would benefit indirectly through receipt of RNG.
Expand use of low GWP refrigerants within buildings.	**Consistent.** The Project would use low GWP refrigerants consistent with current CARB HFC Regulations. In addition, **MM 4.8-1d** requires tagging of any equipment containing greater than five pounds of refrigerant.
Carbon Dioxide Removal and Capture – N/A	
Short-Lived Climate Pollutants (Non-Combustion Gases)	
Expand the use of very low- or no-GWP technologies in all HFC end-use sectors, including emerging sectors, like heat pumps for applications other than space conditioning, to maximize the benefits of building decarbonization.	**Consistent.** The Project would use low GWP refrigerants consistent with current CARB HFC Regulations. In addition, **MM 4.8-1d** requires tagging of any equipment containing greater than five pounds of refrigerant.
Reduce anthropogenic black carbon by reducing fuel combustion commensurate with state's climate and air quality programs, particularly from reductions in transportation emissions and agricultural equipment emissions.	**Consistent.** All vehicles associated with the Project would comply with vehicle emission and fuel efficiency standards, resulting in reduced fuel consumption and GHG emissions.

Natural and Working Lands – N/A

It is also important to note that the CARB 2022 Scoping Plan identifies CARB's Cap-and-Trade Program as one of the strategies employed to reduce GHG emissions. The Cap-and-Trade Program places a limit on GHG emissions from the industrial, utility, and transportation fuels sectors. In accordance with SJVAPCD CEQA policy, the CARB's Cap-and-Trade Program is considered to be an adopted Statewide plan for reducing or mitigating GHG emissions, which includes emissions from the transportation fuel and energy sectors. As such, the SJVAPCD considers GHG emissions resulting from the combustion of fuels at the project level, either for energy use or transportation,

to be mitigated under the Cap-and-Trade Program, and therefore would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions.

As the Project would not conflict with either the 2022 RTP/SCS or the CARB 2022 Scoping Plan, there would be a less than significant impact related to a conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. It should be noted that the Project's consistency with the CARB 2022 Scoping Plan also satisfies consistency with AB 32 since the CARB 2022 Scoping Plan is based on the overall targets established by AB 32 and SB 32.

The Project would not have a potentially significant impact related to any conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Implementation of **Mitigation Measures MM 4.8-1** and **MM 4.8-2, MM 4.3-3** and **MM 4.3-5** in Section 4.3, *Air Quality*, **MM 4.6-1** and **MM 4.6-2** in Section 4.6, *Energy*, and **MM 4.17-3** in Section 4.17, *Transportation and Traffic* would further reduce GHG impacts, but these measures are not required to reduce **Impact 4.8-2** to a less than significant level.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (Section 4.3, *Air Quality*), **MM 4.6-1, MM 4.6-2** (Section 4.6, *Energy*) **Mitigation Measures MM 4.8-1**, **MM 4.8-2** and **MM 4.17-3** (Section 4.17, *Transportation and Traffic*) would be required.

Level of Significance After Mitigation

With the implementation of **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (Section 4.3, *Air Quality*), **MM 4.6-1, MM 4.6-2** (Section 4.6, *Energy*) **Mitigation Measures MM 4.8-1**, **MM 4.8-2** and **MM 4.17-3** (Section 4.17, *Transportation and Traffic*), impacts would be less than significant.

4.8.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

Cumulative impacts occur when the incremental effects of a project are significant when combined with similar impacts from other past, present, or reasonably foreseeable projects in a similar geographic area. The geographic scope for cumulative impacts to GHG emissions and global climate change is considered the SJVAB. Cumulative projects considered as part of this cumulative analysis include the project, other cumulative projects identified in Chapter 3, *Project Description*, **Table 3-8** of this Draft EIR, and other past, present, and reasonably foreseeable future projects within the incorporated and unincorporated areas of Kern County. As stated previously, climate change is a cumulative and global issue causing global impacts. Thus, a broad geographic scope of analysis is appropriate because climate change is influenced by global emissions and their associated effects.

Impact 4.8-3: Cumulative Greenhouse Gas Emissions Impacts

Global climate change occurs as a result of global emissions of GHGs. An individual project such as the Project does not have the potential to result in direct and significant global climate change. The *CEQA Guidelines* also emphasize that the effects of GHG emissions are cumulative and should be analyzed in the context of CEQA's requirements for cumulative impact analysis (*CEQA Guidelines* Section 15130[f]).

Without the necessary science and analytical tools, it is not possible to assess, with certainty, whether the Project's contribution would be cumulatively considerable within the meaning of *CEQA Guidelines* Sections 15065(a)(3) and 15130. CEQA, however, does note that more severe environmental problems have lower thresholds for determining that a project's contribution to cumulative impacts is significant. Given the position of the legislature in AB 32, which states that global warming poses serious detrimental effects, and the requirements of CEQA for the lead agency to determine that a project does not have a cumulatively considerable contribution, the effect of the Project's total emissions of 13,974 $MTCO_2e$ per year could be considered cumulatively considerable. This determination is based on the lack of clear scientific or other criteria for determining the significance of the Project's contribution to global climate change. This impact is therefore considered cumulatively potentially significant.

As there is no clear scientific or other criteria for determining the significance of the Project's contribution to global climate change, the Project's cumulative impacts would remain significant and unavoidable despite the implementation of the mitigation measures.

CEQA Guidelines Section 15130 notes that sometimes the only feasible mitigation for cumulative impacts may involve the adoption of ordinances or regulations rather than the imposition of conditions on a project-by-project basis. Global climate change is this type of issue. The causes and effects may not be just regional or statewide, they may also be worldwide. Given the uncertainties in identifying, let alone quantifying the impact of any single project on global warming and climate change, and the efforts made to reduce emissions of GHGs from the project through design, in accordance with CEQA Section 15130, any further feasible emissions reductions would be accomplished through CARB regulations adopted pursuant to AB 32.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (Section 4.3, *Air Quality*), **MM 4.6-1, MM 4.6-2** (Section 4.6, *Energy*) **Mitigation Measures MM 4.8-1**, **MM 4.8-2** and **MM 4.17-3** (Section 4.17, *Transportation and Traffic*) would be required.

Level of Significance After Mitigation

Despite the implementation of **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (Section 4.3, *Air Quality*), **MM 4.6-1, MM 4.6-2** (Section 4.6, *Energy*) **Mitigation Measures MM 4.8-1**, **MM 4.8-2** and **MM 4.17-3** (Section 4.17, *Transportation and Traffic*), cumulative impacts would be significant and unavoidable.

Section 4.9

Hazards and Hazardous Materials

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Section 4.9
Hazards and Hazardous Materials

4.9.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding hazards and hazardous materials. It also evaluates the IPG Industrial Project's (Project) potential impacts on sensitive receptors that would result from the implementation of the IPG Industrial Project, and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the 2022 Phase 1 Environmental Site Assessment Report prepared by Advanced Environmental Concepts, Inc. (Appendix G).

4.9.2 Environmental Setting

This section discusses the existing conditions related to hazards and hazardous materials in the proposed IPG Industrial Project (the Project) area and describes the environmental setting for hazardous materials and waste, airports, and wildfire hazards. Residences and other sensitive receptors such as schools are also described, as their proximate location to the Project site affects their exposure to the potential hazards described below. A description of the Project site relative to hazards and hazardous materials can also be found below.

Existing Setting

The Project site is located on approximately 49.05 acres, comprised of two privately owned parcels, in the central part of unincorporated Kern County, California. The Project site is approximately 1.7 miles north of the incorporated City of Bakersfield and approximately 3.1 miles east of the incorporated City of Shafter. The site is within the unincorporated community of Oildale, which extends further to the north, east, and west of the Project site. The Project site is situated approximately 1.4 miles northeast of State Route (SR) 99. Regional access to the Project site is provided by SR 99 via Airport Drive. Local access to the Project site is available via Airport Drive and Boughton Drive.

Land uses immediately surrounding the Project site are varied and consist of industrial, commercial, transportation, and residential uses. The residential uses are single- and multi-family residences, mostly east of the Project site with the nearest residence approximately 100 feet directly east. To the north, the Project boundary runs parallel to Boughton Drive with vacant undeveloped land across Boughton Drive and is zoned for light industrial use. To the east, the Project boundary runs parallel to Airport Drive, with a mix of uses across Airport Drive including Derrel's Mini Storage, Park Meadows Apartments, and Fabulous Burgers. To the south is Skyway Drive, where a FedEx Ship Center, Epic Jet Center, and Airman Flight Training are opposite of Skyway Drive. Meadows Field Airport is approximately 0.6 mile west along Hangar Drive.

Historical Property Use

The subject property is undeveloped and vacant; no permanent structures are on the property. According to available historical resources, the subject property had been farmed prior to 1937 into the 1990s, primarily with irrigated cover crops. The property has remained fallow from the 1990s to the present.

The general area has been used historically for agriculture and oil field production starting prior to the 1910s. Nearby offsite properties to the north, west, and east indicate that those properties appear to have been occupied by large crude oil aboveground storage tanks in the former Chevron Tank Farm. The Kern Front and Poso Creek Oil Fields are a short distance north of the general site area. Oil produced from these nearby fields have been historically stored in large surface impoundments throughout the region during production activities. Surrounding property adjoining the site had been planted with irrigated row crops and orchard crops.

Currently, the surrounding area consists of commercial, residential, and industrial development. North of the subject property is asphalt-paved Boughton Drive, followed by undeveloped ground that is similarly designated for industrial use. The south boundary is also undeveloped ground, Hangar Way and a commercial structure and yard. East of the subject property is asphalt-paved Airport Drive; across Airport Drive is a residential neighborhood, drive-thru restaurant, and a mini storage facility. West of the subject property is similar undeveloped property, along with the Meadows Field hangars, AVIS rental car return facility, and other commercial development.

Hazardous Materials and Waste

A hazardous material is any substance that, due to quantity, concentration, or physical or chemical properties, may pose a hazard to human health and the environment. Under Title 22 of the California Code of Regulations (CCR), the term "hazardous substance" refers to both hazardous materials and hazardous wastes. Both are classified according to four properties: (1) toxicity; (2) ignitability; (3) corrosiveness; and (4) reactivity (CCR Title 22, Chapter 11, and Article 3). A hazardous material is defined in CCR, Title 22 as:

> *A substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed (CCR, Title 22, Section 66260.10).*

Hazardous materials in various forms can cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property. Hazards to human health and the environment can occur during production, storage, transportation, use, or disposal of hazardous materials.

California Environmental Protection Agency's (CalEPA) Department of Toxic Substances Control (DTSC) defines hazardous waste as a waste with properties that make it potentially

dangerous or harmful to human health or the environment. They can be the by-products of manufacturing processes; discarded used materials; or discarded unused commercial products, such as cleaning fluids (solvents) or pesticides. In regulatory terms, a hazardous waste is a waste that exhibits one of the four characteristics of a hazardous waste: ignitability, corrosivity, reactivity, or toxicity. However, materials can be hazardous waste even if they are not specifically listed or do not exhibit any characteristic of a hazardous waste. For example, "used oil" products, which contain materials on California's M-list (which includes certain wastes known to contain mercury, materials regulated pursuant to the mixture or derived-from rules, and contaminated soil generated from a "clean up") can also be hazardous wastes.

Recognized Environmental Conditions

The Phase I Environmental Site Assessment (ESA) evaluated the site consistent with the procedures included in ASTM Practice E 1527-13. The purpose of the Phase I ESA was to identify any Recognized Environmental Conditions (RECs) in connection with the Project site. RECs present a material risk of harm to public health or the environment and generally are the subject of an enforcement action if brought to the attention of appropriate governmental agencies. The Phase I ESA additionally identifies Controlled RECs (CRECs), which are defined as a REC resulting from a past release that has been addressed to the satisfaction of the applicable regulatory authority. These hazardous substances are allowed to remain in place and are subject to institutional controls. Lastly, it identifies Historical RECs (HRECs), which are conditions which may have presented a material risk to public health and/or the environment but have now been mitigated to the satisfaction of a regulatory agency at the Project site.

The Phase I ESA did not locate any RECs, CRECs, or HRECs in connection with the Project site (Appendix G). The Phase I ESA identified de minimis conditions in connection with the Project site, which are defined as conditions related to a release that generally do not present a threat to human health or the environment. Additionally, they generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. The de minimis conditions and recommendations in the Phase I ESA are provided below:

- The subject property has a historical agricultural use as irrigated row crop ground from prior to 1937 to the late 1990s. There is the potential that chlorinated pesticide residues exceeding commercial-use Regional Screening Levels may be present.

  Since the subject property has been disturbed on a yearly basis by discing for weed abatement for the past approximate 25 years, it was recommended that no further investigation is warranted regarding the former agricultural use of the site.

- In the southeast portion of the subject property, Advanced Environmental Concepts Inc. (AEC) observed both older and newer soil stockpiles that have been dumped onsite; the genesis of the older-dumped material is currently unknown; however, the newer dumped material appears to be derived from construction waste and gardening waste (green waste). In addition, there a few small areas of illegal dumping surrounding the stockpiles of soil that primarily consist of household-related waste.

It was recommended to remove construction debris or material that would be considered "unsuitable" by a geotechnical engineer prior to conducting grading and disposing the inferred non-hazardous waste at an appropriate offsite landfill. It was also recommended to post a "no dumping" sign to deter future illegal dumping.

- A review of historical aerial photographs indicates that the subject property was adjacent to the former location of large aboveground impoundments used for crude oil storage in offsite Section 1 east of Airport Drive. The impoundments were in active use in the open ground east of Airport Drive from at least 1910 through the 1940s and the footprints visible through the early 1990s. Closure of these impoundments typically consisted of pumping out all accessible crude and then pushing the residual crude to the center so that it would dry and then be removed for offsite disposal. However, this mitigation effort did not take into account any crude oil that had previously percolated into the subsurface.

  Further investigation was not recommended unless crude oil-related waste is discovered onsite during grading.

Hazardous Materials Transportation

There is one major highway that is within proximity of the Project site: State Route 99. U.S. Route 99, also known as the "Golden State Highway," is a three-lane highway located approximately 2.3 miles west of the Project site. Additionally, SR 65 is located approximately 2.0 miles west of the Project site. The transportation of hazardous materials within the State of California is subject to various federal, State, and local regulations.

It is illegal to transport explosives or inhalation hazards on any public highway that is not designated for that purpose, unless the use of a highway is required to permit delivery or the loading of such materials (California Vehicle Code, Sections 31602 (b) and 32104(a)). The California Highway Patrol (CHP) designates through routes that are to be used for the transportation of hazardous materials. According to Section 2.5.4 of the Kern County General Plan Circulation Element, SR 99 (approximately 2.3 miles west), and SR 65 (approximately 2.0 miles west) are designated as adopted commercial hazardous materials shipping routes (Kern County 2009).

Airports

The nearest airport to the Project site is the Meadows Field Airport, a public airport located approximately 0.6 mile west of the Project site. The proposed Project is located within the Sphere of Influence (SOI) of the Meadows Field Airport. Meadows Field Airport is recognized as an Airport Influence Area, in which policies of the Kern County Airport Land Use Compatibility Plan (ALUCP) apply to the proposed Project, further described in Section 4.11, *Land Use and Planning*. Additionally, the Bakersfield Municipal Airport is located approximately 7.7 miles south of the Project site.

Fire Hazard Areas

The California Department of Forestry and Fire Prevention requires counties within the State to develop fire protection management plans that address potential threats of wildland fires. The Kern County Wildland Fire Management Plan identifies federal, State, and local responsibility areas for the entire County to facilitate coordination efforts for fire protection services. The California Department of Forestry and Fire Protection (CalFire) publishes Fire Hazards Severity Zone Maps for the State Responsibility Areas (SRA); however, the Project site is not located within a State Responsibility Area. The Project site is located in a local responsibility area (LRA) for which the County of Kern is responsible for providing fire protection. Impacts related to wildfire hazards are further discussed in Section 4.20, *Wildfire*, of this Draft EIR.

Hazardous Materials Release Sites in the Area – Cortese List

A records search was conducted of government databases compiled pursuant to the State of California Hazardous Waste and Substances Sites (Cortese) List (Government Code §65962.5) to identify any government listed hazardous materials or waste sites located on or within a 1-mile radius of the Project area. This database search included sites that did not necessarily contain contaminated soil or groundwater but were identified in federal or state databases for compliance with or enforcement of environmental regulations. A search was conducted on July 5, 2024. According to a review of the DTSC EnviroStor database, there are four hazardous release sites located within 1 mile of the Project site (DTSC 2024a). A review of the DTSC latest list of parcels relating to hazardous wastes pursuant to Section 65962.5 of the California Government Code indicates the Project site is not listed. The State Water Resources Control Board (SWRCB) GeoTracker database identified 11 Cleanup Program Sites located within 1 mile of the Project site (SWRCB 2024a). A brief summary of the relevant information obtained is listed below in **Table 4.9-1**.

Table 4.9-1: EnviroStor and GeoTracker List for One-Mile Radius of Project Site

Database	Site Name	Assessor Parcel Number	Description	Approximate Distance to Project Site
DTSC	Bakersfield Municipal Airport (J09CA0230) (80000136)	N/A	The site was used as a firing range that led to potential soil contamination from explosives (DTSC 2024b)	0.72-mile SW
DTSC	Highland Knolls School Site (15650003)	483-040-35-00	The facility led to potential soil contamination from hydrogen sulfide and methane (DTSC 2024c).	0.60-mile NE
DTSC	Lanxess Corporation (CAT080018658)	483-040-35-00	The facility was used for above ground storage tanks, hazardous waste treatment, illegal dumping, and manufacturing of petroleum and oil/water separators, which led to potential soil and soil vapor contamination from petroleum and polynuclear aromatic hydrocarbons	0.40-mile NE

Database	Site Name	Assessor Parcel Number	Description	Approximate Distance to Project Site
			(PAHS) (DTSC 2024d).	
DTSC	Tricor Refining LLC Tank Farm (80001851)	483-040-036, 483-040-35-8, 483-040-40	The facility was used for above ground storage tanks, hazardous waste treatment, illegal dumping, and manufacturing of petroleum and oil/water separators, which led to potential soil and soil vapor contamination from petroleum and PAHS (DTSC 2024e).	0.40-mile NE
SWRCB	AVIS Rent A Car Systems, Inc (T0602900771)	492-010-36	The facility led to potential soil contamination from gasoline (SWRCB 2024b).	0.54-mile SW
SWRCB	Bakersfield Pump Station (T0602900002)	483-040-01	The facility led to potential soil contamination from solvents (SWRCB 2024c).	0.88-mile NW
SWRCB	Chevron - North Meadows/Airport Plaza Property (SLT5FS004420)	491-011-41	The facility led to potential soil contamination from diesel, other petroleum, and total petroleum hydrocarbons (TPH) (SWRCB 2024d).	0.20-mile NE
SWRCB	Chevron Motor Transport (T0602900357)	492-010-37	The facility led to soil contamination from gasoline (SWRCB 2024e).	0.88-mile W
SWRCB	K.C. Air Fuel Services (T0602900527)	492-010-36	The facility led to soil contamination from gasoline (SWRCB 2024f).	0.81-mile SW
SWRCB	Ken Small Oilfield Service (T0602900131)	483-030-01	The facility led to soil contamination from gasoline (SWRCB 2024g).	0.95-mile N
SWRCB	Meadows Field (T10000012776)	492-010-37	The facility led to contamination from per- and polyfluoroalkyl substances (PFAS) (SWRCB 2024h).	0.88-mile SW
SWRCB	Mercury Air Center (T0602993706)	492-010-36	The facility led to soil contamination from gasoline (SWRCB 2024i).	0.81-mile SW
SWRCB	N.L. McCullough Co. (T0602900159)	483-030-12	The facility led to soil contamination from diesel (SWRCB 2024j).	0.87-mile NE
SWRCB	Witco Corp. Tank Farm (T0602900341)	483-040-11	The facility led to soil contamination from waste oil/motor/hydraulic/lubricating (SWRCB 2024k).	0.26-mile N

Notes:
DTSC = The Department of Toxic Substances Control
SWRCB = The State Water Resources Control Board

Schools

The County is served by 46 K-12 school districts (KCSS a). The Project site is within the boundaries of both Beardsley Elementary and Kern High School Districts (KCSS a). The closest schools to the Project site are Wingland Elementary School and North High School. These schools are located approximately within 1 mile of the Project site, and specific distances to the Project site along with other nearby schools are listed in Table 4.9-2.

Table 4.9-2: Active Schools in Proximity to the Project Site

School Name	Student Population (2022–2023)	District	Distance to Project Site (miles)
Wingland Elementary	751	Standard Elementary	0.82
Highland Elementary	729	Standard Elementary	1.38
Standard Elementary	575	Standard Elementary	1.71
Standard Middle	991	Standard Elementary	1.84
North Beardsley Elementary	752	Beardsley Elementary	1.56
San Lauren Elementary	368	Beardsley Elementary	2.41
North High	2,214	Kern High	0.86
Centennial High	2,175	Kern High	4.30
Vista West Continuation High	312	Kern High	4.51
Bakersfield High	3,004	Kern High	4.82
East Bakersfield High	2,421	Kern High	5.73

Source: Ed Data 2024

Disease Vectors

A disease vector is an insect or animal that carries a disease-producing micro-organism from one host to another. The Federal Insecticide, Fungicide and Rodenticide Act defines the term vector as "…any organism capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including mosquitoes, flies, fleas, cockroaches, or other insects and ticks, mites or rats."

The accumulation of organic wastes would act as attractors for various vectors. In addition, any depressed areas, ponds, or drainage channels would provide areas for the breeding of mosquitoes.

Mosquitoes

Mosquitoes are of particular concern because of their abundance and distribution. In Kern County, mosquitoes are most abundant and active between May and October. Mosquitoes require standing water to breed and can be prolific in areas with standing water, such as wetlands.

Adult female mosquitoes can deposit eggs in a variety of aquatic habitats and other sources that contain water. The immature stages of each mosquito species develop in particular habitats. In general, there are four mosquito habitat groups: agricultural, industrial, domestic, and natural sources. Typical sites within these habitat groups include:

- Agricultural Sources: irrigated pastures, dairies, and orchards.
- Industrial Sources: sewage treatment ponds and drain ditches.
- Domestic Sources: containers, debris in and around ponds, bird baths, pet watering dishes, animal troughs, septic tanks, catch basins, roadside ditches, leaky sprinkler systems, and stagnant swimming pools.
- Natural Sources: wetlands, floodplains, and rain pools.

All species of mosquitoes require standing water to complete their growth cycle. Therefore, any standing body of water represents a potential mosquito breeding habitat. Although mosquitoes typically stay close to suitable breeding habitat and blood-meal hosts, they are known to travel up to 10 miles under breezy conditions. The breeding period for mosquitoes depends on temperature but generally occurs in March through October.

Water quality also affects mosquito reproduction. Generally, poor-quality water (e.g., water with limited circulation, high temperature, and high organic content) produces greater numbers of mosquitoes than high-quality water (e.g., water with high circulation, low temperature, and low organic content). Typically, water bodies with water levels that slowly increase or recede produce greater numbers of mosquitoes than water bodies with water levels that are stable or that rapidly fluctuate.

In Kern County, the Kern Mosquito and Vector Control District is responsible for vector control and services the areas of Wasco, Buttonwillow, Shafter, Bakersfield, Lamont, and Arvin.

Mosquito Hazards

Mosquito-Borne Diseases

Mosquitoes are known to be the carriers of many serious diseases.

West Nile virus is the most important mosquito-borne disease affecting Kern County. In 2023, there were 324 human West Nile virus infections in California and 10 deaths (CDPH 2023). Of these cases, 15 (4.6%) were in Kern County.

In September 2002, the Kern County Department of Health formed a West Nile Virus Task Force and has subsequently released reports documenting cases; developed strategies to prevent the occurrence of West Nile virus; and generated public education information, such as information pamphlets. Statewide, there are 52 local agencies, including local mosquito abatement districts and the California Department of Health Services Arbovirus Field Testing Stations, which work cooperatively to routinely conduct surveillance and control of mosquitoes and the diseases they transmit throughout California.

Mosquito Species of Concern

In Kern County, two species of mosquito are primary targets for suppression. These two species, *Culex quinquefasciatus* and *Culex tarsalis*, are potential vectors of encephalitis and West Nile

virus. Other species of mosquitoes exist in Kern County that can cause a substantial nuisance in surrounding communities, but the *Culex* mosquito is the primary vector species of concern.

Although the West Nile virus can be transmitted by a number of mosquito species, *Culex* is the most common carrier. This disease is thought to be a seasonal epidemic that flares up in the summer and fall. West Nile virus is spread when mosquitoes that feed on infected birds bite humans and other animals.

The encephalitis mosquito (*Culex tarsalis*) breeds in almost any freshwater pond. Birds appear to be the primary blood-meal hosts of this species, but the insect will also feed on domestic animals and humans. This species is the primary carrier in California of western equine encephalitis, St. Louis encephalitis, and California encephalitis, and is considered a significant disease vector of concern in the state.

The house mosquito (*Culex quinquefasciatus*) usually breeds in waters with a high organic material content. This species is often identified by its characteristic buzzing. Although its primary blood-meal host is birds, the house mosquito may also seek out humans. The house mosquito is a vector of St. Louis encephalitis.

Flies

Nuisance flies have a life cycle consisting of an egg stage, three larval stages, a pupal stage, and an adult stage. Eggs are laid by a mature female fly onto a substrate appropriate for larval development. A single female can lay hundreds of eggs during her life. Nuisance fly larvae (grubs) are generally white in color and are blunt ended. They develop in wet substrates, especially dung pats and manure, wet or rotting feed, hay, and bedding straw. They feed on food particles found on the substrate. Fly larvae are not capable of developing in truly aqueous habitats; they need wet, but not overly wet, substrates.

Within the confines of a pupal case, the developing fly will undergo further changes to become a winged adult fly that will eventually emerge from the pupal case and disperse from the site. The length of time required to complete the development from egg to adult is temperature dependent and may be as short as seven days during the summer months in California.

Some nuisance flies are blood feeders and can inflict a painful bite while feeding on animals or humans. Blood feeding (or biting) flies include the stable fly and horn fly. Other flies do not bite (nonbiting flies), instead feeding on body secretions or liquefied organic matter. Nonbiting flies include the house fly, face fly, and garbage fly.

Adult flies are generally active during daylight hours and inactive at night. Nuisance flies are known to disperse from their development sites into surrounding areas; however, the distance and direction of dispersal are not well understood. Nonbiting nuisance fly species are likely to disperse further than those fly species that require animal blood meals. The habitat surrounding a breeding site plays a role in the distance of nuisance fly dispersal. Nuisance flies are likely to disperse further in open habitats, typical of rangeland and low agricultural crops, than they will in urban or

forested/orchard areas that contain substantially more vertical structure, on which flies may rest and that provide shade and higher humidity on hot summer days.

Most nuisance flies are not known to disperse great distances. Studies using marked house flies show that 60% to 80% of house flies were captured within 1 mile of their release point; 85% to 95% were caught within 2 miles of the release site within the first four days after they were turned loose. A few flies have been shown to travel further, but in general, fly control efforts for a community problem are focused within 1 mile of the source.

Rodents

There is a potential for significant populations of mice and rats due to the accumulation of organic waste. Rodents can spread, or accelerate the spread of, disease from contaminated areas to uncontaminated areas via their droppings, feet, fur, urine, saliva, or blood. In addition, mice provide a food source that could attract wild predatory animals (e.g., skunks, foxes, coyotes, and stray dogs), which could pose other disease problems.

Mice are generally nocturnal and secretive animals with keen senses of taste, hearing, smell, and touch. They are small enough to enter any opening larger than one quarter of an inch. Mice prefer cereal grains, if available, but will eat garbage, insects, meat, and even manure. Mice reproduce at high rates, making early control important in minimizing the potential for infestation. Although the life span of a mouse is only nine to 12 months, a female mouse can have five to 10 litters per year, with five or six young in each litter. Mice do not consume large quantities of food but can cause significant economic damage due to physical structure damage and site contamination.

4.9.3 Regulatory Setting

Federal

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) was established in 1970 to consolidate a variety of federal research, monitoring, standard-setting, and enforcement activities into one agency and to ensure environmental protection. The EPA's mission is to protect human health and to safeguard the natural environment—air, water, and land—upon which life depends. The EPA works to develop and enforce regulations that implement environmental laws enacted by Congress, is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance. Where national standards are not met, the EPA can issue sanctions and take other steps to assist the states and tribes in reaching the desired levels of environmental quality.

Federal Toxic Substances Control Act/Resource Conservation and Recovery Act/Hazardous and Solid Waste Act

The Federal Toxic Substances Control Act (1976) and the Resource Conservation and Recovery Act of 1976 (RCRA) established a program administered by the EPA to regulate the generation, transportation, treatment, storage, and disposal of hazardous waste.

The RCRA grants authority to the EPA to control hazardous waste from start to finish. This covers the production, transportation, treatment, storage, and disposal of hazardous waste. The RCRA also sets forth a framework for the management of non-hazardous solid waste. The RCRA allows individual states to develop their own programs for the regulation of hazardous waste, as long as they are at least as stringent as the RCRA. The State has developed the California Hazardous Waste Control Law (Health and Safety Code [HSC] sec. 25100 et. Seq. And 22 CCR sec. 66260.1 et seq.) and the EPA has delegated authority for RCRA enforcement to the State. Primary authority for the Statewide administration and enforcement of HWCL rests with the DTSC. The RCRA was amended in 1984 by the Hazardous and Solid Waste Act, which affirmed and extended the "cradle to grave" system of regulating hazardous wastes. The 1986 amendments to the RCRA enabled the EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law (United States Code [U.S.C.] Title 42, Chapter 103) provides broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA establishes requirements concerning closed and abandoned hazardous waste sites; provides for liability of persons responsible for releases of hazardous waste at these sites; and establishes a trust fund to provide for cleanup when no responsible party can be identified. CERCLA also enables the revision of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NCP (40 CFR, Part 300) provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, and/or contaminants. The NCP also established the National Priorities List. CERCLA was amended by the Superfund Amendments and Reauthorization Act on October 17, 1986.

Clean Water Act/Spill, Prevention, Control, and Countermeasure Rule

The Clean Water Act (CWA) (33 USC Section 1251 et seq.) was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and certain non-point source discharges to surface water. Those discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). In California, NPDES permitting authority is delegated to, and administered by, the nine Regional Water Quality Control Boards (RWQCBs). The Project is within the jurisdiction of the Central Valley RWQCB. Section 402 of the CWA

authorizes the California SWRCB to issue NPDES General Construction Storm Water Permit (Water Quality Order 99-08-DWQ), referred to as the "General Construction Permit." Construction activities can comply with and be covered under the General Construction Permit provided that they:

- Develop and implement a Storm Water Pollution Prevention Plan which specifies best management practices (BMPs) that will prevent all construction pollutants from contacting stormwater and with the intent of keeping all products of erosion from moving off-site into receiving waters
- Eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the nation
- Perform inspections of all BMPs. NPDES regulations are administered by the RWQCB
- Projects that disturb one or more acres are required to obtain NPDES coverage under the Construction General Permits

Other federal regulations overseen by the EPA relevant to hazardous materials and environmental contamination include Title 40 CFR Chapter 1, Subchapter D – Water Programs and Subchapter I – Solid Wastes. Title 40 CFR Chapter 1, Subchapter D, Parts 116 and 117 designate hazardous substances under the CWA. Title 40 CFR Part 116 sets forth a determination of the reportable quantity for each substance that is designated as hazardous. Title 40 CFR Part 117 applies to quantities of designated substances equal to or greater than the reportable quantities that may be discharged into waters of the United States.

Emergency Planning and Community Right-to-Know Act

Under the Emergency Planning and Community Right-to-Know Act, or Title III of the Superfund Amendments and Reauthorization Act, the EPA requires local agencies to regulate the storage and handling of hazardous materials and requires development of a plan to mitigate the release of hazardous materials. Businesses that handle any of the specified hazardous materials must submit to government agencies (i.e., fire departments or public health departments) an inventory of the hazardous materials, an emergency response plan, and an employee training program. The business plans must provide a description of the types of hazardous materials/waste on site and the location of these materials. The information in the business plan can then be used in the event of an emergency to determine the appropriate response action, the need for public notification, and the need for evacuation.

In 1990, Congress passed the Pollution Prevention Act, which requires facilities to report additional data on waste management and source reduction activities to the EPA under the Toxics Release Inventory Program. The goal of the Toxics Release Inventory is to provide communities with information about toxic chemical releases and waste management activities and to support informed decision-making at all levels by industry, government, nongovernmental organizations, and the public.

Hazardous Materials Transportation Act (P.L. 93-933, January 1975)

The Hazardous Materials Transportation Act (HMTA) is the federal legislation that regulates transportation of hazardous materials. The primary regulatory authorities are the U.S. Department of Transportation (USDOT), the Federal Highway Administration, and the Federal Railroad Administration. The Secretary of the USDOT receives the authority to regulate the transportation of hazardous materials from the HMTA, as amended and codified in 49 U.S.C. 5101 et seq. The Pipeline and Hazardous Materials Safety Administration (formerly the Research and Special Provisions Administration) was delegated the responsibility to write the hazardous materials regulations, which are contained in 49 CFR Parts 100-180. The HMTA requires that carriers report accidental releases of hazardous materials to the USDOT at the earliest practical moment, but no later than 12 hours after the occurrence of any incident (49 CFR Subtitle B, Chapter 1, Subchapter C, Part 171.15 Subpart B).

Associated Hazardous and Solid Waste Amendments (40 CFR 260)

Under the RCRA, individual states may implement their own hazardous waste programs, instead of the RCRA, as long as the state program is at least as stringent as the federal RCRA requirements. The DTSC administers and enforces the federal hazardous waste regulations, in addition to more stringent state hazardous waste regulations. In the state chapter in this section is the Hazardous Waste Control Act of 1972. This Act is the California Waste Management program, which is similar to, but more stringent than, RCRA program requirements.

The RCRA was amended by the Associated Hazardous and Solid Waste Amendments (HSWA), which affirmed and extended the concept of regulating hazardous wastes from generation through disposal. The HSWA specifically prohibits the use of certain techniques for the disposal of some hazardous wastes. 40 CFR, Part 260.1 and Part 260.2 provide the guidelines to establish a Hazardous Waste Management System. Part 260.1 defines the terminology, requirements and guidelines necessary to track hazardous waste activities, treatment, storage, and disposal, facility and keep certain records plus submit reports to the EPA at regular intervals. Part 260.2 addresses the availability or confidentiality of information available to the public including both written and electronic hazardous waste manifest.

Occupational Safety and Health Act (29 U.S.C. 651-678)

Under the authority of the Occupational Safety and Health Act of 1970, the Occupational Safety and Health Administration—a division of the Department of Labor—established health and safety standards for the workplace, including the reporting requirements for accidents and occupational injuries. Relevant regulations include those related to hazardous materials handling, employee protection requirements, first aid, and fire protection, as well as material handling and storage. Relevant portions are summarized below.

Hazard Communication (29 CFR 1910.1200)

The purpose of this section is to ensure that the hazards of all chemicals produced or imported are classified, and that information concerning the classified hazards is transmitted to employers and employees. The requirements of this section are intended to be consistent with the provisions of

the United Nations Globally Harmonized System of Classification and Labeling of Chemicals, Revision 3. The transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, safety data sheets and employee training.

Process Safety Management of Highly Hazardous Materials, 29 CFR 1910.119

This regulation establishes requirements for preventing or minimizing the consequences of catastrophic releases of toxic, flammable, reactive or explosive materials. The Process Safety Management regulation requires compiling process safety information, conducting process hazard analyses, written operating procedures, employee training and participation programs, pre-startup safety reviews, evaluation of mechanical integrity of critical equipment, contractor requirements, written procedures for managing change, hot work permit systems, incident investigations, emergency action plans, and compliance audits.

Federal Aviation Administration

The Federal Aviation Administration (FAA) regulates aviation at regional, public, private, and military airports. The FAA regulates objects affecting navigable airspace and structures taller than 200 feet, according to Federal Aviation Regulation 14 CFR Part 77. The U.S. and California Departments of Transportation also require the proponent to submit FAA Form 7460-1, Notice of Proposed Construction or Alteration. According to 14 CFR Part 77.5, notification allows the FAA to identify potential aeronautical hazards in advance, thus preventing or minimizing any adverse impacts on the safe and efficient use of navigable airspace. Any structure that would constitute a hazard to air navigation, as defined in 14 CFR Part 77, requires issuance of a permit from the California Department of Transportation's (Caltrans's) Aeronautics Program. The permit is not required if the FAA aeronautical study determines that the structure has no impact on air navigation.

State

Federal statutes establish national standards for the transportation, emission, discharge, and the disposal of harmful substances; however, implementation and enforcement of many of the large programs has been delegated to the states by the EPA. In general, states set stricter standards than those required by federal law.

Hazardous Materials and Hazardous Waste

Whether a material is deemed a hazardous material and/or a hazardous waste determines which state regulation will apply to it. According to HSC § 25124, materials become waste when the material is disposed of, burned or incinerated, or accumulated, stored or treated before or in lieu of being disposed of, burned or incinerated. Recyclable materials that are managed as provided in HSC § 25143.2 and 25143.9 are excluded from classification as waste. A hazardous waste is a waste that because of its quantity, concentration, or physical, chemical, or infectious characteristics may either:

- Cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness.
- Pose a substantial present or potential hazard to human health or the environment, due to factors including, but not limited to, carcinogenicity, acute toxicity, chronic toxicity, bioaccumulative properties, or persistence in the environment, when improperly treated, stored, transported, disposed of, or otherwise managed (HSC § 25117; 25141).

Hazardous Materials Release Response Plans and Inventory Act of 1985

The Hazardous Material Release Response Plans and Inventory Act (HSC, Division 20, Chapter 6.95, Sections 25500-25547.8) also known as the Business Plan Act (HSC, Division 20, Chapter 6.95, Sections 25500-25519) requires businesses using hazardous materials to prepare a plan that describes their facilities, inventories, emergency response plans, and training programs. Hazardous materials are defined as raw or unused materials that are hazardous and are part of a process or manufacturing step. Specifically, the California HSC Sections 25503 and 25505 require facilities that store hazardous materials in excess of 55 gallons, 500 pounds, or 200 cubic feet to submit Hazardous Materials Business Plans to the Certified Unified Program Agency (CUPA). This plan must include a hazardous materials inventory and address emergency response, planning, training, and evacuation.

Hazardous Waste Control Act of 1972 (HSC Division 20, Chapter 6.5)

The Hazardous Waste Control Act established the state hazardous waste management program, which is similar to, but more stringent than RCRA program requirements. The Hazardous Waste Control Law regulates the management of hazardous waste under HSC, Division 20 Chapter 6.5. This law defines hazardous wastes and the procedures for the handling, transportation, and disposal of hazardous waste. The implementing regulations prescribe management practices for hazardous wastes; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills. Hazardous waste is tracked from the point of generation to the point of disposal or treatment using hazardous waste manifests. The manifests list a description of the waste, its intended destination, and regulatory information about the waste. The hazardous waste control program is administered by the state DTSC and by local CUPAs.

Title 22 of the CCR Division 4.5, Environmental Health Standards for Management of Hazardous Waste provides the regulatory requirements for the implementation of the law. Chapter 11 defines a waste as hazardous if it has any of the following characteristics: ignitability, corrosivity, reactivity, and toxicity. Article 3 provides detailed definitions of each characteristic. Articles 4 and 5 provide lists of RCRA hazardous wastes, non-RCRA hazardous wastes, hazardous wastes from specific sources, extremely hazardous wastes, hazardous wastes of concern, and special wastes. Chapters 12, 13, and 14 provide the standards for hazardous waste generators and transporters as well as for the owners of transfer, treatment, storage, and disposal facilities.

Uniform Fire Code--Hazardous Materials Management Plan, Hazardous Materials Inventory Statement

The Uniform Fire Code (UFC) prescribes regulations that are consistent with best practices to address fire and explosion hazards that can arise from the storage, handling and use of hazardous substances, materials, and devices. The State Fire Marshal has adopted the UFC, with amendments, as the California Fire Code. Local fire departments are required to adopt local fire codes that are no less stringent than the California Fire Code (Brown n.d.).

According to Section 8001.3.1, a permit is required to store, use, or handle hazardous material in excess of specified quantities. A local fire chief may require permit applicants to prepare a Hazardous Materials Management Plan (Section 8001.3.2a) and a Hazardous Materials Inventory Statement (Section 8001.3.3a). These documents are consistent with the Hazardous Materials Business Plans (Brown n.d.).

Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)

Senate Bill 1082 of 1993 (HSC Chapter 6.11) required the Secretary of the CalEPA to establish a "unified hazardous waste and hazardous materials management" regulatory program (Unified Program) by January 1, 1996. Currently, there are 83 CUPAs in California. All counties have been certified by the Secretary. The *Unified Program* consolidates, coordinates, and makes consistent six existing programs.

The Unified Program provides for local implementation of the following six state and federal regulatory programs:

- The Aboveground Storage Tank program (and its Spill, Prevention, Control, and Countermeasures)
- The Hazardous Materials Release Response Plan and Inventory Program (Business Plan)
- The California Accidental Release Prevention Program (CalARP)
- The California UFC, Hazardous Materials Management Plan, and Hazardous Materials Inventory Statement
- The Underground Storage Tank program
- The Hazardous Waste Generator and Onsite Hazardous Waste Treatment program (tiered permitting)

The local implementing agencies are known as CUPAs (certified unified program agencies) or PAs (participating agencies) (Brown, n.d.).

California Environmental Protection Agency

The CalEPA was created in 1991, which unified California's environmental authority into a single cabinet-level agency and brought the California Air Resources Bboard, SWRCB, RWQCBs,

California Department of Resources Recycling and Recovery—formerly the Integrated Waste Management Board, DTSC, Office of Environmental Health Hazard Assessment, and Department of Pesticide Regulation—under one agency. These agencies were placed within the CalEPA "umbrella" for the protection of human health and the environment and to ensure the coordinated deployment of state resources. Their mission is to restore, protect, and enhance the environment, to ensure public health, environmental quality, and economic vitality.

Department of Toxic Substances and Control

DTSC, a department of CalEPA, is the primary agency in California for regulating hazardous waste, cleaning up existing contamination, and finding ways to reduce the amount of hazardous waste produced in California. DTSC regulates hazardous waste primarily under the authority of the Federal RCRA and the California Health and Safety Code (primarily Division 20, Chapters 6.5 through 10.6, and Title 22, Division 4.5). Other laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning.

USC 65962.5 (commonly referred to as the Cortese List) includes DTSC-listed hazardous waste facilities and sites, Department of Health Services lists of contaminated drinking water wells, sites listed by the SWRCB as having underground storage tank leaks or a discharge of hazardous wastes or materials into the water or groundwater and lists from local regulatory agencies of sites with a known migration of hazardous waste/material.

Hazardous Waste and Substances Sites (Cortese) List (California Government Code §65962.5)

This state code requires the state to compile a hazardous waste and substance list. The Cortese List is a planning document used to comply with the California Environmental Quality Act (CEQA) requirements by providing information about the location of hazardous materials release sites. The CalEPA must update the Cortese List annually.

California Accidental Release Prevention (CCR 2745.1, 1997)

The CalARP is designed to minimize the risk of extremely hazardous substances that can potentially cause immediate harm to the public and the environment, by requiring business owners and/or operators handling one or more regulated substance over the state and/or federal threshold to evaluate and determine the potential impacts of an accidental release. The CalARP mirrors the federal Risk Management Program (RMP) under the federal Clean Air Act Section 112(r), except that it includes external events and seismic analysis to the requirements and includes facilities with lower inventories of materials.

Facilities subject to the CalARP requirements must submit an RMP to the CUPA. The RMP must contain the required elements, which are similar to those required under the federal RMP program. The specific requirements are determined by the CalARP "program level" that applies to the facility. For example, the RMP typically must include safety information, process hazard analysis,

or hazard review, written operating procedures, training, maintenance, compliance audits, and incident investigations.

Emergency Services Act of 2009

Under the Emergency Services Act, the state developed an emergency response plan to coordinate emergency services provided by federal, State, and local agencies. Rapid response to incidents involving hazardous materials or hazardous waste is an important segment of the plan, as administered by the California Office of Emergency Services (CalOES), formerly the California Emergency Management Agency. CalOES is responsible for the coordination of overall state agency response to major disasters in support of local government. The office is responsible for assuring the state's readiness to respond to and recover from all hazards—natural, manmade, war-caused emergencies and disasters—and for assisting local governments in their emergency preparedness, response, recovery, and hazard mitigation efforts.

Local

Metropolitan Bakersfield General Plan

The Project is located within the Metropolitan Bakersfield General Plan (MBGP) area; therefore, would be subject to applicable policies and measures of the MBGP. The Land Use Element and Safety Element of the MBGP include goals, policies, and implementation measures related to hazardous and hazardous materials that apply to the Project, as described below.

Chapter II. Land Use Element.

Policies

Policy 6. Accommodate new development that is sensitive to the natural environment, and accounts for environmental hazards.

Chapter VIII. Safety Element.

General Provisions

Goals

Goal 4. Assure that fire, hazardous substance regulation and emergency medical service problems are continuously identified and addressed in a proactive way, in order to optimize safety and efficiency.

Implementation Measures

Implementation Measure 1. The adopted multi-jurisdictional Kern County, California Multi-Hazard Mitigation Plan, as approved by the Federal Emergency Management Agency, shall be used as a source document for preparation of environmental documents pursuant to CEQA, evaluation

of Project proposals, formulation of potential mitigation and identification of specific actions that could, if implemented, mitigate impacts from future disasters and other threats to public safety.

Implementation Measure 27. Facilities used for the manufacture, storage or use of hazardous materials shall comply with the uniform fire code, with requirements for siting or design to prevent on-site hazards from affecting surrounding communities in the event of inundation.

Implementation Measure 32. Require disaster response plans to include adequate capabilities for search and rescue, medical responses, interim morgue, emergency shelter, traffic and utility impacts, debris removal and disposal, as well as hazardous materials response.

Flooding

Implementation Measures

Implementation Measure 2. Develop procedures for the review of proposed facilities which use, manufacture or store hazardous materials proposed in areas of identified flood hazard.

Public Safety

Policies

Policy 7. Enforce ordinances regulating the use/manufacture/sale/ transport/disposal of hazardous substances, and require compliance with state and federal laws regulating such substances.

Policy 8. The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste.

Policy 12. Where recommended by appropriate local, State or Federal agencies for discretionary Projects, soils shall be tested for concentrations of agricultural chemicals prior to grading permit approval, whenever feasible. Contaminated soils shall be excavated and disposed of at a certified hazardous waste disposal facility whenever necessary.

Policy 16. All new discretionary development Projects shall be subject to environmental and design review on a site-specific, Project-by-Project basis, including but not limited to, an assessment to determine whether hazardous materials present potential health affects to human health as required by the Department of Environmental Services.

Kern County Multi-Jurisdiction Hazard Mitigation Plan

The purpose of the multi-jurisdiction hazard mitigation plan is to reduce or eliminate the long-term risk to people and property from natural hazards and their effects in the County. The 2019-2020 Update to the Plan is to help Kern County become less vulnerable to losses from future disasters. Hazard mitigation is the use of sustained, long-term actions to reduce the loss of life, personal injury, and property damage that can result from a disaster. The multi-jurisdictional plan includes the County and the incorporated municipalities of Arvin, Bakersfield, California City, Delano, Maricopa, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco. The County also encompasses areas of land controlled by federal and State land management agencies, including

the California Department of Forestry and Fire Protection, Bureau of Land Management, and Bureau of Reclamation. While other levels of government have jurisdiction in these parts of the County, the Hazard Mitigation Plan could also be used to document and coordinate mitigation efforts among federal, State, and local jurisdictions. This plan also covers 49 special districts that include school, airport, community service, water, recreation and park, sanitation, and other districts.

Kern County Fire Code

Kern County has adopted, by reference, portions of the California Building Standards Code and the UFC, with modifications and amendments, in Chapter 17.32 of the Kern County Code of Building Regulations (Fire Code). The purpose of this code is to prescribe the minimum requirements necessary to establish a reasonable level of fire safety to protect life and property from hazards created by fire, explosion, and dangerous conditions.

The Kern County Fire Code defines a hazardous fire area as any land that is covered with grass, grain, brush, or forest and situated so that a fire originating upon such land would present an abnormally difficult job of suppression (e.g., in an inaccessible location) and would result in great and unusual damage through fire or the resulting erosion.

Kern County Certified Unified Program Agency

The CUPA was developed to consolidate the administration of hazardous materials programs. In the Kern County, the CUPA is the Environmental Health Services Division. The city of Bakersfield's CUPA is the Bakersfield Fire Department. Under the CUPA, site inspections of aboveground storage tanks, underground storage tanks, hazardous waste treatment, hazardous waste generators, hazardous materials management and response plans, and the California Fire Code are consolidated in a single inspection. These departments also provide emergency response to hazardous materials events.

Kern County and Incorporated Cities Hazardous Waste Management Plan

State Assembly Bill 2948 (1986) authorizes local governments to develop comprehensive hazardous waste management plans. The intent of each plan is to ensure that adequate treatment and disposal capacity is available to manage the hazardous wastes generated within the local government's jurisdiction. The Kern County and Incorporated Cities Hazardous Waste Management Plan (Hazardous Waste Plan) was first adopted by Kern County, and each incorporated city, before September 1988, and was subsequently approved by the California Department of Health Services. The Hazardous Waste Plan was updated and incorporated by reference into the Kern County General Plan in 2004 as permitted by HSC Section 25135.7(b) and thus must be consistent with all other aspects of the KCGP.

The Hazardous Waste Plan provides policy direction and action programs to address current and future hazardous waste management issues that require local responsibility and involvement in Kern County. In addition, the Hazardous Waste Plan discusses hazardous waste issues and analyzes current and future waste generation in the incorporated cities, County, and State, and

federal lands. The purpose of the hazardous Waste Plan is to coordinate local implementation of a regional action to effect comprehensive hazardous waste management throughout Kern County. The action program focuses on development of programs to equitably site needed hazardous waste management facilities; to promote on-site source reduction, treatment, and recycling; and to provide for the collection and treatment of small quantity hazardous waste generators. An important component of the Hazardous Waste Plan is the monitoring of hazardous waste management facilities to ensure compliance with federal and state hazardous waste regulations. The siting criteria and any subsequent environmental documentation required pursuant to CEQA would also ensure the mitigation of adverse impacts associated with the siting of any new hazardous waste facility.

Kern County Airport Land Use Compatibility Plan

The purpose of the Kern County ALUCP is to establish procedures and criteria by which Kern County, and the affected incorporated cities, can address compatibility issues when making planning decisions regarding airports and military operations areas and the land uses around them. In general, the plan describes and maps influence areas in the vicinity of public use airports in Kern County where development restrictions are established to prevent the construction or placement of structures or objects which may be an obstruction to air navigation. The plan covers airports in the unincorporated portions of the County and the affected incorporated cities of Bakersfield, California City, Delano, Shafter, Taft, Tehachapi, and Wasco. Compatibility Criteria as included in the ALUCP is provided in **Figure 4.9-1.** The plan was last updated in 2012.

Figure 4.9-1: Kern County ACLUP Compatibility Criteria

Table 2A

Compatibility Criteria

Kern County Airport Land Use Compatibility Plan

Zone	Location[1]	Impact Elements	Maximum Densities		Required Open Land[4]
			Residential[2] (du/ac)	Other Uses (people/ac)[3]	
A	Runway Protection Zone or within Building Restriction Line	• High risk • High noise levels	0	10	All Remaining
B1	Approach/Departure Zone and Adjacent to Runway	• Substantial risk — aircraft commonly below 400 ft. AGL or within 1,000 ft. of runway • Substantial noise	0.1	60	30%
B2	Extended Approach/Departure Zone	• Significant risk — aircraft commonly below 800 ft. AGL • Significant noise	0.5	60	30%
C	Common Traffic Pattern	• Limited risk — aircraft at or below 1,000 ft. AGL • Frequent noise intrusion	15	150	15%
D	Other Airport Environs	• Negligible risk • Potential for annoyance from overflights	No Limit	No Limit	No Requirement
E	Special Land Use	• Compatibility Issues	15	150	No Requirement

Zone	Additional Criteria		Examples	
	Prohibited Uses[5]	Other Development Conditions[8]	Normally Acceptable Uses[9]	Uses Not Normally Acceptable[10]
A	• All structures except ones with location set by aeronautical function • Assemblages of people • Objects exceeding FAR Part 77 height limits • Hazards to flight[6]	• Dedication of avigation easement	• Aircraft tiedown apron • Pastures, field crops, vineyards • Automobile parking	• Heavy poles, signs, large trees, etc.
B1 and B2	• Schools, day care centers, libraries • Hospitals, nursing homes • Highly noise-sensitive uses (e.g. amphitheaters) • Storage of highly flammable materials[7] • Hazards to flight[6]	• Locate structures maximum distance from extended runway centerline • Dedication of avigation easement	• Uses in Zone A • Any agricultural use except ones attracting bird flocks • Warehousing, truck terminals • Two-story offices • Single-family homes on an existing lot	• Residential subdivisions • Intensive retail uses • Intensive manufacturing or food processing uses • Offices with more than two stories • Hotels and motels
C	• Schools • Hospitals, nursing homes • Hazards to flight[6]	• Dedication of overflight easement for residential uses	• Uses in Zone B • Parks, playgrounds • Most retail uses • Duplexes and medium-density apartments • Two-story motels	• Large shopping malls • Theaters, auditoriums • Large sports stadiums • Hi-rise office buildings with more than four stories
D	• Hazards to flight[6]	• Deed notice required for residential development	• All except ones hazardous to flight	
E	• Hazards to flight[6]	• Special development conditions	• Unique circumstance land use development[11]	

2-2

Table 2A Continued

Compatibility Criteria

Kern County Airport Land Use Compatibility Plan

NOTES

1 Zones may also apply elsewhere if an airport has atypical operational procedures or specialized aircraft activities.

2 Residential parcels should not contain more than the indicated number of dwelling units per gross acre. Clustering of units is encouraged as a means of meeting the Required Open Land requirements.

3 The land use should not attract more than the indicated number of people per acre at any time. This figure should include all individuals who may be on the property (e.g., employees, customers/visitors, etc.). These densities are intended as general planning guidelines to aid in determining the acceptability of proposed land uses. Special short-term events related to aviation (e.g., air shows), as well as non-aviation special events, are exempt from the maximum density criteria.

4 Open land requirements are intended to be applied with respect to the entire zone. This is typically accomplished initially as part of the community's general plan or a specific plan.

5 May be modified by airport-specific policies or decision of local governing body with appropriate adopted findings based upon evidence in the record.

6 See Policy Section 3.3.

7 Within the B1 and B2 zones, only the following flammable materials are permitted: aviation fuel, other aviation-related materials, and up to 2,000 gallons of nonaviation materials.

8 These conditions do not apply to ministerial actions.

9 These uses typically can be designed to meet the density requirements and other development conditions listed.

10 These uses typically do not meet the density and other development conditions listed. They should be allowed only if a major community objective is served by their location in this zone and no feasible alternative location exists.

11 The E zone accommodates land uses with special characteristics that are not normally allowed in the C Zone. Each E zone is unique to the requested land use and each individual airport. Special conditions of development may be formulated in order to minimize flight hazards.

Source: Comprehensive Airport Land Use Plan (1996)

2-3

Kern County Code of Ordinances Chapter 19.76 – Airport Approach Height (H) Combining District

The purpose of the Kern County Airport Height (H) Combining District is to minimize aviation hazards by regulating land uses, restricting the height of buildings and vegetation, and specifying design criteria necessary to promote aviation safety and to implement the requirements of the adopted ALUCP. The H district may be applied to areas within the vicinity of any public or general-use airport as provided for in the ALUCP. The H district design standards restrict the types of lighting, surface reflectivity, types and heights of structures and electrical or radio interference with air navigation communications. The H district design standards also require that storage of more than 2,000 gallons of nonaviation liquid fuel at privately-owned airports in the B-1 and B-2 airport land use compatibility zones be restricted to underground storage tanks. The H district further requires that except for the construction of single-family dwellings and permitted residential accessory structures on existing lots of record, no use, building, structure, plant, or tree shall be established until and application for site development plan review has been submitted to and approved by the Planning Director.

Lake Isabella Dam Failure Evacuation Plan

The Lake Isabella Dam Failure Evacuation Plan was developed and is maintained by the Kern County/Operational Area Office of Emergency Services. It provides the basic framework for response to an actual or potential failure of the Lake Isabella Dam, in accordance with the requirements of the Dam Safety Act (Government Code § 8589.5). The plan describes the specific actions to be taken by various response organizations and establishes a process and procedures for the mass evacuation and short-term support of populations at risk below the Dam. The plan defines evacuation routes within the County, separated into zones: North, Northwest, Southwest, Southeast, and Central. The North Zone indicates to travel north on the nearest major street, Airport Drive, North Chester or Manor Street to Merle Haggard Drive (KCFD 2009).

4.9.4 Impacts and Mitigation Measures

Methodology

The methodology for determining impacts relating to hazardous materials focuses on (1) the potentially significant impacts related to the routine transport, use, or disposal of hazardous materials and the release of hazardous materials into the environment; and (2) proposed Project components that could result in environmental contamination.

The methodology for determining impacts relating to wildland fires focuses on the fire severity at the Project site and the surrounding areas based on existing state and local maps and land characteristics.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a Project would normally be considered to have a significant impact if it would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 1/4 mile of an existing or proposed school
- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment
- For a Project located within the adopted Kern County Airport Land Use Compatibility Plan, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area
- Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan
- Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires
- Would implementation of the Project generate vectors (flies, mosquitoes, rodents, etc.) or have a component that includes agricultural waste?

Specifically, would the Project exceed the following qualitative threshold:

The presence of domestic flies, mosquitoes, cockroaches, rodents, and/or any other vectors associated with the Project is significant when the applicable enforcement agency determines that any of the vectors:

- Occur as immature stages and adults in numbers considerably in excess of those found in the surrounding environment
- Are associated with design, layout, and management of Project operations; and
- Disseminate widely from the property
- Cause detrimental effects on the public health or well-being of the majority of the surrounding population.

Project Impacts

Impact 4.9-1: The Project would create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

Construction

Construction of the proposed Project would not involve the routine transport, use, or disposal of substantive quantities of hazardous materials, as defined by the Hazardous Materials Transportation Uniform Safety Act. Most of the hazardous materials used and hazardous waste generated by the Project would occur during the temporary construction period. Hazardous materials used for construction would be typical of most construction projects of this type. Materials would include small quantities of gasoline, diesel fuel, oils, lubricants, solvents, detergents, degreasers, paints, ethylene glycol, dust palliative, herbicides, and welding materials/supplies. These materials would be transported to the Project site during construction, and any hazardous wastes that are produced as a result of the construction of the Project would be collected and transported away from the site in accordance with BMPs. During construction of the Project, material safety data sheets for all applicable materials present at the site would be made readily available to onsite personnel in accordance with required BMPs as part of a Stormwater Pollution Prevention Plan (Section 4.10, *Hydrology and Water Quality*). Workers would be trained to properly identify and handle all hazardous materials. Any hazardous waste or hazardous materials would be either recycled or disposed of at a permitted and licensed treatment and/or disposal facility. All hazardous waste shipped offsite for recycling or disposal would be transported by a licensed and permitted hazardous waste hauler and disposed of at an approved location.

During construction of the facilities, non-hazardous construction debris would be generated and disposed of in local landfills or recycled. Sanitary waste would be managed using portable toilets and portable hand washing facilities serviced by truck, located at a reasonably accessible onsite location.

Hazardous materials such as petroleum fuels and lubricants used on field equipment would be subject to the Material Disposal and Solid Waste Management Plan and other measures to limit releases of hazardous materials and wastes (see further discussion of BMP requirements in Section 4.10, *Hydrology and Water Quality*, of this Draft EIR). Recyclable materials including wood, shipping materials, and metals would be separated when possible, for recycling. Liquids and oils in the transformers and other equipment would be used in accordance with applicable regulations. The disposal of all oils, lubricants, and spent filters would be performed in accordance with all applicable regulations including the requirements of licensed receiving facilities.

Overall, the relatively limited use and small quantities of hazardous materials, and subsequently transport and disposal of such materials, during construction would be controlled through compliance with applicable regulations including the Kern County and Incorporated Cities

Hazardous Waste Management Plan. As such, impacts during construction would be less than significant.

Operation

The Project proposes the development of two single-story logistics warehouses and associated improvements. The primary function of the Project would be high cube and cold storage to facilitate material handling equipment and storage uses. Operations and maintenance activities associated with facilities would require very limited use of hazardous waste, as the primary use is a storage facility for material handling. The transport and/or storage of hazardous materials is not proposed or reviewed in this Draft EIR. Once a tenant is identified for the building, that tenant would be required to comply with all applicable federal, state, and local regulatory framework related to the storage, handling, and transport of any goods, products or materials used at the Project Site.

The proposed Project would produce a small amount of hazardous waste associated with maintenance activities, which could include paint, solvents, cleaners, and waste oil. Workers would be trained to properly identify and handle all hazardous wastes. Fuels and lubricants used in operations would be subject to the Spill Prevention, Containment, and Countermeasure Plan to be prepared for the proposed Project, as required by **Mitigation Measure MM 4.9-1**. Hazardous waste would be either recycled or disposed of at a permitted and licensed treatment and/or disposal facility. All hazardous waste shipped off-site for recycling or disposal would be transported by a licensed and permitted hazardous waste hauler and disposed of at an approved location. To mitigate any potential impacts of the use of hazardous materials, **Mitigation Measure MM 4.9-2**, requires that any hazardous materials be stored and managed properly as well as Material Safety Data Sheets be on site. Additionally, **Mitigation Measure MM 4.9-3**, requires IPG Kern County 52 Holdings, LLC (the project proponent) to consult with the Kern County Public Health Services Department – Environmental Health Division to determine the need to prepare a Hazardous Materials Business Plan that would describe proper handling, storage, transport, and disposal techniques; methods to be used to avoid spills and minimize impacts in the event of a spill. If needed, the Plan would ensure that all handling, storage, and disposal of hazardous materials would be conducted in accordance with proven practices to minimize exposure to maintenance workers and/or the public. As such, impacts during operation would be less than significant with mitigation.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.9-1** through **Mitigation Measure MM 4.9-3** would be required.

MM 4.9-1 Prior to the issuance of grading or building permits related to facilities requiring a Spill Prevention Control and Countermeasures Response Plan, the Project proponent shall prepare and submit a Spill Prevention Control and Countermeasures Response Plan to the Kern County Public Health Services Department. Environmental Health Division, and the California Department of Water Resources, for review and approval by those agencies. The Project

proponent shall ensure the Project is implemented in compliance with the approved Spill Prevention Control and Countermeasures Response Plan.

MM 4.9-2 Prior to the issuance of building permits, the Project proponent shall ensure that any hazardous materials be stored properly, and Material Safety Data Sheets shall be on site. Hazardous waste shall be managed properly. Training shall be provided to all personnel involved in handling of any hazardous materials or waste.

MM 4.9-3 The project proponent shall consult with the Kern County Public Health Services Department – Environmental Health Division – Hazardous Materials Program. If required, the project proponent shall submit a Hazardous Materials Business Plan to the Kern County Environmental Health Division Hazardous Materials program and with the California Environmental Reporting System (CERS) for hazardous materials/wastes stored on site. This Business Plan, as applicable, shall be submitted within 30 days of operation.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.9-1** through **MM 4.9-3**, impacts would be less than significant.

Impact 4.9-2: The Project would create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Construction

The Phase I ESA prepared for the proposed Project identified the following de minimis conditions and recommendations:

- The subject property has a historical agricultural use as irrigated row crop ground from prior to 1937 to the late 1990s. There is the potential that chlorinated pesticide residues exceeding commercial-use Regional Screening Levels may be present.

  It was recommended that no further investigation is warranted.

- In the southeast portion of the subject property, AEC observed both older and newer soil stockpiles that have been dumped onsite; the genesis of the older-dumped material is currently unknown; however, the newer dumped material appears to be derived from construction waste and gardening waste (green waste). In addition, there a few small areas of illegal dumping surrounding the stockpiles of soil that primarily consist of household-related waste.

  It was recommended to remove construction debris or material that would be considered "unsuitable" by a geotechnical engineer prior to conducting grading and disposing the inferred non-hazardous waste at an appropriate offsite landfill.

It was also recommended to post a "no dumping" sign to deter future illegal dumping.

- A review of historical aerial photographs indicates that the subject property was adjacent to the former location of large aboveground impoundments used for crude oil storage in offsite Section 1 east of Airport Drive. The impoundments were in active use in the open ground east of Airport Drive from at least 1910 through the 1940s and the footprints visible through the early 1990s. Closure of these impoundments typically consisted of pumping out all accessible crude and then pushing the residual crude to the center so that it would dry and then be removed for offsite disposal. However, this mitigation effort did not take into account any crude oil that had previously percolated into the subsurface.

  Further investigation was not recommended unless crude oil-related waste is discovered onsite during grading.

Potentially significant impacts that may result from construction of the Project include the accidental release of materials, such as cleaning fluids and petroleum products including lubricants, fuels, and solvents. Fuels and lubricants used in operations would be subject to the Spill Prevention, Containment, and Countermeasure Plan to be prepared for the proposed Project, as required by **Mitigation Measure MM 4.9-1**. **Mitigation Measure MM 4.9-2** would also be implemented to mitigate any potential impacts of the use of hazardous materials, ensuring that any hazardous materials be stored and managed properly as well as Material Safety Data Sheets be on site. Additionally, potential impacts would be mitigated through implementation of **Mitigation Measure MM 4.9-3**, which would provide methods to be used to avoid spills and minimize impacts in the event of a spill by providing procedures for handling and disposing hazardous materials as well as public and agency notification procedures for spills and other emergencies including fires, would reduce this impact to a less than significant level. Additionally, **Mitigation Measure MM 4.7-8** would require the preparation of a Soil Erosion and Sedimentation Control Plan to mitigate potential loss of soil and erosion, addressing drainage and runoff (Section 4.7, *Geology and Soils*).

Nearby sensitive receptors could be exposed to pollutant emissions during construction of the Project, resulting in a potentially significant impact. An adverse risk related to exposure to hazardous materials could result from the grading of the site, the application of herbicides, or other construction processes because of the distance between the sensitive receptors and the Project site. Implementation of **Mitigation Measure MM 4.4-3** (Section 4.3, *Biological Resources*, for full mitigation measure text) would ensure that proper procedures are followed when using herbicides. The construction phase has the potential to accidentally release cleaning fluids and petroleum products including lubricants, fuels, and solvents. Implementation of established construction controls would reduce the risk of hazardous materials spills and releases during Project construction. Implementation of **Mitigation Measure MM 4.9-4** would ensure that proper procedures are followed if suspect materials or wastes of unknown origin are discovered during construction. Therefore, impacts during construction would be less than significant with mitigation.

Operation

The operation of the facility has the potential to accidentally release hazardous materials into the environment in the form of waste associated with maintenance activities, which could include paint, solvents, cleaners, and waste oil.

Paints may consist of toxic materials and heavy metal compounds, including lead, arsenic and chromium. Paint used during operation may include oil-based paints, which contain solvents and chemicals that are flammable. The use of paints often includes the use of solvents, such as thinners, mineral spirits or turpentine and rags. Similarly, paint thinners, paint removers, or any other solvent also contain chemicals that are flammable.

Cleaning fluids are a mix of oils, detergents, surfactants, biocides, lubricants, anti-corrosive agents, and other potentially toxic ingredients. Typically, these fluids can cause a variety of health hazards, but mainly have negative effects on the skin, respiratory system, and can cause cancer. The two types of skin diseases associated with metal working fluids are dermatitis and acne. Cleaning fluids mist or aerosol can irritate the lungs, throat, and nose. Certain types of cancers can also be associated with frequent exposure to cleaning fluids which include cancer of the rectum, pancreas, larynx, skin, scrotum, and bladder.

Implementation of BMPs would ensure that hazardous materials used on-site during operation would neither be released into the environment nor expose operational personnel to hazardous materials. Overall, adherence to regulations and standard protocols during the storage, transportation, and usage of any hazardous materials, and implementation of **Mitigation Measures MM 4.9-1** through **4.9-9** would minimize or reduce potential impacts related to reasonably foreseeable upset and accident conditions involving the release of hazardous materials, to less than significant.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.9-1** through **MM 4.9-3**, as provided above, **MM 4.4-3** (Section 4.3, *Biological Resources*, for full mitigation measure text) and **MM 4.7-8** would be required (Section 4.7, *Geology and Soils*, for full mitigation measure text).

MM 4.9-4 The Project proponent shall continuously comply with the following:
If suspect materials or wastes of unknown origin are discovered during construction on the Project site, which is thought to include hazardous waste materials the following shall occur:

a. All work shall immediately stop in the vicinity of the suspected contaminant;

b. Project Construction Manager shall be notified;

c. Area(s) shall be secured as directed by the Project Construction Manager ;

d. Notification shall be made to the Kern County Environmental Health Services Division/Hazardous Materials Section for consultation, assessment, and appropriate actions; and

e. Copies of all notifications and correspondence shall be submitted to the Kern County Planning and Natural Resources Department.

MM 4.9-5 The following note shall appear on all final maps and grading plans:

"If during grading or construction, any plugged and abandoned or unrecorded wells are uncovered or damaged, the California Department of Geologic Energy Management Division will be contacted to inspect and approve any remediation required."

MM 4.9-6 Prior to grading or excavating, the Underground Service Alert One-call center shall be contacted. The proposed excavation area shall be delineated with white marking paint or with other suitable markers such as flags or stakes at least two days prior to commencing any excavation work. A "Dig Alert" ticket number would be issued at the time Underground Service Alert is contacted. Excavating is not permitted without this ticket number and is valid for twenty-eight days. Underground Service Alert would notify its member utilities having underground facilities in the area. Underground Service Alert does not notify nonmember utilities or energy companies, or Caltrans.

MM 4.9-7 Prior to the issuance of both grading and building permits, the Project proponent shall prepare notification requirements should the rupturing of a pipeline occur during excavation and construction activities, the Kern County Fire Department and Pacific Gas and Electric Company (PG&E should be contacted immediately. Natural gas transmission pipeline rupture most often indicates an emergency situation and 9-1-1 should be dialed. If an emergency is not indicated, the Kern County Fire Department Meadows Field Station 62, located at 1652 Sunnyside Court, should be contacted at (661) 393-9311. Or at the non- Emergency telephone number (661) 324-6551. The Project proponent shall follow all safety and cleanup regulations.

MM 4.9-8 Prior to the issuance of grading permits, any known or unknown on-site water wells not to be used for irrigation or industrial purposes shall be destroyed in accordance with California Well Standards as governed by the California Department of Water Resources and permit requirements of the Kern County Environmental Health Services Division.

MM 4.9-9 Prior to the issuance of building permits, the Project proponent shall prepare notification requirements should asbestos containing materials be identified during construction. The San Joaquin Valley Air Pollution Control District shall be contacted for removal and disposal procedures. These procedures shall be followed

in order to eliminate asbestos exposure to construction workers and surrounding workers and residents.

Level of Significance After Mitigation

With implementation of **MM 4.9-1** through **MM 4.9-9**, and **MM 4.7-8**, impacts would be less than significant after mitigation.

Impact 4.9-3: The Project would emit hazardous emissions or involves handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.

The Project site is not located within 0.25-mile of any school. The nearest school to the Project site is Wingland Elementary School, located approximately 0.82 miles southeast of the Project site. Therefore, there would be no impact related to hazardous emissions within 0.25-mile of a school.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

There would be no impact.

Impact 4.9-4: The Project would be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment.

A review of the CalEPA, DTSC latest list of parcels relating to hazardous wastes pursuant to Section 65962.5 of the California Government Code indicates the Project site is not listed. Additionally, the Phase 1 ESA that was conducted by AEC did not find evidence of RECs or CREC in connection with the Project site. Therefore, there would be no impact.

Mitigation Measures

No mitigation would be required.

Level of Significance after Mitigation

There would be no impact.

Impact 4.9-5: For a Project located within the adopted Kern County Airport Land Use Compatibility Plan, the Project would result in a safety hazard or excessive noise for people residing or working in the Project area.

The nearest aircraft operation facility identified by the Kern County ALUCP is the Meadows Field Airport, a public airport located approximately 0.6 mile west of the Project site. The proposed Project is located within the SOI of the Meadows Field Airport. Meadows Field Airport is recognized as an Airport Influence Area, in which policies of the Kern County ALUCP apply to the proposed Project, further described in Section 4.11, *Land Use and Planning*. The site's proximity to the Meadows Field Airport requires additional oversight given the overlain H (Airport Approach Height) Combining District, which is intended to minimize aviation hazards by regulating land uses, restricting the height of buildings and vegetation, and specifying design criteria necessary to promote aviation safety and to implement the requirements of the adopted ALUCP. The proposed project has a maximum height of 56 feet which conforms to Section 19.36.080, Height Limits, in the M-1 Base District which states the following development standards relevant to the project site:

a. *Buildings and structures shall not exceed six (6) stories or seventy-five (75) feet. , unless the building is set back from each street, alley, and lot line at least one (1) foot for each three (3) feet of height above six (6) stories or seventy-five (75) feet.*

b. *No building or structure shall exceed ten (10) stories or one hundred and thirty-five (135) feet.*

However, Section 19.76.080, Height Limits, of the H Combining District states no building, structure, plant, or tree in an H District shall exceed thirty-five (35) feet in height, except as may be approved pursuant to Sections 19.76.130 and 19.76.140 of the H Combining District chapter, and in no case shall the height exceed the height allowed by the base district with which the H District is combined. Section 19.76.130 lists the Site Development Plan Review process that the proposed project is currently undergoing and Section 19.76.140 lists the minimum requirements for the Site Development Plan Review application, which includes the following particular condition related to height:

- E. For any proposed structure or vegetation that will exceed a height of thirty-five (35) feet, a letter from the Federal Aviation Administration which shall state that the proposed development does not constitute a hazard to air traffic and does not violate any federal regulations. The letter shall also include any special conditions imposed by the Federal Aviation Administration.

The project proponent has secured letters from the FAA that indicate Determinations of No Hazards to Air Navigation for multiple coordinates within the proposed project site boundary (Appendix G.2). Safety hazards are not otherwise anticipated for people residing or working in the Project area with respect to the Project's proximity to an airport. Facilities developed are not expected to exceed FAA height limits. The Project would not develop structures that could impact operations associated with the airport. Furthermore, implementation of **Mitigation Measure**

MM 4.9-10 would mitigate potential impacts by ensuring compliance with requirements and regulations of the FAA and the County's Planning and Natural Resources Department. Impacts would be less than significant.

Mitigation Measures

Implementation of **MM 4.9-10** would be required.

MM 4.9-10 Prior to issuance of building and grading permits for portions of the Project that meet the Federal Aviation Administration's noticing requirements, the Project proponent/operator shall comply with the following:

a. Submit Form 7460-1 (Notification of Proposed Construction or Alteration) to the Federal Aviation Administration, in the form and manner prescribed in Code of Federal Regulation 77.17.

b. Obtain a Federal Aviation Administration issued "Determination of No Hazard to Air Navigation" or make the Federal Aviation Administration's recommended changes to the Project.

c. Provide documentation to the Kern County Planning and Natural Resources Department demonstrating the Project would comply with the Kern County Zoning Ordinance Figure 19.08.160 that all Project components in the flight area would create no significant military mission impact and a copy of the site plan has been provided to the appropriate military authority responsible for operations in the flight area.

d. Provide documentation to the Kern County Planning and Natural Resources Department demonstrating that a copy of the final site plan has been provided to the operators of Meadows Field Airport.

Level of Significance after Mitigation

With implementation of **Mitigation Measure MM 4.9-10**, impacts would be less than significant after mitigation.

Impact 4.9-6: The Project would impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

Local access to the Project site is available via Airport Drive and Boughton Drive. Direct access to the Project site is located off Airport Drive, which is the eastern portion of the proposed Project site. The Project site is situated approximately 1.4 miles northeast of SR 99. Regional access to the Project site is provided by SR 99 and Merle Haggard Drive via Airport Drive. In the event of an emergency, emergency vehicles would most likely access the site via SR 99, then exit onto Airport Drive. The nearest Kern County Fire Department fire station is located approximately 1.09 miles southeast of the Project site. The Bakersfield Police Department is located approximately 4.54 miles south of the Project site.

The Project site falls within plans such as Kern County Fire Department's Ready, Set, Go! Plan, which provides guidance for evacuation during a wildfire event (KCFD 2020), as well as the County's Emergency Operations Plan, which identifies an emergency management program, provides standard operating procedures, and provides for public awareness and education. The above emergency response plans provide guidelines on emergency preparedness and outlines the responsibilities of all agencies during an emergency, however, do not identify evacuation routes. Thus, the proposed Project would not physically interfere with the adopted emergency plans identified above. Additionally, the Project would adhere to any applicable guidelines set forth in the plans and not conflict with the processes or procedures outlined by the plans.

The Project site is within an identified emergency evacuation route within the evacuation plan for potential Lake Isabella Dam failure. Based on the plan, (adopted December 2009), a dam failure would result in flooding the Kern Canyon (Kern River) and greater Bakersfield area, which would include an evacuation of 260,000 people with the largest group of evacuees having access to a vehicle (KCFD 2009). Evacuation routes within the vicinity of the Project include routes traveling north of Kern River, which is approximately two miles south of the Project site, and onto Airport Drive to Merle Haggard Drive to access temporary parking and staging zones before heading west to SR 99.

The Project would generate construction trips, including the movement of oversize equipment, and the potential for roadway lane closures exist to the site during construction. These factors could temporarily increase the daily traffic volumes on surrounding local roadways and at intersections. It is anticipated that emergency access would be maintained at all times, and appropriate detours would be provided, as necessary. Additionally, the Project would implement **Mitigation Measure MM 4.9-11**, which requires the development and implementation of a Fire Safety Plan, ensuring that procedures and emergency fire precautions are implemented that can also be applied should other emergency evacuations occur, such as dam failure discussed above.

While the Project would not require closures of public roads—which could inhibit emergency vehicle access—during construction, heavy construction-related traffic could interfere with emergency response or emergency evacuation procedures in the event of an emergency, such as a wildfire or a chemical spill. Heavy construction-related traffic could also interfere with emergency response to other uses in the vicinity and, therefore, could represent a significant impact. As described in Section 4.17, *Transportation and Traffic*, implementation of **Mitigation Measure MM 4.17-4** requires the preparation of a Construction Traffic Control Plan. Implementation of this mitigation measure would minimize the potential for the Project to interfere with an adopted emergency response plan or emergency evacuation plan.

The proposed Project would not interfere with any known existing emergency response plans, emergency vehicle access, or personnel access to the Project site. The Project site is located in an area with mixed uses and existing access road that are available to access the property in the event of an emergency, as well as proposes new road improvements along Airport Road, Boughton Drive, and Hanger Way. Impacts related to impairment of the implementation of, or physical interference with, an adopted emergency response plan or emergency evacuation plan would be less than significant with mitigation.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.9-11** and **MM 4.17-4** (Section 4.17, *Transportation*) would be required.

MM 4.9-11 Prior to the issuance of grading permits, the project proponent shall develop and implement a Fire Safety Plan for use during construction and operation.

The project proponent shall submit the plan, along with maps of the project site and access roads, to the Kern County Fire Department for review and approval. The Fire Safety Plan shall contain notification procedures and emergency fire precautions, including, but not limited to, the following:

a. All internal combustion engines, both stationary and mobile, shall be equipped with spark arresters. Spark arresters shall be in good working order.

b. Light trucks and cars with factory-installed (type) mufflers shall be used only on roads where the roadway is cleared of vegetation. These vehicle types shall maintain their factory-installed (type) mufflers in good condition.

c. Fire rules shall be posted on the project bulletin board at the contractor's field office and in areas visible to employees.

d. Equipment parking areas and small stationary engine sites shall be cleared of all extraneous flammable materials.

e. Personnel shall be trained in the practices of the fire safety plan relevant to their duties. Construction and maintenance personnel shall be trained and equipped to extinguish small fires to prevent them from growing into more serious threats.

f. The project proponent shall make an effort to restrict the use of chainsaws, chippers, vegetation masticators, grinders, drill rigs, tractors, torches, and explosives to periods outside of the official fire season. When the above tools are used, water tanks equipped with hoses, fire rakes, and axes shall be easily accessible to personnel.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.9-11** and **4.17-4** (Section 4.17, *Transportation and Traffic,* for full mitigation measure text), impacts would be less than significant after mitigation.

Impact 4.9-7: The Project would expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.

According to the Fire Hazard Severity Zones map published by the California Department of Forestry and Fire Protection (CAL FIRE), the Project site is located approximately 1.10 miles from a High Fire Hazards Severity Zone (FHSZ) in an SRA, located northeast of the site. As described further in Section 4.20, *Wildfire*, wildfire associated in the High FHSZ are anticipated to prevail northwest away from the Project site. According to the 2007 CAL FIRE, Kern County FHSZ Maps for the LRAs, the project site is classified as LRA Moderate and LRA Unzoned. Moderate zones are typically wildland supporting areas of low fire frequency and relatively modest fire behavior. An Unzoned designation indicates that the area is urbanized and not susceptible to wildland conflagrations.

The Project proponent would implement **Mitigation Measure MM 4.9-11**, which would require the preparation and submittal of a Fire Safety Plan to the Kern County Fire Department for review and approval. The purpose of the Fire Safety Plan would be to eliminate causes of fire, prevent loss of life and property by fire, to comply with County and County Fire Protection District standards and to comply with the Occupational Safety and Health Administration standard of fire prevention, 29 CFR 1910.39. The Fire Safety Plan would address fire hazards of the different components of the Project and would include BMPs to reduce the potential for fire and extinguishment techniques if a fire were to occur. Additionally, the Project would implement **Mitigation Measure MM 4.15-1**, which requires the Project proponent to work with the County to determine how the use of sales and use taxes from construction of the project can be maximized. This would ensure public facilities, such as the fire department, are supported by the Project, as discussed further in Section 4.15, *Public Services*.

The Project site is located within an urbanized area. While the Project is not anticipated to significantly increase the risk of wildfire, **Mitigation Measures MM 4.9-11** and **4.15-1** would be implemented to ensure a Fire Safety Plan for construction and operation of the Project is incorporated as part of the Project as well as ensure that the use of sales and use taxes from construction are maximized. With mitigation, potential impacts from wildfire would be reduced to a less than significant level.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.9-11** and **MM 4.15 1** (Section 4.15, *Public Services*) would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.9-11** and **4.15-1**, impacts would be less than significant after mitigation.

Impact 4.9-8: The Project would generate vectors (flies, mosquitoes, rodents, etc.) or have a component that includes agricultural waste. Specifically, the Project would exceed the following qualitative threshold: The presence of domestic flies, mosquitoes, cockroaches, rodents, and/or any other vectors associated with the Project is significant when the applicable enforcement agency determines that any of the vectors:

- Occur as immature stages and adults in numbers considerably in excess of those found in the surrounding environment; and
- Are associated with design, layout, and management of Project operations; and
- Disseminate widely from the property; and
- Cause detrimental effects on the public health or well-being of the majority of the surrounding population.

The proposed Project will consist of the construction of two single-story buildings, including dedicated office space. The construction and operational phases of the Project are expected to bring a number of workers on-site. It is expected that the workers during both phases will produce a small quantity of waste which would be stored in enclosed containers, then transported to and disposed of at approved disposal facilities. Typically, waste that would attract vectors, such as flies, cockroaches, or rodents, to the Project site would consist of food-related waste. Additionally, standing water, agricultural products, and agricultural waste can attract mosquitoes, flies, cockroaches, and rodents.

During the construction phase, which is expected to occur over a period of 16 months, it is expected to bring a construction workforce of up to 100 individuals. Throughout this time, the construction workers will mostly bring food-related waste, which could attract a variety of vectors. Additionally, the operational phase is expected to employ approximately 437 employees over the course of three shifts. The proposed facility would operate 24 hours a day, 365 days a year. Despite the number of employees working on-site, the amount of waste that could attract vectors is expected to be small.

Regarding other types of waste that have the potential to attract vectors, both phases of the Project are not expected to produce them. These other types of vector-attracting waste consist of standing water, agricultural products, and agricultural waste. Underground retention basins are proposed as part of the Project, which are not expected to attract vectors. The Project is not agricultural in nature and will not produce any agricultural products or agricultural waste. To mitigate any potential impacts, **Mitigation Measure MM 4.9-12** would be implemented, which would consist of establishing a long-term trash abatement program for construction, operation, and maintenance. Additionally, **Mitigation Measure MM 4.9-13** would require the preparation and implementation of a Vector Control Plan. As a result of the small amount of waste being produced on-site and the implementation of **Mitigation Measure MM 4.9-12** and **4.9-13**, the impacts on generating vectors would be less than significant.

Mitigation Measures

MM 4.9-12 Prior to issuance of building permits, a long-term trash abatement program shall be established for construction, operations and maintenance. Trash and food items shall be contained in closed containers and removed weekly:

a. Trash and food items shall be contained in closed containers to be locked at the end of the day and removed at least once per week to reduce the attractiveness to opportunistic predators such as common ravens, coyotes, and feral dogs.

MM 4.9-13 Prior to the issuance of building permits, the project proponent shall prepare a Vector Control Plan and submit it to the Kern County Environmental Health Services Department and Kern Mosquito Abatement District for review and approval. The Plan shall include best management practices such as: good housekeeping measures to minimize harborage for vectors. Further controls may include the use of traps or other abatement controls, and/or the use of a licensed pest management service if needed.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.9-12** and **4.9-13**, impacts would be less than significant after mitigation.

4.9.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

As described in Chapter 3, *Project Description*, multiple projects are proposed throughout Kern County. As shown in Chapter 3, *Project Description*, other projects are either operational, in construction, or proposed within the region. The geographic scope of impacts associated with hazardous materials and wildfire generally encompasses a 0.25-mile-radius area around the project site. Similar to other potential impacts, such as those related to geology and soils, risks related to hazards and hazardous materials are typically localized in nature since they tend to be related to onsite existing hazardous conditions and/or hazards caused by the Project's construction or operation. A geographic scope of a 0.25-mile-radius area also coincides with the distance used to determine whether hazardous emissions or materials would have a significant impact upon an existing or proposed school, as discussed above. Given the existing topography, lack of vegetation for fuel, and other existing development surrounding the Project site, a 0.25-mile radius for cumulative fire hazard impacts is appropriate.

Potential impacts stemming from the routine transport, use, or disposal of hazardous materials would be considered less than significant. As stated previously, the proposed Project would use typical hazardous materials during the construction phase such as gasoline, diesel fuel, oils, lubricants, solvents, detergents, degreasers, paints, ethylene glycol, dust palliative, herbicides, and welding materials/supplies. Use of these hazardous materials would be subject to the Material

Disposal and Solid Waste Management Plan and other measures to limit releases of hazardous materials and wastes. During the operation phase, the proposed Project would also produce a small amount of hazardous waste associated with maintenance activities, which could include paint, solvents, cleaners, and waste oil. These materials will be stored and disposed of according to applicable regulations. With the implementation of **Mitigation Measures MM 4.9-1** through **4.9-3**, which consist of the Project operator preparing and maintaining a Spill Prevention Control and Countermeasures Response Plan and Hazardous Materials Business Plan as well as properly storing and managing any hazardous materials, the potential impacts would be less than significant. Additionally, **Mitigation Measure MM 4.7-8** would require the preparation of a Soil Erosion and Sedimentation Control Plan to mitigate potential loss of soil and erosion, addressing drainage and runoff (Section 4.7, *Geology and Soils*).

Regarding potential impacts to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment, impacts would be less than significant. As described previously, both phases of the proposed Project would have the potential to accidently release hazardous materials into the environment. These include lubricants, paint, solvents, cleaners, and fuel. To mitigate any potential impacts, **Mitigation Measure MM 4.9-1** through **4.9-9** and **MM 4.7-8** would be implemented.

For potential impacts involving the location of the Project and its proximity to an existing or proposed school, being located on a site potentially containing hazardous materials pursuant to Government Code Section 65962.5 and being located in an adopted Kern County ALUCP, the proposed Project would be less than significant. Although the Project site is with the SOI of the Meadows Field Airport as identified in the Kern County ALUCP, implementation of **Mitigation Measure MM 4.9-10** would ensure the proposed Project would coordinate with FAA and the County's Planning and Natural Resources Department noticing requirements. As such, the Project site would not be within the proximity of any of these locations. As result, impacts would be considered less than significant, and no mitigation is required.

Potential impacts from the Project regarding interference with an adopted emergency response plan or emergency evacuation plan would be less than significant. Direct access to the Project site would come from Airport Drive, and emergency vehicles would most likely use State Route 99 to Airport Drive to access the Project site in case of an emergency. As proposed, the Project site is not expected to interfere with any known existing emergency response plans. To mitigate any potential impacts, the Project would require implementation of **Mitigation Measure MM 4.17-4**, which requires preparation of a Construction Traffic Control Plan. Additionally, the Project would implement **Mitigation Measure MM 4.9-11**, which requires the development and implementation of a Fire Safety Plan, ensuring that procedures and emergency fire precautions are implemented. Impacts would be considered less than significant, and no mitigation would be required.

The potential impacts from the Project that would expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires would be considered less than significant. The proposed Project is not located within or near SRAs or land classified as very high fire hazard severity zones. Though the Project is located in an urbanized

area, any potential impacts would be mitigated by **Mitigation Measures MM 4.9-11** and **MM 4.15-1** from Section 4.15, *Public Services*. Thus, impacts would be less than significant.

Regarding the potential impacts stemming from the Project generating vectors or having a component that includes agricultural waste, impacts would be considered less than significant. The proposed Project is an industrial Project and would not have an agricultural component and would not produce agricultural waste. However, up to 100 employees will be on-site during the construction phase and approximately 437 employees will be present during the operational phase, though not all at once. The employees on-site will produce waste that has the potential to attract vectors such as flies, mosquitoes, and rodents. To mitigation any potential impacts, **Mitigation Measure MM 4.9-12** would be implemented, which consists of establishing a long-term trash abatement program for the construction, operation, and maintenance phases. **Mitigation Measure MM 4.9-13** would also be implemented, requiring the preparation of a Vector Control Plan. With the implementation of **Mitigation Measures MM 4.9-12** and **4.9-13**, impacts would be less than significant.

Conformance with existing State and County regulations, as well as implementation of **MM 4.4-3** (Section 4.3, *Biological Resources*, for full mitigation measure text), **MM 4.7-8**, of Section 4.7, *Geology and Soils* (Soil Erosion and Sedimentation Control Plan), **MM 4.9-1** through **MM 4.9-13**, **MM 4.15-1** of Section 4.15, *Public Service*s (Fire Safety Plan), and **MM 4.17-4** of Section 4.17, *Transportation* (Construction Traffic Control Plan), would further reduce the potential for cumulative impacts. In addition, implementation of appropriate safety measures during construction of the Project, as well as any other cumulative Project, would reduce the impact to a level that would not contribute to cumulative effects. Therefore, impacts related to hazardous materials would not be cumulatively significant.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.4-3** (Section 4.3, *Biological Resources*), **MM 4.7-8** (Section 4.7, *Geology and Soils)*, **MM 4.9-1** through **MM 4.9-13**, **MM 4.15-1** (Section 4.15, *Public Services*), and **MM 4.17-4** (Section 4.17, *Transportation and Traffic*) would be required.

Level of Significance After Mitigation

With the implementation of **Mitigation Measure MM 4.4-3** (Section 4.3, *Biological Resources*), **MM 4.7-8**, **MM 4.9-1** through **MM 4.9-13**, **MM 4.15-1**, and **MM 4.17-4**, cumulative impacts would be less than significant after mitigation.

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Section 4.10

Hydrology and Water Quality

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Section 4.10

Hydrology and Water Quality

4.10.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the environmental and regulatory settings regarding hydrology and water quality. It also addresses potential impacts of the proposed IPG Industrial Project (Project) on hydrology and water quality and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the 2023 Preliminary Drainage Report for Airport and Boughton Drive and the 2023 Water Supply Assessment for Warehousing at Airport Drive and Boughton Drive, both prepared by Kier and Wright Civil Engineers and Surveyors, Inc. (Kier + Wright) (Appendix H.1 and H.2, respectively). Will serve letters from North of River Sanitary District and Oildale Mutual Water Company (OMWC) are attached as Appendix H.3.

4.10.2 Environmental Setting

Regional Setting

The California Department of Water Resources (DWR) has divided the state into 10 Hydrologic Regions. The Project site is located in the southern portion of the San Joaquin Valley within the Tulare Lake Hydrologic Region (Tulare Lake Basin, or Basin). The Basin is a triangle-shaped, topographically closed basin bordered to the east by the Sierra Nevada, to the west by the Coast Ranges, and to the south by the Tehachapi Mountains.

The Project site is entirely within the OMWC service area and relies on OMWC as its public water supplier. OMWC groundwater is drawn from the Kern County Subbasin (Subbasin) within the Tulare Lake Hydrologic Region of the San Joaquin Valley Basin (**Figure 4.10-1**). The Subbasin is overseen by the basin manager of the Kern Groundwater Authority (KGA). The Subbasin is not adjudicated.

Tulare Lake Hydrologic Region

The Tulare Lake Basin is ranked as high priority in a statewide ranking of groundwater importance. The Basin comprises the drainage area of the San Joaquin Valley south of the San Joaquin River encompassing approximately 16,800 square miles (**Figure 4.10-1**).

Climate

Climate in the region is arid to semiarid with average annual precipitation of 6 to 7 inches per year. On average, the valley floor receives 8.32 inches of precipitation per year, most of which falls between November and April. Average temperatures are relatively high, and total evaporation exceeds total precipitation. Winter is generally mild, but an occasional freeze does occur and may

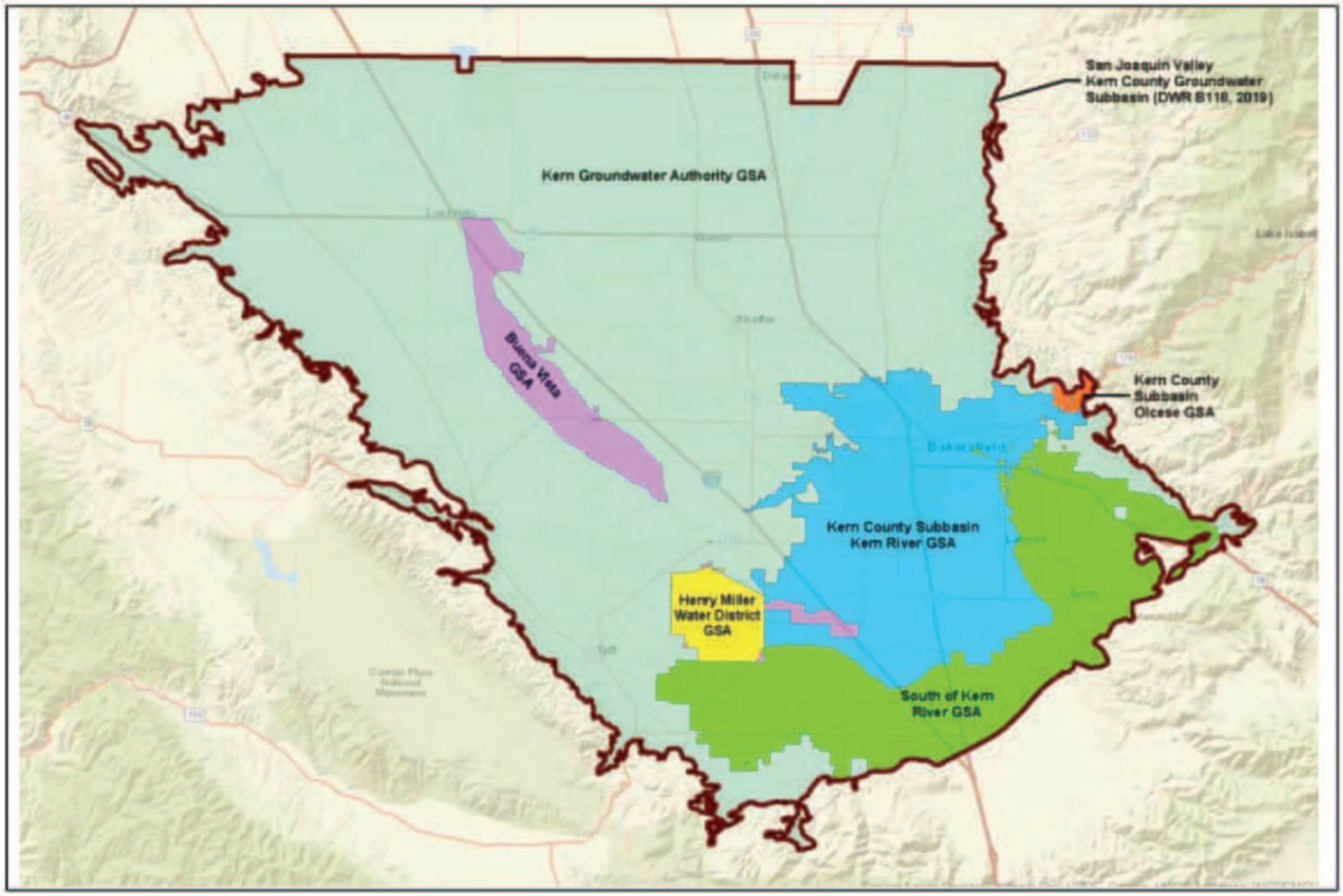
cause substantial agricultural damage. The majority of rainfall occurs between January and March. Summers are dry with high temperatures and low humidity. Average high temperatures range from 57.4 degrees Fahrenheit (°F) in January to 98.6°F in July. Average low temperatures range from 38.5°F in December and January to 69.2°F in July.

A "water year" in California runs from September 30 to October 1 of the following year. California typically receives 50 percent of its precipitation in the months of December, January, and February in the form of snow in the Sierras. The snowpack in the Sierras typically stores water throughout the winter months and then releases it beginning in the spring (National Weather Service and National Oceanic and Atmospheric Administration, 2023).

Soil Types and Erosion

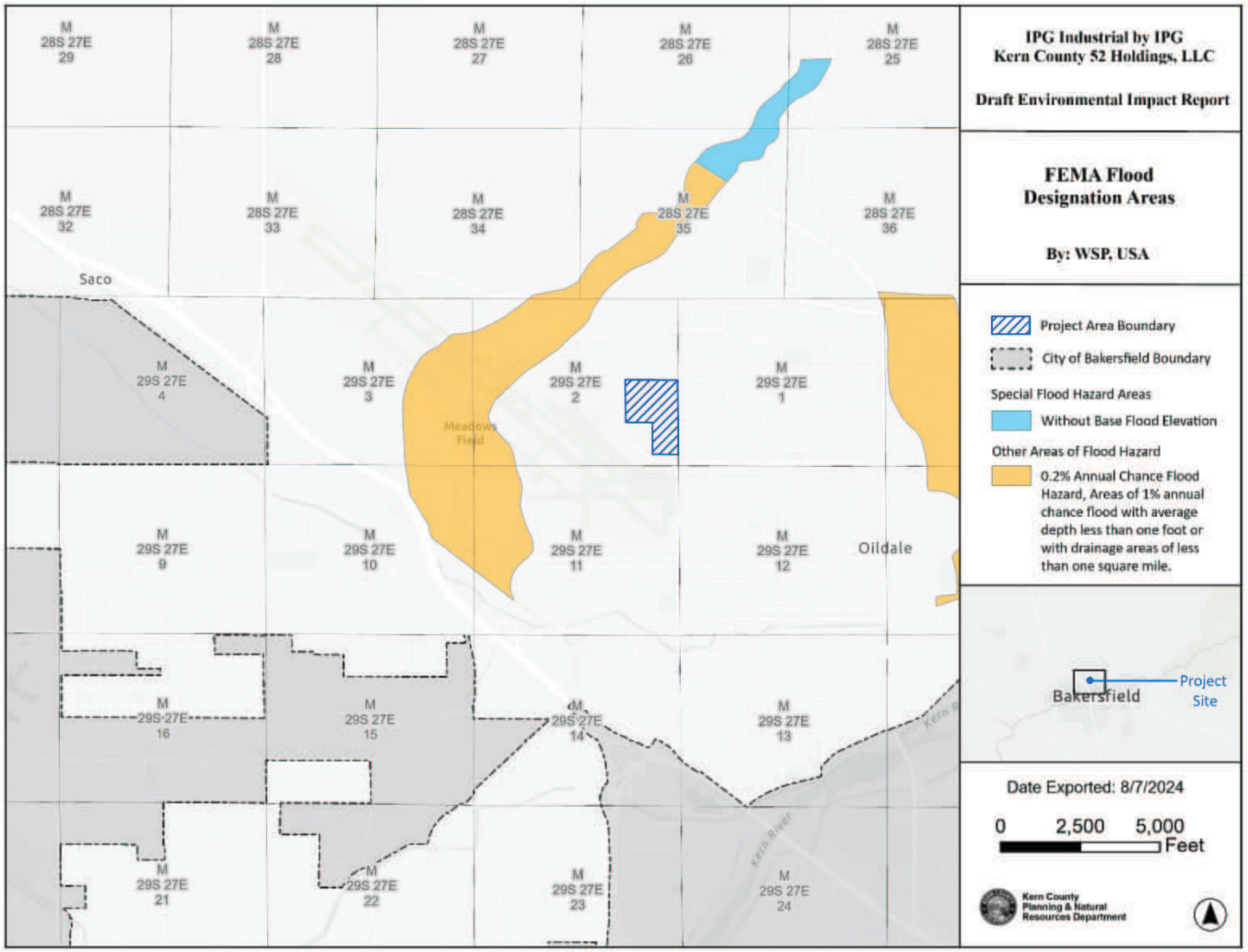
The Subbasin is bounded to the north by the Tulare Lake and Tule Subbasin, to the east and south by crystalline bedrock of the Sierra Nevada and San Emigdio Mountains, and to the west by the marine sediments of the San Emigdio Mountains and Coast Ranges. Continental deposits shed from the surrounding mountains form an alluvial wedge that thickens from the valley margins toward the axis of the structural trough. Sediments that comprise the shallow intermediate depth water-bearing deposits in the groundwater subbasin are primarily continental deposits of Tertiary and Quaternary age. From oldest to youngest the deposits are the Olcese and Santa Margarita Formations; the Tulare Formation (western subbasin) and its eastern subbasin equivalent, the Kern River Formation; older alluvium/stream deposits; and younger alluvium and coeval flood basin deposits. The greatest thickness of unconfined aquifer occurs along the eastern subbasin margin. The highest specific yield values are associated with sediments of the Kern River Fan west of Bakersfield (Appendix F.1).

Figure 4.10-1: Department of Water Resources Designated Groundwater Basins and Subbasins



Source: Kier + Wright, 2024

Figure 4.10-2: Federal Emergency Management Area Flood Designation Areas



Site Hydrology

Surface Hydrology and Drainage

The Project site can be characterized as flat; however, outside of leveled fields and orchards, the area is better described as an uneven plain consisting of extensive alluvial fans, debris flow, and over-bank deposits. The elevation of the Project site ranges between approximately 495 feet above mean sea level and approximately 540 feet with a gentle northeasterly slope. Project site runoff follows topography and drains to the northeast across the site toward Airport Drive. There are no existing stormwater drainage systems on the Project site.

Soil Types and Erosion

According to the Preliminary Drainage Report prepared for the Project (Kier + Wright, 2023; Appendix H.1), the Project site consists of approximately 94% Delano sandy loam (1 to 5% slopes) and 6% Kimberlina-Urban land-Cajon complex (0 to 2% slopes). These soil groups for the Project site are Type C, which includes granular soils in which particles do not stick together and cohesive soils with a low unconfined compressive strength (Occupational Safety and Health Administration, 2024).

As further discussed in Section 4.7, *Geology and Soils*, the Project area is underlain by Quaternary old alluvial deposits. Previous regional mapping identifies the deposits at the site as Pleistocene (Quaternary) Non-Marine (continental) deposits. Undocumented artificial fills consisting of berms and stockpiles are located across large portions of the site. The undocumented fill is interpreted to be dry and loose. The Quaternary-aged old alluvium was found to consist mostly of silty sand and sandy silt with scattered discontinuous beds of sandy clay and clayey sand. The upper 5 feet of the alluvium was generally found to be dry and loose to medium dense, however, at depth it was generally found to be dense to very dense or very stiff to hard and slightly moist to moist in-place.

Floodplains

A Flood Insurance Rate Map (FIRM) is an official map prepared by the Federal Emergency Management Agency (FEMA) to delineate both the special flood hazard areas and the flood risk premium zones applicable to a community (**Figure 4.10-2**). FEMA designates flood zones using a series of letters; for example, Zone A indicates areas of the 100-year flood where base flood elevations are not known, Zone AE indicates areas where 100-year flood elevations have been calculated, and Zone X indicates areas that experience minimal flooding. The Project area is located in one FIRM area (FIRM 06029C1825F). The FIRM area is designated as Zone X and is outside of the 0.2% annual chance floodplain.

Groundwater Resources

Kern County Groundwater Subbasin

The Subbasin, which has a surface area of approximately 1,945,000 acres (3,040 square miles), is the specific groundwater subbasin in which the Project is situated. The KGA is the Subbasin's principal groundwater management agency.

The San Joaquin Valley represents the southern portion of the Great Central Valley of California. The San Joaquin Valley is a structural trough up to 200 miles long and 70 miles wide, filled with up to 32,000 feet of marine and continental sediments deposited during periodic inundation by the Pacific Ocean and by erosion of the surrounding mountains respectively. Continental deposits shed from the surrounding mountains forming an alluvial wedge that thickens from the valley margins toward the axis of the structural trough. This depositional axis is slightly west of the series of rivers, lakes, sloughs, and marshes that mark the current and historic axis of surface drainage in the San Joaquin Valley. Water-bearing formations in the Subbasin are found in the shallow to intermediate depths of the groundwater Subbasin and are primarily continental deposits of Tertiary and Quaternary age.

The Project area is located in the southeastern portion of the Subbasin in the central portion of unincorporated Kern County, California, approximately 1.7 miles north of the incorporated City of Bakersfield and 3.1 miles east of the incorporated City of Shafter. The water-bearing unit is the Tulare Formation, which contains up to 2,200 feet of interbedded, oxidized to reduced sands, and gypsiferous clays and gravels derived predominantly from Coast Range sources. Water quality is characterized as primarily sodium sulfate to calcium sodium sulfate type (DWR, 2006).

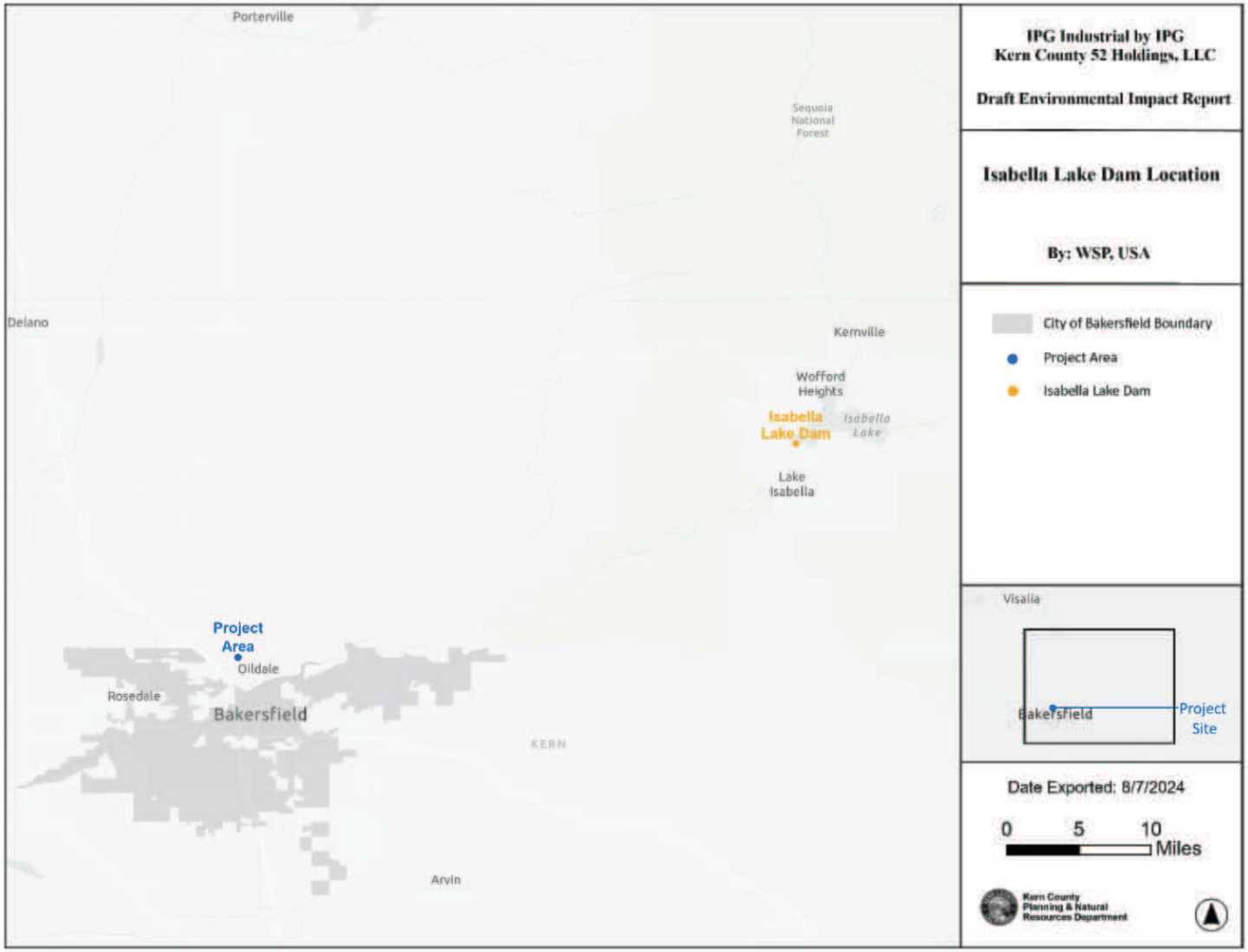
DWR has identified the Subbasin as a "critically overdrafted basin." There are no Adjudicated Areas within the Subbasin. The Subbasin was determined or classified to be a high-priority basin, which triggers the requirement of a Groundwater Sustainability Plan (GSP) under the Sustainable Groundwater Management Act (SGMA). According to the GSP prepared by the KGA, the Subbasin as a whole has an overdraft of 324,326 acre-feet per year over the baseline conditions. However, it is forecasted that the Subbasin will achieve sustainability by 2040 with an estimated 42,144 acre-feet of annual surplus (KGA, 2022).

Dam Failure, Seiche, and Tsunami

The U.S. Army Corps of Engineers prepares flood inundation maps in the event of a dam failure, including the closest dam (the Lake Isabella Dam east of Bakersfield). The Lake Isabella Dam is outside of dam inundation areas as defined by the Kern County General Plan (KCGP), as it is over 30 miles to the east of the Project area and the flood waters would not reach the Project area because of its distance and topography (**Figure 4.10-3**). As further described in Section 4.20*, Wildfire*, the Project site is in the area of a defined evacuation route for Lake Isabella Dam failure and contains several entrances on Airport Drive, an established evacuation route.

A tsunami is a series of ocean waves generated by sudden displacements in the sea floor, landslides, or volcanic activity. A seiche is a standing wave in an oscillating body of water. The Project area is approximately 100 miles east of the Pacific Ocean and there are no enclosed bodies of water within the Project area. Therefore, the risk for tsunami or seiche in the Project area is very low.

Figure 4.10-3: Lake Isabella Dam Location from Project Area



4.10.3 Regulatory Setting

Federal

Clean Water Act (33 United States Code § 1321 et seq.)

The Clean Water Act (CWA) (33 United States Code Section 1251 et seq.), formerly the Federal Water Pollution Control Act of 1972, was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. The CWA required states to set standards to protect, maintain, and restore water quality through the regulation of point source and certain nonpoint source discharges to surface water. Those discharges are the regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). In California, NPDES permitting authority is delegated to, and administered by, the nine Regional Water Quality Control Boards (RWQCBs). The Project site is within the Central Valley RWQCB. Projects that disturb one or more acres, including the proposed Project, are required to obtain NPDES coverage under construction general permits.

Section 401, Water Quality Certification

Section 401 of the CWA requires that, prior to issuance of any federal permit or license, any activity (including river or stream crossing during road, pipeline, or transmission line construction) which may result in discharges into waters of the United States must be certified by the state, as administered by the RWQCB. This certification ensures that the proposed activity does not violate state and/or federal water quality standards.

Section 402, National Pollutant Discharge Elimination System

Section 402 of the CWA authorizes the State Water Resources Control Board (SWRCB) to issue a NPDES General Construction Storm Water Permit (Water Quality Order 2009-0009-DWQ), referred to as the "General Construction Permit." Construction activities can comply with and be covered under the General Construction Permit provided that they meet the following criteria:

- Develop and implement a Storm Water Pollution Prevention Plan (SWPPP) which specifies best management practices (BMPs) that will prevent all construction pollutants from contacting stormwater and intend to keep all products of erosion from moving off-site into receiving waters.
- Eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the United States.
- Perform inspections of all BMPs.

NPDES regulations are administered by the Central Valley RWQCB at the Project site.

Section 303, Water Quality Standards and Implementation Plans

Section 303(d) of the CWA (33 United States Code 1250, et seq., at 1313(d)) requires states to identify "impaired" water bodies as those which do not meet water quality standards. States are required to compile this information in a list and submit the list to the U.S. Environmental Protection Agency (EPA) for review and approval. This list is known as the Section 303(d) list of impaired waters. As part of this listing process, states are required to prioritize waters and watersheds for future development of total maximum daily load requirements. The SWRCB and RWQCBs have ongoing efforts to monitor and assess water quality, to prepare the Section 303(d) list, and to develop total maximum daily load requirements.

The Safe Drinking Water Act of 1974 (42 United States Code § 300f et seq.)

The Safe Drinking Water Act was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect all waters actually or potentially designed for drinking use, whether from aboveground or underground sources, including rivers, lakes, reservoirs, springs, and groundwater wells (EPA 2016). The act authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water.

National Flood Insurance Program

FEMA is responsible for managing the National Flood Insurance Program (NFIP), which makes federally backed flood insurance available for communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. The NFIP, established in 1968 under the National Flood Insurance Act, requires that participating communities adopt certain minimum floodplain management standards, including restrictions on new development in designated floodways, a requirement that new structures in the 100-year flood zone be elevated to or above the 100-year flood level (known as base flood elevation), and a requirement that subdivisions be designed to minimize exposure to flood hazards.

To facilitate identifying areas with flood potential, FEMA has developed FIRMs that can be used for planning purposes, including floodplain management, flood insurance, and enforcement of mandatory flood insurance purchase requirements. Kern County is a participating jurisdiction in the NFIP and, therefore, all new development must comply with the minimum requirements of the NFIP.

State

Department of Water Resources

DWR's major responsibilities include preparing and updating the California Water Plan to guide development and management of the state's water resources; planning, designing, constructing, operating, and maintaining the State Water Resources Development System; regulating dams; providing flood protection; assisting in emergency management to safeguard life and property;

educating the public; and serving local water needs by providing technical assistance. In addition, DWR cooperates with local agencies on water resources investigations, supports watershed and river restoration programs, encourages water conservation, explores conjunctive use of ground and surface water, facilitates voluntary water transfers, and, when needed, operates a state drought water bank.

Porter-Cologne Water Quality Control Act (California Water Code §13000 et seq.)

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) (Water Code Sections 13000 et seq.), passed in 1969, is the primary statute covering the quality of waters in California and requires protection of water quality by appropriate designing, sizing, and construction of erosion and sediment controls. The Porter-Cologne Act established the SWRCB and divided California into nine regions, each overseen by an RWQCB. The SWRCB is the primary State agency responsible for protecting the quality of the State's surface and groundwater supplies and has delegated primary implementation authority to the nine RWQCBs. The Porter-Cologne Act assigns responsibility for implementing the CWA Sections 401 through 402 and 303(d) to the SWRCB and the nine RWQCBs. The Porter-Cologne Act requires the development and periodic review of water quality control plans (basin plans) that designate beneficial uses of California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters, provide the technical basis for determining waste discharge requirements, identify enforcement actions, and evaluate clean water grant proposals. The basin plans are updated every three years. Compliance with basin plans is primarily achieved through implementation of the NPDES, which regulates waste discharges as previously discussed. The Porter-Cologne Water Quality Control Act requires that any person discharging waste or proposing to discharge waste within any region, other than to a community sewer system, which could affect the quality of the "waters of the State" file a report of waste discharge. Absent a potential effect on the quality of "waters of the State," no notification is required. However, the RWQCB encourages implementation of BMPs similar to those required for NPDES stormwater permits to protect the water quality objectives and beneficial uses of local surface waters.

Sustainable Groundwater Management Act

In September 2014, California Governor Jerry Brown signed a three-bill package known as the SGMA into law. The SGMA establishes a framework for local groundwater management and requires local agencies to bring over drafted basins into balanced levels of pumping and recharge. The California Statewide Groundwater Elevation Model Priority List ranks groundwater basins across the state with assessment rankings of high, medium, low, or very low. SGMA requires the formation of local-controlled groundwater sustainable agencies in high- and medium-priority groundwater basins. Groundwater Sustainability Agencies (GSAs) are responsible for developing and implementing GSPs to guide groundwater management decisions and ensure long-term sustainability in their basins. In adjudicated basins, the court identified Watermaster serves the purpose of the GSA, and the adjudication judgment serves as the groundwater sustainability plan.

The Kern County Subbasin is currently designated as a high priority basin under SGMA. Thus, the Kern County Subbasin's 14 GSAs including: Buena Vista Waster Storage District GSA, Henry Miller Water District GSA, Cawelo Water District GSA, KGA GSA, City of McFarland GSA, Pioneer GSA, Semitropic Water Storage District GSA, West Kern Water District GSA, Greenfield County Water District GSA, Kern River GSA, Olcese Water District GSA, Arvin GSA, Wheeler Ridge-Maricopa GSA, and the Tejon-Castac Water District GSA must submit a GSP. The 14 GSAs have collaborated in the adoption of a coordination agreement, as required under SGMA, for the coordinated management and implementation of the six GSPs prepared in the Subbasin (KGA, 2022). The Project site is located within the boundaries of the Kern River GSA. SGMA allows for multiple GSPs to be implemented by multiple GSAs and executed pursuant to a single coordination agreement that covers the entire basin to be an acceptable planning scenario. (Water Code § 10727.) In the San Joaquin Valley – Kern County Subbasin (Subbasin), six GSPs were prepared by 17 GSAs for the various management areas established in the Subbasin pursuant to the coordination agreement and submitted to the California DWR for review. Collectively, the six GSPs and the coordination agreement are referred to as the Plan for the Subbasin. Individually, the GSPs include the following:

- Kern Groundwater Authority Groundwater Sustainability Plan – Amended July 2022 (KGA GSP) – prepared by the KGA GSA, Semitropic Water Storage District (SWSD) GSA, Cawelo Water District (CWD) GSA, City of McFarland GSA, Pioneer GSA, West Kern Water District (WKWD) GSA, and Westside District Water Authority GSA.
- Amended Kern River Groundwater Sustainability Plan – July 2022 (Kern River GSP) – prepared by the Kern River GSA and Greenfield County Water District GSA.
- Buena Vista Water Storage District GSA Groundwater Sustainability Plan – July 2022 (Buena Vista GSP) – prepared by the Buena Vista Water Storage District (Buena Vista) GSA.
- Olcese Groundwater Sustainability Agency Groundwater Sustainability Plan – July 2022 (Olcese GSP) – prepared by the Olcese Water District (OWD) GSA.
- Henry Miller Water District Groundwater Sustainability Plan – July 2022 (Henry Miller GSP) – prepared by the Henry Miller Water District (HMWD) GSA.
- South of Kern River Groundwater Sustainability Plan – July 2022 (SOKR GSP) – prepared by the Arvin GSA, Tejon-Castac Water District (TCWD) GSA, the Wheeler Ridge-Maricopa GSA.

On March 2, 2023, the DWR deemed the above six GSPs inadequate for the following deficiencies:

- Deficiency 1: involved how the Plan established and justified undesirable results that represent effects caused by groundwater conditions occurring throughout the Subbasin.
- Deficiency 2: involved the establishment of minimum thresholds for the chronic lowering of groundwater levels.

- Deficiency 3: involved the establishment of sustainable management criteria for land subsidence.
- These findings are based on all uses of groundwater in the region and not specific to the proposed Project. Under SGMA, the Groundwater Authorities are required to begin implementation of the plans, although found inadequate, while working to amend the plans and address the deficiencies.

Local

Metropolitan Bakersfield General Plan

Construction and operation of the Project would be subject to policies and regulations contained within the general plans including the Metropolitan Bakersfield General Plan (MBGP), Kern County Zoning Ordinance, and the Kern County Code of Building Regulations, which include policies, goals, and implementation measures related to hydrology and water quality. The policies and implementation measures in the MBGP related to hydrology and water quality that are applicable to the Project are provided in this section. The MBGP contains additional policies, goals, and implementation measures that are more general in nature and not specific to development, such as the Project. These measures are not listed below, but as stated in Chapter 2, *Introduction*, all policies, goals, and implementation measures in the MBGP are incorporated by reference.

The Project site is in the MBGP area; therefore, it would be subject to applicable policies and measures of the MBGP. The Conservation, Safety, and Public Services and Facilities Elements of the MBGP include goals, policies, and implementation measures related to hydrology and water quality that apply to the Project, described as follows.

Chapter V – Conservation/Water Resources.

Goals

Goal 1. Conserve and augment the available water resources of the planning area.

Goal 2. Assure that adequate groundwater resources remain available to the planning area.

Goal 3. Assure that adequate surface water supplies remain available to the planning area.

Goal 5. Achieve a continuing balance between competing demands for water resource usage.

Policies

Policy 2. Minimize the loss of water which could otherwise be utilized for groundwater recharge purposes and benefit planning area groundwater aquifers from diversion to locations outside the area.

Policy 6. Protect planning area groundwater resources from further quality degradation.

Policy 7 Provide substitute or supplemental water resources to areas already impacted by groundwater quality degradation by supporting facilities construction for surface water diversions.

Policy 8 Consider each proposal for water resource usage with the context of total planning area needs and priorities—major incremental water transport, groundwater recharge, flood control, recreational needs, riparian habitat preservation and conservation.

Chapter VIII – Safety/Seismic

Goals

Goal 7. Protect land uses from the risk of dam failure inundation including the assurances that: the functional capabilities of essential facilities are available in the event of a flood; hazardous materials are not released; effective measures for mitigation of dam failure inundation are incorporated into the design of critical facilities; and the rapid and orderly evacuation of populations in the inundation area will occur.

Policies

Policy 4. Encourage critical facilities in dam inundation areas to develop and maintain plans for safe shut-down and efficient evacuation from their facilities, as appropriate to the degree of flood hazard for each facility.

Policy 13. Determine the liquefaction potential at sites in areas of high groundwater prior to development and determine specific mitigation to be incorporated into the foundation design, as necessary to prevent or reduce damage from liquefaction in an earthquake.

Policy 18. Design discretionary critical facilities located within the potential inundation area for dam failure in order to: mitigate the effects of inundation on the facility; promote orderly shut-down and evacuation (as appropriate); and, prevent on-site hazards from affecting building occupants and the surrounding communities in the event of dam failure.

Policy 19. Design discretionary facilities in the potential dam inundation area used for the manufacture, storage or use of hazardous materials to prevent on-site hazards from affecting surrounding communities in the event of inundation.

Kern Groundwater Authority Groundwater Sustainability Plan

The SGMA was implemented in 2014 to ensure the protection of groundwater in California. The SGMA set forth a statewide directive to bring groundwater basins to a sustainable level through groundwater management and planning. The act also requires GSAs to implement GSPs that manage groundwater sustainability over a 20-year period for groundwater basins/subbasins that have been designated as medium or high priority (critical overdraft) by the DWR.

DWR has determined that the Kern County Subbasin is critically over drafted and therefore a high priority subbasin. The Kern County Subbasin is managed by 14 different GSAs. The OMWC's service area lies primarily within the boundary of the Kern River GSA, with the rest of the service

area in the boundaries of the KGA GSA, and the Cawelo Water District GSA. The following six GSAs have submitted GSPs: Kern River GSA, Buena Vista GSA, South of the Kern River GSA, Olcese Water District GSA, and Henry Miller GSA. Each GSP covers a certain area of the Kern County Subbasin.

The six GSPs were determined to be inadequate by the DWR due to inconsistencies, see discussion above. These inconsistencies are being addressed by the six GSAs to satisfy the requirements of SGMA. The GSP will aim to alleviate overdraft conditions in the Kern County Subbasin by implementing actions that help negate a negative change in groundwater storage. These implementation actions will aim to maintain groundwater levels as well as prevent water quality degradation and land subsidence. The GSPs will implement actions that achieve sustainability in the subbasin by year 2042.

Presently, the Kern County Water Agency implemented a groundwater recharge program which subsequently reduced the pumping of the OMWC. This has stabilized the water table beneath the OMWC service area. Additionally, the KGA GSA, Kern River GSA, and the Cawelo Water District GSA are currently managing groundwater levels within a safe basin operating range. The OMWC continues to aid these efforts by recommending water use reductions to its customers.

Kern County Code of Building Regulations

Kern County Grading Ordinance (17.28)

Chapter 17.28 Kern County Grading Code. Requirements of the Kern County Grading Code will be implemented. A grading permit will be obtained prior to commencement of construction activities. Of particular note with respect to hydrology and water quality is Section 17.28.140, Erosion Control, which addresses the following:

Slopes. The faces of cut and fill slopes shall be prepared and maintained to control against erosion. This control may consist of effective planting. The protection for the slopes shall be installed as soon as practicable and prior to calling for final approval. Where cut slopes are not subject to erosion due to the erosion-resistant character of the materials, such protection may be omitted.

Other Devices. Where necessary, check dams, cribbing, riprap, or other devices or methods shall be employed to control erosion and provide safety.

Temporary Devices. Temporary drainage and erosion control shall be provided as needed at the end of each work day during grading operations, such that existing drainage channels would not be blocked. Dust control shall be applied to all graded areas and materials and shall consist of applying water or another approved dust palliative for the alleviation or prevention of dust nuisance. Deposition of rocks, earth materials, or debris onto adjacent property, public roads or drainage channels shall not be allowed.

Floodplain Management

Kern County has adopted a Floodplain Management Ordinance (Chapter 17.48 of the Building and Construction Code) that applies to "any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation, drilling operations, or storage of equipment or materials." The purposes of the ordinance include the promotion of "public health, safety, and general welfare, and to minimize public and private losses due to flood conditions" and compliance "with the requirements of the NFIP Regulations." Among other implementation measures, the ordinance (1) restricts or prohibits certain uses that are susceptible to flood damage or increase erosion and flood heights or velocities; (2) requires that uses vulnerable to floods be protected against flood damage at the time of initial construction; (3) controls the alteration of natural floodplains, stream channels, and natural protective barriers that accommodate or channel flood waters; (4) controls filling, grading, dredging, and other development which may increase flood damage; and (5) prevents or regulated the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Kern County Development Standards

The Kern County Development Standards apply to all developments within Kern County that are outside of incorporated cities. These standards establish minimum design and construction requirements that will result in improvements that are economical to maintain and will adequately serve the general public. The requirements set forth in these standards are considered minimum design standards and will require the approval of the entity that will maintain the facilities to be constructed prior to approval by the County.

Kern County Water Quality Control Plan

Each of the nine RWQCBs adopts a water quality control plan that recognizes and reflects regional differences in existing water quality, the beneficial uses of the region's groundwater and surface waters, and local water quality conditions and problems. Water quality problems in the regions are listed in these plans, along with the causes if they are known. Each RWQCB is to set water quality objectives that will ensure the reasonable protection of beneficial uses and the prevention of nuisance, with the understanding that water quality can be changed somewhat without unreasonably affecting beneficial uses.

The Kern County Engineering and Survey Services Department requires the completion of an NPDES applicability form for all construction projects disturbing one or more acre within Kern County. This form requires IPG Kern County 52 Holdings, LLC (Project proponent) to provide background information on construction activities. Project proponents must apply for the permit under one of the following four conditions:

1. All storm water is retained on-site and no storm water runoff, sediment, or pollutants from on-site construction activity can discharge directly or indirectly off-site or to a river, lake, stream, municipal storm drain, or off-site drainage facilities.

2. All storm water runoff is not retained on-site but does not discharge to a water of the United States (i.e., drains to a terminal drainage facility). Therefore, a SWPPP has been developed and BMPs must be implemented.
3. All storm water runoff is not retained on-site, and the discharge is to a water of the United States. Therefore, a Notice of Intent must be filed with the State Regional Water Resources Control Board prior to issuance of the building permit. Also, a SWPPP has been developed and BMPs must be implemented.
4. Construction activity is between 1 to 5 acres and an Erosivity Waiver was granted by the SWRCB. BMPs must be implemented.

Kern County – Applicability of NPDES Program for a Project Disturbing 1 Acre or Greater

As closed systems that never contact the ocean or other waters of the United States, many of the waters within Kern County are technically not subject to protective regulations under the federal NPDES Program. The Kern County Public Works Department requires the completion of an NPDES applicability form for projects with construction activities disturbing one or more acres and requires the Project proponent to provide information about construction activities and to identify whether storm water runoff has the potential of discharging into waters of the United States, waters of the state, or a terminal drainage facility. The purpose of the form is to identify which water quality protection measure requirements apply to different projects (if any). Should stormwater runoff be contained on-site and not discharge into any waters, no special actions are required. Should stormwater runoff discharge into waters of the United States, compliance with the SWRCB Construction General Permit SWPPP requirements is required. Should stormwater runoff not be contained on-site and drains to waters of the state or a terminal drainage facility, the Project proponent would be required to develop a SWPPP and BMPs.

4.10.4 Impacts and Mitigation Measures

Methodology

This section analyzes impacts on hydrology and water quality from the implementation of the Project based on changes to the environmental setting as described above. The Project's potential impacts on hydrology and water quality have been evaluated using the 2023 Preliminary Drainage Report for Airport and Boughton Drive and the 2023 Water Supply Assessment for Warehousing at Airport Drive and Boughton Drive, both prepared by Kier + Wright (Appendix H.1 and H.2, respectively). Impacts were also evaluated w California Environmental Quality Act (CEQA) significance criteria described below and a variety of resources, including multiple online sources, published documents, the MBGP, and professional judgment..

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant adverse effect on hydrology and water quality.

A project could have a have a significant impact on hydrology and water quality if it would meet any of the following criteria:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would result in any of the following:
  - substantial erosion or siltation on- or off-site
  - substantial increase in the rate of amount of surface runoff, in a manner which would result in flooding on- or off-site
  - create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff
  - impede or redirect flood flows.
- Result in a flood hazard, tsunami, seiche zones, risk release of pollutants due to project inundation.
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Project Impacts

Impact 4.10-1: The Project would violate water quality standards or waste discharge requirements, or otherwise substantially degrade surface or groundwater quality

Water quality standards and waste discharge requirements could be violated if the Project releases polluted discharges into receiving waters without a permit. Polluted discharges can generate polluted stormwater runoff (i.e., water generated during storm events) or dry weather runoff (i.e., water generated during activities such as dust control). Polluted discharge can consist of sediment

from erosion, pollutants from herbicides or pesticides applied to agricultural lands or vegetation, or pollutants from construction equipment, such as oil drippings or accidental spills of petroleum hydrocarbons.

Construction

The construction phase is anticipated to last approximately 24 months and is proposed for completion in one phase with operations starting immediately after construction is completed. Grading of the proposed Project is anticipated to last approximately 60 days. Construction activities would consist of site preparation, grading, building construction, paving, and architectural coating. Due to the relatively flat terrain of the site, it is anticipated that grading would be limited throughout the Project site to achieve an elevation for final grading.

Short-term impacts related to water quality can occur during the earthwork and construction phase, when the potential for erosion, siltation, and sedimentation would be the greatest. Additionally, impacts could occur prior to the establishment of ground cover, when the erosion potential may remain relatively high. Potential impacts on water quality from erosion and sedimentation are expected to be localized and temporary during construction. Further, as the proposed Project would disturb more than one acre of land surface, it would be required to obtain coverage under the NPDES storm water program. The NPDES Construction General Permit program calls for the implementation of BMPs to reduce or prevent pollutant discharge from these activities to the Maximum Extent Practicable for urban runoff and meeting the Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology standards for construction storm water.

To reduce potential impacts during construction, the proposed Project would be required to include a project-specific SWPPP that includes BMPs designed to prevent the occurrence of soil erosion and discharge of other construction-related pollutants that could contaminate water quality and would be applicable to all areas of the Project, per **Mitigation Measure MM 4.10-1**. In addition, prior to the commencement of construction activities, the project proponent would be required to adhere to the requirements of the Kern County Grading Code. This includes implementation of various measures designed to prevent erosion and control drainage on-site, thereby further preventing the potential sedimentation and subsequent degradation of stormwater. Further, as noted in Section 4.7, *Geology and Soils*, **Mitigation Measure MM 4.7-8** would require the preparation of a Soil Erosion and Sedimentation Control Plan to mitigate for any loss of soil and erosion.

During Project construction, any activity that results in the accidental release of hazardous or potentially hazardous materials could result in water quality degradation. Materials that could contribute to this impact include, but are not limited to, petroleum products (e.g., gasoline, diesel, and motor oil), automotive fluids (e.g., antifreeze, lubricant oils, transmission fluid, and hydraulic fluids), cement slurry, and other fluids utilized by construction vehicles and equipment. Motorized equipment could leak hazardous materials due to inadequate or improper maintenance, unnoticed or unrepaired damage, improper refueling, or operator error. The mobilization of sediment or inadvertent spills or leaks of such pollutants could affect the quality of runoff water from construction activities.

To reduce potential impacts associated with hazardous materials that could affect water quality, **MM 4.10-1** would require the preparation of a SWPPP (see below). BMPs identified within the SWPPP would be required to be shown on a drainage plan per the Kern County Development Standards and the Kern County Code of Building Regulations, prior to issuance of a grading permit.

Mitigation Measure MM 4.10-1 would require that ground disturbance be minimized within drainage areas and timed to avoid the rainy season where possible. This would decrease the potential of stormwater mixing with construction-related materials and degrading water quality.

As noted in Section 4.9, *Hazards and Hazardous Materials*, of this Draft EIR, **Mitigation Measure MM 4.9-3** would require the Project proponent to provide a Hazardous Materials Business Plan that would describe proper handling, storage, transport, and disposal techniques; describe methods to be used to avoid spills and minimize impacts in the event of a spill; describe procedures for handling and disposing of unanticipated hazardous materials encountered during construction; and establish public and agency notification procedures for spills and other emergencies, including fires. **MM 4.10-1** identify additional guidance for the safe handling and use of these materials, which is guided by the NPDES Construction General Permit and SWPPP. The measures identify protocols regarding the handling of these types of materials should a spill or release occur. Therefore, with implementation of **MM 4.10-1, MM 4.7-8**, and **MM 4.9-3**, impacts to water quality would be less than significant during construction.

Operation

Operation of the Project would require use of certain materials that could be considered hazardous materials during maintenance activities, of which could include paint, solvents, cleaners, and waste oil. The overall proposed Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage and logistics uses, with up to 20 percent of the facility occupied by cold storage use. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage, handling and distribution for a variety of goods and materials used in commerce that could include but not limited to finished products, consumer goods, parts, materials, tires, tools, and others that are typically found in a modern distribution/logistics facility consistent with M-1 PD-H Zone District. Outdoor storage of bulk and wholesale materials is not proposed as part of this Project. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. Building Code, Fire Code, Plumbing Code, etc.). Project-level impacts are not expected to increase to a significant level and additional mitigation measures specific to product-type are not warranted.

An increase of impervious surfaces within the proposed Project area would result in increased rates of stormwater runoff during rainy periods, which can be a source of surface water pollution. Urban runoff pollutants may stem from erosion of disturbed areas, deposition of atmospheric particles derived from automobile or industrial sources, corrosion or decay of building materials, rainfall contact with toxic substances, and spills of toxic materials on surfaces which receive rainfall and generate runoff. New urban industrial and commercial development can generate urban runoff from

parking areas as well as any areas of hazardous materials storage exposed to rainfall. The proposed Project would implement **Mitigation Measure MM 4.10-2**, which requires the preparation of a hydrologic study and drainage plan per the Kern County Development Standards and the Kern County Code of Building Regulations prior to issuance of a grading permit. Based on the findings of the hydrologic study, the drainage plan would recommend an on-site design that complies with all channel setback requirements and ensure facilities are located in such a way to lessen their impact on drainage areas and their water quality. The drainage plan requires that the proposed Project include on-site surface water retention basins to control surface water runoff on-site. Adherence to the requirements of the approved final hydrologic study and drainage plan would minimize operational impacts to water quality during operation.

As described in **Section 4.9**, *Hazards and Hazardous Materials*, the proposed Project would incorporate **Mitigation Measure MM 4.9-3** that would require the Project proponent to provide a Hazardous Materials Business Plan that would delineate hazardous material and hazardous waste storage areas; describe proper handling, storage, transport, and disposal techniques; describe methods to be used to avoid spills and minimize impacts in the event of a spill. Implementation of **Mitigation Measure MM 4.9-3** would ensure safe handling of hazardous materials on-site and provide the means for prompt cleanup in the event of an accidental hazardous material release.

Water quality could also be degraded by non-hazardous materials during operation activities, as the Project would result in an approximate total-building coverage of 43 percent within the 49.05-acre site, or roughly 923,130 total-square feet, resulting in a significant increase in impervious surfaces on the site at buildout. During dry periods, impervious surfaces can collect greases, oils, and other vehicle-related pollutants. During storm events, these pollutants can mix with stormwater and degrade water quality. The proposed Project would also be required to retain the stormwater per Kern County's drainage requirements and all other applicable standards. Additionally, a drainage plan would be prepared in accordance with the Kern County Development Standards and Kern County Code of Building Regulations. The drainage plan would include post-construction structural and nonstructural BMPs. Adherence to these requirements would minimize potential for operation period water quality degradation. Therefore, with implementation of **Mitigation Measures MM 4.10-1, MM 4.10-2, MM 4.7-8**, and **MM 4.9-3**, impacts to water quality would be less than significant during Project operation.

Mitigation Measures

Implementation of **MM 4.7-8** and **MM 4.9-3** would be required (see **Section 4.7**, *Geology and Soils*, and **Section 4.9**, *Hazards and Hazardous Materials*, for full mitigation measure text). **MM 4.10-1** and **MM 4.10-2** would also be required.

MM 4.10-1 Prior to issuance of a grading permit, the Project proponent/operator shall submit a Stormwater Pollution Prevention Plan for review and approval by the Kern County Planning and Natural Resources Department and/or Kern County Public Works Department. The Stormwater Pollution Prevention Plan shall be designed to minimize runoff and shall specify best management practices to prevent all construction pollutants from contacting stormwater, with the intent

of keeping sediment or any other pollutants from moving offsite and into receiving waters. The requirements of the Stormwater Pollution Prevention Plan shall be incorporated into design specifications and construction contracts. Recommended best management practices to be incorporated in the Stormwater Pollution Prevention Plan shall include the following:

a. Minimization of vegetation removal;

b. Implementing sediment controls, including silt fences as necessary;

c. Installation of a stabilized construction entrance/exit and stabilization of disturbed areas;

d. Properly containing and disposing of hazardous materials used for construction onsite;

e. Properly covering stockpiled soils to prevent wind erosion;

f. Proper protections and containment for fueling and maintenance of equipment and vehicles;

g. Appropriate disposal of demolition debris, concrete and soil, and aggressively controlling litter.

h. Cleanup of silt and mud on adjacent street due to construction activity;

i. Checking all lined and unlined ditches after each rainfall;

j. Restore all erosion control devices to working order to the satisfaction of the Kern County Planning and Natural Resources Department and/or Kern County Public Works Department after each rainfall run-off;

k. Install additional erosion control measures as may be required due to uncompleted grading operations or unforeseen circumstances which may arise.

MM 4.10-2 Prior to the issuance of a grading permit, the Project proponent/operator shall complete a final drainage plan designed to evaluate and minimize potential increases in runoff from the Project site. The study shall include, but is not limited to the following:

a. A numerical stormwater model for the project site that evaluates existing and proposed (with project) drainage conditions during storm events ranging up to the 100-year event.

b. The drainage plan shall consider potential for erosion and sedimentation in light of modeled changes in stormwater flow across the project area that

would result from project implementation.

c. Engineering recommendations to be incorporated into the project design and applied within the site boundary. Engineering recommendations will include measures to offset increases in stormwater runoff that would result from the project, as well as implementation of design measures to minimize or manage flow concentration and changes in flow depth or velocity so as to minimize erosion, sedimentation, and flooding onsite or offsite.

d. The drainage plan shall be prepared in accordance with the Kern County Grading Code and Kern County Development Standards and approved by the Kern County Public Works Department prior to the issuance of grading permits.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.7-8, MM 4.9-3**, **MM 4.10-1** and **MM 4.10-2**, impacts would be less than significant.

Impact 4.10-2: The Project would substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin

The Project is entirely located within the OMWC service area and relies on OMWC as its public water supplier. Groundwater is an existing water supply source for the OMWC. However, since the California State Water Project delivery system was initiated in 1977, local groundwater has only been used as a supplemental source, which has historically been approximately 10% of the OMWC's supply. OMWC groundwater is drawn from the Kern County Subbasin within the Tulare Lake Hydrologic Region of the San Joaquin Valley Basin. Groundwater sustainability in the subbasin is overseen by the KGA. Per the 2014 SGMA, the KGA was responsible for the development of a Groundwater Sustainability Plan. The Kern Groundwater Authority Groundwater Sustainability Plan was determined to be inadequate by the DWR due to inconsistencies in 2023 (DWR, 2023). These inconsistencies are currently being addressed by GSA to satisfy the requirements of SGMA. Other Kern subbasin plans where the other similar known and unknown projects could occur have also been deemed inadequate. Thus, a determination of the cumulative impacts is discussed further below.

Construction

The Project would require water for dust suppression, fire protection, and pipeline hydrotesting. Water usage during construction, primarily for dust suppression purposes, is not anticipated to exceed the 16-month construction phase. The water would be transported via truck from OMWC and would not substantially decrease groundwater supplies within the Subbasin, as detailed in **Section 4.19**, *Utilities and Service Systems*.

Construction water demand for the Project is estimated to be 102 (AFY). As further explained in **Section 4.19**, *Utilities and Service Systems*, construction water demands would not substantially deplete the supplies of the local water district (including groundwater). Construction would not prevent or inhibit any incidental groundwater recharge that currently occurs on-site from precipitation. During construction, the Project site would generally remain pervious and would allow any current infiltration that occurs to continue. During installation of the Project components, most rainfall would disperse across their panel surface and fall to the ground surface. This would facilitate infiltration and subsequent groundwater recharge. While the Project would result the conversion of portions of the site impervious area, most of the ground surface would remain permeable and enable infiltration. Thus, construction of the Project would not substantially reduce groundwater volumes or impede recharge and impact sustainable groundwater management within the basin.

Thus, due to the minimal amount of groundwater needed for construction activities, and the temporary, short-term nature of groundwater extraction required, construction of the Project would not be considered water intensive. Thus, the Project also would not impede sustainable groundwater management of the basin and impacts would be less than significant.

Operation

The Project site is not specifically designated to operate as a groundwater recharge location (Todd, 2020). The Project would result in the conversion of portions of the site to impervious surface areas including concrete foundations, paved parking areas for automobiles, trailers, and truck docks, and impervious off-site enhancements such as new pavement, curb and gutter, and sidewalks along Airport Drive, Boughton Drive, and Hanger Way.

However, it is reasonable to assume some groundwater infiltration would still occur at the Project site during precipitation events, because approximately 17% of the site would remain as landscape area, where infiltration could occur. Thereby, groundwater recharge could still occur with implementation of the Project, and the Project would not result in significant impacts relative to interference with groundwater recharge.

The ongoing operational water demand for the Project is estimated to be 31 AFY (Appendix H.2). The Project water demands are not expected to change and shall remain the same at buildout and through the year 2040. The surplus water supply volume is greater than 9,000 AF through year 2040. The demand projections for the Project at buildout in normal, single dry, and multiple dry years are summarized in **Tables 4.19-3** through **4.19-8** in **Section 4.19**, *Utilities and Service Systems*. As concluded by the water supply assessment, the OMWC will have sufficient water supplies to serve the existing and future water uses of the area, including the proposed Project, under normal, single dry, and multiple dry years.

The California DWR has determined that the Subbasin is critically over drafted and therefore a high priority subbasin. The OMWC's service area lies primarily within the boundary of the Kern River GSA, with the rest of the service area in the boundaries of the KGA GSA, and the Cawelo Water District GSA. Presently, the Kern County Water Agency implemented a groundwater

recharge program, which subsequently reduced the pumping of the OMWC. This has stabilized the water table beneath the OMWC service area. Additionally, the proposed Project would not have the scale or massing within the OMWC service area to interfere with groundwater recharge in the area (Appendix H.2). Therefore, the Project would not impede groundwater management of the Subbasin.

Implementation of the Project does not propose uses that would require removal of groundwater from the Project site. Therefore, it would not decrease groundwater supplies or impede sustainable management of the Subbasin. As described in Section 4.19, *Utilities and Service Systems*, the Subbasin as a whole has an overdraft of 324,326 acre-feet per year over the baseline conditions of which the KGA is approximately 239,346 acre-feet of the deficit. Should the Project require groundwater supplies in excess of the allotment from the District, impacts to water supplies would be considered potentially significant. In order to address this and mitigate any potential impacts, the Project would implement **MM 4.19-3**, which requires the operator to provide information on any groundwater that will be used. Implementation of **MM 4.19-4** would also be required, which consists of installing water meters on all facilities. Therefore, with mitigation, the impacts would be less than significant for the Project.

Mitigation Measures

Implementation of **MM 4.19-3** and **MM 4.19-4** would be required (see **Section 4.19**, *Utilities and Service Systems*).

Level of Significance After Mitigation

With implementation of **MM 4.19-3** and **MM 4.19-4**, impacts would be less than significant after mitigation.

Impact 4.10-3: The Project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner that would result in a substantial erosion or siltation on- or off-site:

Erosion and sedimentation are natural processes driven by surface runoff that can be accelerated by human activities, such as construction earthwork activities. During construction, removal of vegetation or impervious areas (such as concrete or asphalt) expose soils to precipitation and surface runoff and can accelerate surface soil erosion. The process may result in loss of topsoil and creation of erosional features including rills and gullies. Erosion potential is determined by four principal factors: the characteristics of the soil, the extent of vegetative cover, topography, and climate. Soil texture and permeability determine the resistance of soil to entrainment by surface runoff. Vegetative cover plays a critical role in controlling erosion by shielding and binding the soil. Slope influences the rate of runoff and is directly correlated with erosion potential where flatter topography has a much lower potential for erosion. The intensity and duration of rainfall determines the extent and the capacity for flowing water to detach and transport soil particles.

Excessive erosion can cause a loss of land or possibly increase flooding. Increased sedimentation can also restrict storm drains and channels and lead to flooding during storms that the drainage system should capably handle. In addition, development can increase the likelihood of erosion and sedimentation along unlined drainage channels because of increased stormwater flows.

The Project is located on relatively flat terrain, with the Project site situated on varying slopes. There are no surface water bodies (creeks, streams, or rivers) within the Project area. The Project site mostly consists of sands, and the on-site soils are generally well drained. Vegetation on-site primarily consists of a moderate growth of weeds. Typically, long slope length and high slope steepness contribute to higher erosion rates. Thus, since the site is relatively flat, erosion potential related to slope length and slope steepness is low.

Due to the relatively flat nature of the Project site, grading is not anticipated to be substantial and would not substantially change the existing drainage patterns. The drainage patterns during both construction and operation would be such that water received on-site during rain event and off-site flow that enters the site would continue to flow through the site much as it does currently.

During operation, the overall proposed Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage and logistics uses, with a up to 20 percent of the facility occupied with cold storage. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage and distribution for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, tools, etc. typically found in a modern distribution/logistics facility consistent with M-1 PD-H Zone District. Outdoor storage of bulk and wholesale materials is not proposed as part of this Project. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. Building Code, Fire Code, Plumbing Code, etc.).

As described above, the Project would implement **Mitigation Measures MM 4.10-1** and **MM 4.10-2** to reduce erosion or siltation, and thereby, long-term impacts on drainage patterns across the Project site. **Mitigation Measure MM 4.10-2** would require the completion of a hydrologic study and final drainage plan for the proposed Project prior to the issuance of a grading permit. The plan would demonstrate that the Project site has been designed to minimize potential increases in runoff. Potential runoff would also be minimized with the inclusion of retention basin on-site to capture high storm flows. Further, as noted in Section 4.7, *Geology and Soils*, **Mitigation Measure MM 4.7-8** would require the preparation of a Soil Erosion and Sedimentation Control Plan to mitigate for any loss of soil and erosion that could alter existing drainage patterns. Therefore, any stormwater management features would be consistent with existing regulatory requirements and would minimize any erosion or sedimentation to less than significant levels.

With implementation of the mitigation measures, the impacts from stormwater and sedimentation would be less than significant for the Project.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.7-8** (see Section 4.7, *Geology and Soils*, for full mitigation measure text), **MM 4.10-1**, and **MM 4.10-2** would be required**.**

Level of Significance After Mitigation

With implementation of **MM 4.7-8, MM 4.10-1,** and **MM 4.10-2**, impacts would be less than significant after mitigation.

Impact 4.10-4: The Project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner that would substantially increase the rate of amount of surface runoff in a manner that would result in flooding on- or off-site:

The Project site is relatively flat and is unlikely to alter existing drainage patterns post-construction. The Project site runoff would continue to drain to the northeast across the site as Project construction and operation would not substantially alter the existing contours of the site. Furthermore, no rivers exist within the Project site or near it.

Although excavation and grading would occur on portions of the Project site during construction, ground disturbance would not substantially alter the overall topography or flow regime of these areas or the Project site. Water would be applied to the ground surface during the temporary construction phase, primarily for dust suppression and to reduce erosion from wind and vehicle disturbances. The water would be mechanically and precisely applied and would generally infiltrate or evaporate which would minimize the potential for uncontrolled runoff from this source. The potential effects would be further reduced through compliance with **MM 4.10-2**, requiring the completion of a hydrologic study and final drainage plan for the proposed Project prior to the issuance of a grading permit; the plan would demonstrate that the Project site has been designed to minimize potential increases in runoff.

During Project operation, the overall proposed Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage and logistics uses, with a secondary application of cold storage occupying up to 20 percent of the facility. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage and distribution for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, tools, etc. typically found in a modern distribution/logistics facility consistent with M-1 PD-H Zone District. Outdoor storage of bulk and wholesale materials is not proposed as part of this Project. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. Building Code, Fire Code, Plumbing Code, etc.) Outdoor storage is not proposed as part of this Project. Final exterior design, however, ensures runoff would drain to retention basins located on the south side of each building within the boundaries of the Project site. The basins would be able to store 371,897 cubic feet of water; well over the required volume of 371,680 cubic feet as explained in Appendix H.1. The basins would be designed to accommodate a 100-year storm event and would detain runoff and release it at a rate no greater than the predevelopment condition of the Project site. The proposed Project would be required to retain the stormwater per Kern County's drainage requirements and all other applicable standards.

Further, the rate and amount of surface runoff is determined by multiple factors, including topography, the amount and intensity of precipitation, the amount of evaporation that occurs in the watershed, and the amount of precipitation and water that infiltrates to the groundwater. The Project would not alter the amount or intensity of precipitation, nor would it require significant amounts of additional water to be imported to the Project site. In addition, the Project site is located in an area designated by FEMA as Zone X, which is defined as an area with minimal flood hazard.

Thus, through conformance with all requirements contained within the Kern County Grading Ordinance and implementation of **Mitigation Measure MM 4.10-2**, long-term effects on drainage patterns and the potential to result in flooding on- or off-site, would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.10-2** would be required.

Level of Significance After Mitigation

With implementation of **MM 4.10-2** impacts would be less than significant after mitigation.

Impact 4.10-5: The Project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner that would create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff:

The Project site does not contain any existing stormwater drainage systems on-site. Proposed Project implementation would result in intensification of development and addition of impervious surfaces that would potentially provide additional sources of polluted runoff. Impacts are considered potentially significant. As mentioned above, to capture any potential stormwater runoff, the Project would install an on-site storm drainage system consisting of inlets, underground piping, and surface and underground basins. Runoff would drain to retention basins located on the south side of each building within the boundaries of the Project site. The basins would be able to store 371,897 cubic feet of water; well over the required volume of 371,680 cubic feet as explained in Appendix H.1. Further, the retention basins would provide storage in exceedance of the post-development 100-year, 24-hour storm event.

To further reduce the potential for effects from erosion or other materials, the proposed Project would be required to adhere to drainage plans approved by the Kern County Engineering, Surveying and Permit Services Department. Conformance with these requirements would minimize stormwater runoff from the Project site during construction and operation. The proposed Project's primary function as a warehouse and distribution facility may require modifications to the interior design and would be subject to tenant improvements in order to accommodate specialized storage for a variety of products as described above. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. Building Code, Fire Code, Plumbing Code, etc.) However, as outdoor storage is not proposed as part of this Project, no additional mitigation measure regarding products stored indoors is warranted. Thus, with the implementation of **Mitigation Measure MM 4.10-2**, impacts associated with polluted runoff would be less than significant.

Mitigation Measures

Implementation **Mitigation Measure MM 4.10-2** would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.10-2** impacts would be less than significant after mitigation.

Impact 4.10-6: The Project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner that would create or contribute runoff water that would impede or redirect flood flows:

According to the FEMA FIRM, the Project is not located within a FEMA-designated 100-year flood zone. As described above, under impact the Project site is relatively flat and would remain so post-construction. In order to retain predevelopment condition rates of runoff, the proposed Project would include installation of an on-site storm drainage system consisting of inlets, underground piping, and surface and underground basins. As explained in Appendix H.1, the proposed Project's drainage areas would be divided into three drainage areas and all runoff would be retained on-site. The Project would include three retaining earthen basins and three underground prefabricated retaining basins for overflow storage from the respective earthen basin. The retention basins would be located on the south side of each building within the boundaries of the Project site. The basins would be able to store 371,897 cubic feet of water; well over the required volume of 371,680 cubic feet. The basins would be designed to accommodate a 100-year storm event and would detain runoff and release it at a rate no greater than the predevelopment condition of the Project site. The calculations for the provided volumes are shown in Appendix H.1.

The Project would also be required to retain the stormwater per Kern County's drainage requirements and all other applicable standards. Additionally, a drainage plan would be prepared in accordance with the Kern County Development Standards and Kern County Code of Building Regulations. The drainage plan would include post-construction structural and nonstructural BMPs. Prior to the commencement of construction activities, the applicant would be required to prepare and submit drainage plans to the Kern County Engineering and Survey Services Department. This would include post-construction structural and nonstructural BMPs. With implementation of the drainage infrastructure described above, the Project would not impede or redirect flows from the site.

Development of the Project site would increase the impervious surface area of the Project site and could result in increased sheet flow across the Project site. To mitigate the potential impacts from increased sheet flow across the Project site, retention basins are proposed to be built, which would retain the water on-site as described above. The proposed Project's primary function as a warehouse and distribution facility may require modifications to the interior design and would be subject to tenant improvements in order to accommodate specialized storage for a variety of products as described above. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. Building Code, Fire Code, Plumbing Code, etc.) However, as outdoor storage is not proposed as part of this Project that would otherwise affect runoff and flood flows, no additional mitigation measure regarding products stored indoors is warranted. Thus, long-term effects on drainage patterns and the potential to result in flooding on- or off-site, would be less than significant.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

Impacts would be less than significant.

Impact 4.10-7: The Project would risk release of pollutants due to Project inundation in a flood, tsunami, or seiche zone

As mentioned above in Section 4.10.2, the U.S. Army Corps of Engineers prepares flood inundation maps in the event of a dam failure, including the closest dam (the Lake Isabella Dam east of Bakersfield). The Lake Isabella Dam is outside of dam inundation areas as defined by the KCGP as it is over 30 miles to the east of the Project area and the flood waters would not reach the Project area because of its distance and topography.

A tsunami is a series of ocean waves generated by sudden displacements in the sea floor, landslides, or volcanic activity. A seiche is a standing wave in an oscillating body of water. The Project area is located approximately 100 miles east of the Pacific Ocean and there are no enclosed bodies of water within the Project area. Therefore, the risk for tsunami or seiche in the Project area is very low. Furthermore, there are no enclosed bodies of water within the Project vicinity and the Project site is in an area of minimal flood hazard, located outside of the FEMA-designated 100-year flood zone area. Therefore, the risk for tsunami or seiche in the Project area is very low and there would be little or no chance for an impact involving release of pollutants during such events.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

No impact would occur.

Impact 4.10-8: The Project would conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan

The Project site is located within the Central Valley RWQCB jurisdiction and is subject to the applicable requirements of the Basin Plan administered by the RWQCB in accordance with the Porter-Cologne Water Quality Control Act (RWQCB, 2023).

Additionally, the Project is entirely located within the OMWC service area and relies on OMWC as its public water supplier. OMWC groundwater is drawn from the Kern County Subbasin within the Tulare Lake Hydrologic Region of the San Joaquin Valley Basin. The Kern County Subbasin is overseen by the KGA basin manager. The OMWC's service area lies primarily within the boundary of the Kern River GSA, with the rest of the service area in the boundaries of the KGA GSA, and the Cawelo Water District GSA. As mentioned above, the KGA Groundwater Sustainability Plan was determined to be inadequate by the DWR due to inconsistencies. These inconsistencies are currently being addressed by GSA to satisfy the requirements of SGMA. As such, the proposed Project would not conflict with any existing applicable requirements within the proposed GSP.

The water purveyor for the Project would be required to comply with any restrictions within the Basin Plan and enforced by the KGA. Construction and operation of the Project would not conflict with or obstruct implementation of the Basin Plan because there is no significant surface drainage, or surface water beneficial uses associated with the Project area (Todd 2020). The proposed Project's primary function as a warehouse and distribution facility may require modifications to the interior design and would be subject to tenant improvements in order to accommodate specialized storage for a variety of products as described above. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. Building Code, Fire Code, Plumbing Code, etc.). However, as outdoor storage is not proposed as part of this Project that could otherwise conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan, no additional mitigation measure regarding products stored indoors is warranted. Additionally, the proposed Project's drainage plan (Appendix H.1) meets the applicable Kern County Design Standards. Therefore, operation of the Project would not conflict with or obstruct implementation of a water quality control or groundwater management plan. Furthermore, as detailed in Appendix H.2, the water needed to support the Project construction and operations is sufficient for the next 20 years. Therefore, the Project would not conflict with the groundwater management of the area and the potential impacts would be less than significant.

Mitigation Measures

No mitigation would be required.

Level of Significance

Impacts would be less than significant.

4.10.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a Project are considered significant if the incremental effects of the individual Projects are considerable when viewed in connection with the effects of past Projects, and the effects of other Projects located in the vicinity of the Project site. As described in Chapter 3, *Project Description*, of this Draft EIR, there are approximately 29 various Projects proposed or approved within the 6 miles of the Project vicinity.

Similar to the Project, none of the cumulative Projects are anticipated to discharge to waters of the United States due to their location within the San Joaquin Valley, which is a closed basin with no outlet to the Pacific Ocean. Regardless, **MM 4.10-1** would require the proposed Project to prepare and implement a SWPPP in accordance with County requirements. All other similar projects also would be required to prepare a SWPPP. These SWPPPs would include BMPs, similar to those of the Project, and/or designed specifically for those projects to prevent the mixture of sediment and

other pollutants with stormwater. This would help prevent cumulative degradation of water quality in the basin.

Furthermore, the proposed Project would implement a Hazardous Materials Business Plan as part of **Mitigation Measure MM 4.9-3** (see **Section 4.9**, *Hazards and Hazardous Materials* for full mitigation measure) that would require appropriate handling of hazardous materials on-site to ensure they do not come into contact with stormwater and affect water quality. All other projects in the vicinity that would handle hazardous materials also would be required to comply with hazardous material regulations. Therefore, cumulative impacts associated with water quality degradation would not be cumulatively considerable, and the Project would not contribute to a cumulative impact on water quality.

With respect to erosion, drainage, and flooding, the Project would implement **Mitigation Measures MM 4.7-8, MM 4.10-1**, and **MM 4.10-2**, which would minimize drainage impacts. Similar to above, it is anticipated that other cumulative projects would be required to implement similar measures, in order to minimize erosion, drainage, and flooding related impacts. Drainage related impacts from cumulative projects would also be primarily localized. Therefore, cumulative impacts related to erosion, drainage, and flooding would not be cumulatively considerable. With the implementation of **Mitigation Measures MM 4.7-8, MM 4.10-1**, and **MM 4.10-2**, the Project would not result in cumulatively considerable contribution to significant cumulative impacts in regard to drainage related impacts.

Regarding groundwater supply, the Project site is within the Kern County Subbasin and is not adjudicated. The proposed Project would obtain its water supply from OMWC (Appendix H.3). The water purveyor for the Project would be required to comply with any restrictions within the Basin Plan and enforced by the KGA. As mentioned above, although the Basin is in an over drafted condition, the Water Supply Assessment prepared for the Project determined that there are sufficient supplies for both proposed Project construction and operation for the next 20 years. Further, in order to mitigate any potential impacts, the Project would implement **Mitigation Measure MM 4.19-3**, which requires the operator to provide information on any groundwater that will be used. Implementation of **Mitigation Measure MM 4.19-4** would also be required, which consists of installing water meters on all facilities. Thus, while the Basin is in a state of overdraft, the Project's water use would be less than significant regarding direct impacts to groundwater supply.

Mitigation Measures

Implementation of **MM 4.7-8** (see Section 4.7**,** *Geology and Soils*) and **MM 4.9-3** (see Section 4.9**,** *Hazards and Hazardous Materials*), **MM 4.10-1, MM 4.10-2, MM 4.19-3**, and **MM 4.19-4** (see Section 4.19, *Utilities and Service Systems*) would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.7-8, MM 4.9-3, MM 4.10-1, MM 4.10-2, MM 4.19-3**, and **MM 4.19-4**, cumulative impacts would be less than significant.

Section 4.11

Land Use and Planning

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Section 4.11

Land Use and Planning

4.11.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environmental and regulatory settings regarding land use and planning. It also evaluates the impacts on land use and planning that would result from implementation of the proposed IPG Industrial Project (Project) and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the Metropolitan Bakersfield General Plan (MBGP), the Kern County Zoning Ordinance, and the Kern County Airport Land Use Compatibility Plan (ALUCP) for the Meadows Field Airport.

4.11.2 Environmental Setting

Regional Setting

Kern County is California's third largest county in land area and encompasses approximately 8,161 square miles. The County's geography includes, among others, mountainous areas, agricultural lands, and deserts. As noted, the project site is located north of the City of Bakersfield, which serves as the County seat and sits at the southern end of the San Joaquin Valley, bound by the Coast Range to the west, the Transverse Range (San Emigdio Mountains) to the south, and the Seirra Nevada (including the Tehachapi Mountains) to the east.

The proposed Project is located within the unincorporated community of Oildale in central Kern County. The nearest boundary for the City of Bakersfield is located 1.7 miles south of the Project site, and the City of Shafter is located 3.1 miles northeast of the project site. The Project site is situated approximately 1.4 miles northeast of State Route (SR) 99. Regional access to the project site is provided by SR-99 and Merle Haggard Drive via Airport Drive. Local access to the project site is available via Airport Drive and Boughton Drive. The project site and surrounding land are in a relatively flat-lying plain and exhibit little topographic variation.

Project Vicinity

The proposed Project is located on approximately 49 acres of privately owned land in unincorporated Kern County (APNs: 492-010-13 and 492-010-17). The project site is relatively flat with a gentle north-easterly slope. The elevation of the project site ranges between approximately 495 and 540 feet above mean sea level. The project site is vacant land, and existing development in the area includes access roads, residential neighborhoods, industrial and commercial uses, and an airport.

The project site is not located within a Special Flood Hazard Area based upon the Federal Emergency Management Agency Flood Insurance Rate Map (FIRM), per FIRM number 060291825F, effective 10/21/2021. The nearest flood hazard areas are located approximately one mile west and east of the project site. There are no identified State-designated Alquist-Priolo Earthquake Fault Zones on the project site. The nearest major faults of the San Andreas Fault and Garlock Fault are approximately 40 miles southwest and 40 miles southeast of the project site, respectively. The project site is not located within an area that is designated by the California Department of Conservation as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. No lands within the project boundary are subject to a Williamson Act Land Use contract. The proposed Project site is not part of an Agricultural Preserve. In addition, the project site is not located within the boundaries of an adopted Habitat Conservation Plan.

General Plan and Zoning

Kern County and the City of Bakersfield have jointly prepared and separately adopted a general plan for an unincorporated planning area known as the MBGP, in which the proposed Project is located. This 409 square mile planning area is a separate, but interrelated plan to the Kern County General Plan. The MBGP guides future development in the area through the adoption of all mandated elements per Government Code section 65302.

Within the MBGP, the Project site has a Land Use Map Code (Land Use Designation) of LI (Light Industrial), which is consistent with the existing zone classification of M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District. This base M-1 District contains the PD and H combining districts overlays to ensure that development in these designated areas are compatible with surrounding land uses. The land use designations, or land use map codes, are illustrated in **Figure 4.11-1** and the zoning classifications are illustrated in **Figure 4.11-2**.

Figure 4.11-1: General Plan Land Use Designation

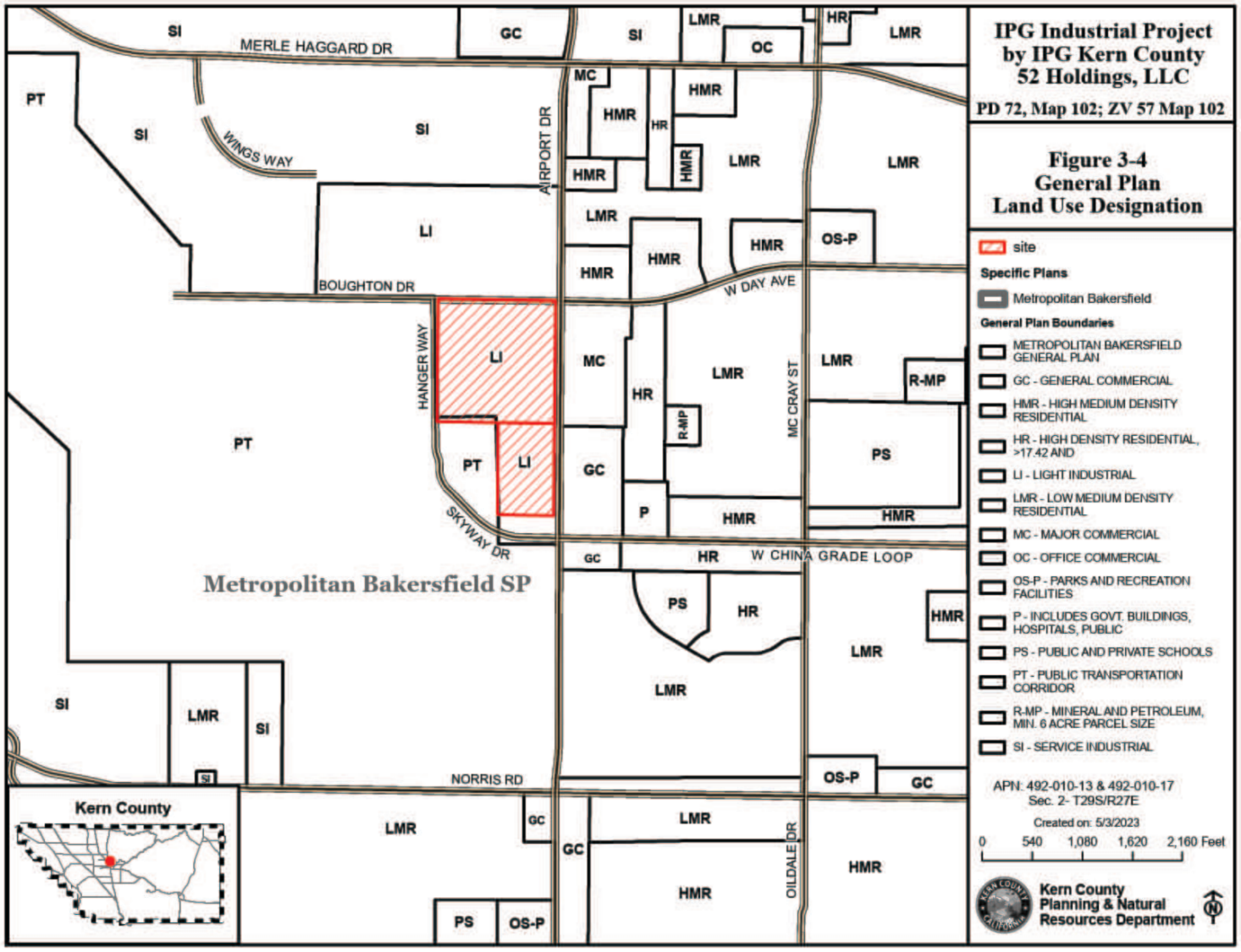
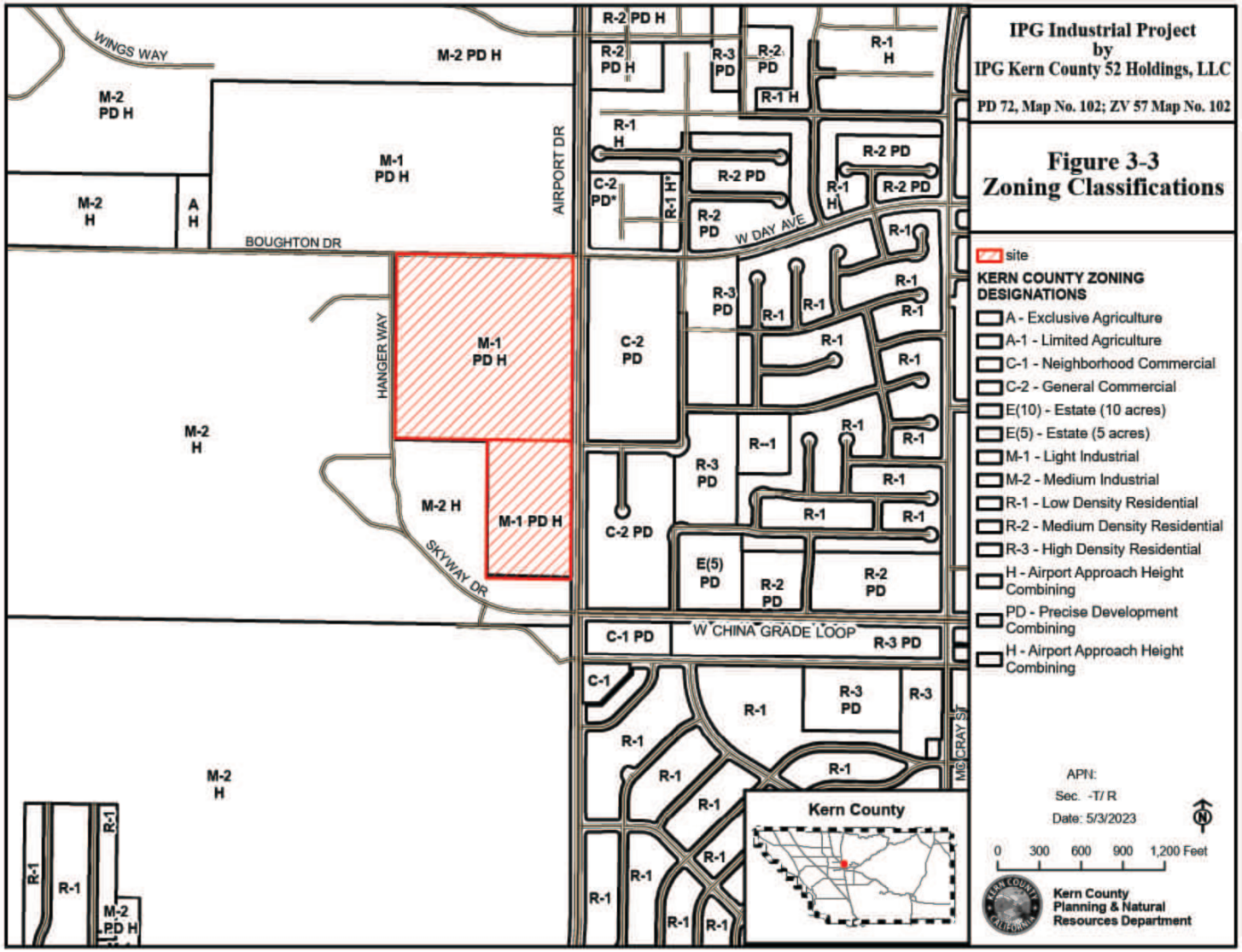


Figure 4.11-2: Zoning Classifications



Surrounding Land Uses

Existing land uses surrounding the immediate Project site are varied and consist of industrial, commercial, transportation, and residential uses. To the north, the Project boundary runs parallel to Boughton Drive with vacant undeveloped land across Boughton Drive which is also zoned for light industrial use. An aeronautical university is also located northwest of the site at the terminus of Boughton Drive. To the east, the Project boundary runs parallel to Airport Drive, with a mix of uses across Airport Drive including Derrel's Mini Storage, Park Meadows Apartments, and Fabulous Burgers. The residential uses comprised of single- and multi-family residences are also located east of the Project site, with the nearest residences being the Park Meadows apartment complex sited approximately 100 feet directly east. To the south is Skyway Drive, where a FedEx Ship Center, Epic Jet Center, and Airman Flight Training are opposite of Skyway Drive. To the west is Hanger Way, and approximately 0.6 miles west of the Project site is Meadows Field Airport and transportation related services. As noted previously, the MBGP establishes land use designations while the Kern County Zoning Ordinance establishes zoning classifications (base and combining districts) in order to ensure compatibility with surrounding uses. The combined zoning classifications that surround the Project site are provided below in **Table 4.11-1.**

Table 4.11-1: Project Site and Surrounding Land Use Designations and Zoning Classifications

Location	Existing Land Use	Existing Map Code Designation	Existing Zoning Classification
Project Site	Vacant	Light Industrial (LI)	Light Industrial Precise Development Airport Approach Height Combining District (M-1 PD H)
North	Vacant	Light Industrial (LI)	Light Industrial Precise Development Airport Approach Height Combining District (M-1 PD H)
East	Residential, Storage, Restaurant	Major Commercial (MC), General Commercial (GC)	General Commercial Precise Development Combining District (C2 PD)
South	Shipping Centers, Transportation services	Public Transportation (PT)	Medium Industrial Airport Approach Height Combining District (M-2 H)
West	Airport, Transportation Services	Public Transportation (PT)	Medium Industrial Airport Approach Height Combining District (M-2 H)

Key:
C2 = General Commercial District
GC = General Commercial
H = Airport Approach Height
LI = Light Industrial
MC = Major Commercial
M-2 = Medium Industrial
PD = Precise Development
PT = Public Transportation

Airport Land Use Compatibility Plan

The proposed Project is located within the Sphere of Influence (SOI) of the Meadows Field Airport, located approximately 0.6 miles west of the project, as shown in **Figure 4.11-3**. Meadows Field Airport is recognized as an Airport Influence Area, in which policies of the Kern County ALUCP apply to the proposed Project.

Figure 4.11-4 shows the compatibility criteria for land uses in the vicinity of airports. The proposed Project is located in zone B1, Approach/Departure Zone and Adjacent to Runway, and zone C, Common Traffic Pattern. Zone B1 is more restrictive and will therefore take precedence over zone C. According to the Kern County ALUCP, allowable density for zone B1 for uses other than residential is 60 people per acre. Required open land for this zone is 30%. Warehousing, truck terminals, two-story office buildings, and automobile parking, all uses in the proposed Project, are normally accepted uses in this zone.

Figure 4.11-3: Airport Land Use Compatibility Plan

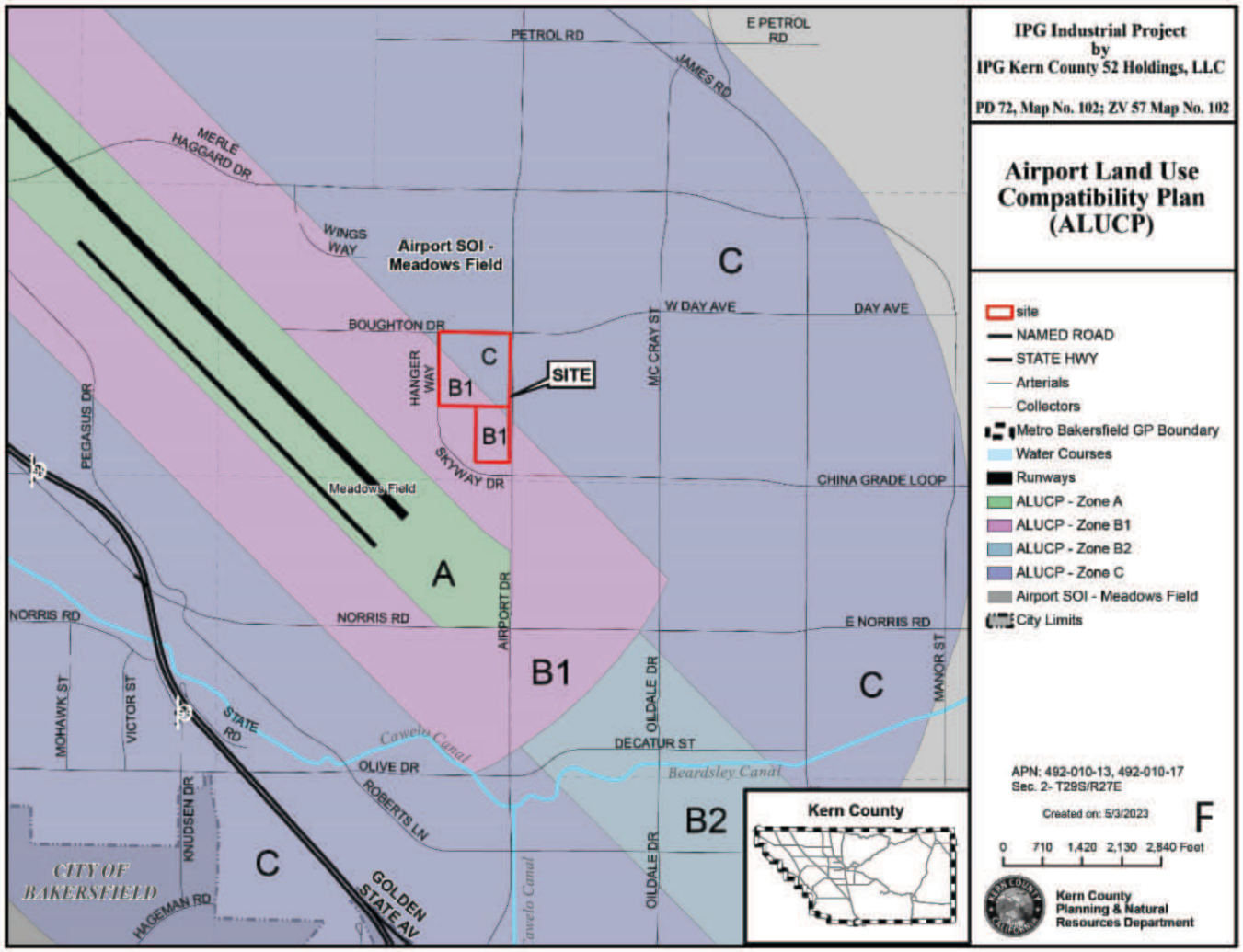


Figure 4.11-4: Kern County ACLUP Compatibility Criteria

Policies / Chapter 2

Table 2A

Compatibility Criteria

Kern County Airport Land Use Compatibility Plan

Zone	Location[1]	Impact Elements	Maximum Densities		Required Open Land[4]
			Residential[2] (du/ac)	Other Uses (people/ac)[3]	
A	Runway Protection Zone or within Building Restriction Line	• High risk • High noise levels	0	10	All Remaining
B1	Approach/Departure Zone and Adjacent to Runway	• Substantial risk — aircraft commonly below 400 ft. AGL or within 1,000 ft. of runway • Substantial noise	0.1	60	30%
B2	Extended Approach/Departure Zone	• Significant risk — aircraft commonly below 800 ft. AGL • Significant noise	0.5	60	30%
C	Common Traffic Pattern	• Limited risk — aircraft at or below 1,000 ft. AGL • Frequent noise intrusion	15	150	15%
D	Other Airport Environs	• Negligible risk • Potential for annoyance from overflights	No Limit	No Limit	No Requirement
E	Special Land Use	• Compatibility Issues	15	150	No Requirement

Zone	Additional Criteria		Examples	
	Prohibited Uses[5]	Other Development Conditions[8]	Normally Acceptable Uses[9]	Uses Not Normally Acceptable[10]
A	• All structures except ones with location set by aeronautical function • Assemblages of people • Objects exceeding FAR Part 77 height limits • Hazards to flight[6]	• Dedication of avigation easement	• Aircraft tiedown apron • Pastures, field crops, vineyards • Automobile parking	• Heavy poles, signs, large trees, etc.
B1 and B2	• Schools, day care centers, libraries • Hospitals, nursing homes • Highly noise-sensitive uses (e.g. amphitheaters) • Storage of highly flammable materials[7] • Hazards to flight[6]	• Locate structures maximum distance from extended runway centerline • Dedication of avigation easement	• Uses in Zone A • Any agricultural use except ones attracting bird flocks • Warehousing, truck terminals • Two-story offices • Single-family homes on an existing lot	• Residential subdivisions • Intensive retail uses • Intensive manufacturing or food processing uses • Offices with more than two stories • Hotels and motels
C	• Schools • Hospitals, nursing homes • Hazards to flight[6]	• Dedication of overflight easement for residential uses	• Uses in Zone B • Parks, playgrounds • Most retail uses • Duplexes and medium-density apartments • Two-story motels	• Large shopping malls • Theaters, auditoriums • Large sports stadiums • Hi-rise office buildings with more than four stories
D	• Hazards to flight[6]	• Deed notice required for residential development	• All except ones hazardous to flight	
E	• Hazards to flight[6]	• Special development conditions	• Unique circumstance land use development[11]	

2-2

Table 2A Continued

Compatibility Criteria

Kern County Airport Land Use Compatibility Plan

NOTES

1 Zones may also apply elsewhere if an airport has atypical operational procedures or specialized aircraft activities.

2 Residential parcels should not contain more than the indicated number of dwelling units per gross acre. Clustering of units is encouraged as a means of meeting the Required Open Land requirements.

3 The land use should not attract more than the indicated number of people per acre at any time. This figure should include all individuals who may be on the property (e.g., employees, customers/visitors, etc.). These densities are intended as general planning guidelines to aid in determining the acceptability of proposed land uses. Special short-term events related to aviation (e.g., air shows), as well as non-aviation special events, are exempt from the maximum density criteria.

4 Open land requirements are intended to be applied with respect to the entire zone. This is typically accomplished initially as part of the community's general plan or a specific plan.

5 May be modified by airport-specific policies or decision of local governing body with appropriate adopted findings based upon evidence in the record.

6 See Policy Section 3.3.

7 Within the B1 and B2 zones, only the following flammable materials are permitted: aviation fuel, other aviation-related materials, and up to 2,000 gallons of nonaviation materials.

8 These conditions do not apply to ministerial actions.

9 These uses typically can be designed to meet the density requirements and other development conditions listed.

10 These uses typically do not meet the density and other development conditions listed. They should be allowed only if a major community objective is served by their location in this zone and no feasible alternative location exists.

11 The E zone accommodates land uses with special characteristics that are not normally allowed in the C Zone. Each E zone is unique to the requested land use and each individual airport. Special conditions of development may be formulated in order to minimize flight hazards.

Source: Comprehensive Airport Land Use Plan (1996)

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4.11.3 Regulatory Setting

Federal

Federal Aviation Administration

Federal Regulation Title 14, Part 77 establishes standards and notification requirements for objects that may affect navigable airspace. The notification would evaluate construction impacts, determine potential hazards, identify safety mitigation measures, and record new objects as it relates to airport and airspace operations, The Part 77 notification process allows the Federal Aviation Administration (FAA) to identify any potential aeronautical hazards in advance in order to prevent/minimize adverse impacts to navigable airspace.

State

California Environmental Quality Act

California Environmental Quality Act (CEQA) was developed to protect the quality of the environment and the health and safety of persons from adverse environmental effects. Discretionary projects are required to be reviewed consistent with the requirements of CEQA to determine if there is potential for the project to cause a significant adverse effect on the environment. Depending on the type of project and its potential effects, technical traffic, noise, air quality, biological resources, and geotechnical reports may be needed. If potential adverse effects can be mitigated to less than significant levels, a mitigated negative declaration may be adopted. If potentially adverse effects cannot be mitigated to less than significant levels, an environmental impact report is required. These documents have mandated content requirements and public review times.

Local

Land use and planning decisions within and adjacent to the project site are guided and regulated by the MBGP and the Kern County Zoning Ordinance. The Metropolitan Bakersfield General Plan contains goals, objectives, and policies and provides an overall foundation for establishing land use patterns. For this land use impact analysis, this section lists all relevant goals, objectives, policies, and implementation measures related to the proposed Project. The Zoning Ordinance contains regulations through which the General Plan's provisions are implemented. The most relevant regulations pertaining to industrial development are presented below.

Metropolitan Bakersfield General Plan

The MBGP is a policy document designed to provide long-range guidance to those making decisions affecting the future character of the Metropolitan Bakersfield planning area. It represents the official statement of the community's physical development as well as its economic, social and environmental goals. Included in the MBGP is the Land Use, Circulation, Housing, Conservation, Open Space, Noise, Safety, Public Services and Facilities, and Parks Elements. Each element establishes goals, policies, and implementation measures that guide planning decisions in

unincorporated Kern County. The goals, policies, and implementation measures relevant to the proposed Project are listed below.

Chapter II – Land Use Element

Goals

Goal l. Accommodate new development which captures the economic demands generated by the marketplace and establishes Bakersfield's role as the capital of the southern San Joaquin Valley.

Goal 2. Accommodate new development which provides a full mix of uses to support its population.

Goal 3. Accommodate new development which is compatible with and complements existing land uses.

Goal 4. Accommodate new development which channels land uses in a phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.

Goal 6. Accommodate new development that is sensitive to the natural environment, and accounts for environmental hazards.

Goal 7. Establish a built environment which achieves a compatible functional and visual relationship among individual buildings and sites.

Goal 8. Target growth companies that meet clean air requirements and create sustainable employment in jobs paying higher wages.

Policies

Policy 8. The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste.

Policy 31. Allow for a variety of industrial uses, including land-extensive mineral extraction and processing, heavy manufacturing, light manufacturing, warehousing and distribution, transportation-related, and research and development uses.

Policy 32. Protect existing industrial designations from incompatible land use intrusions.

Policy 33. Encourage the efficient use of existing industrial land uses through consolidation of building and storage facilities.

Policy 34. Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors.

Policy 35. Encourage upgrading of visual character of heavy manufacturing industrial areas through the use of landscaping or screening-of visually unattractive buildings and storage areas.

Policy 36. Require that industrial uses provide design features, such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration.

Policy 37. Street frontages along all new industrial development shall be landscaped.

Policy 38. Minimize impacts of industrial traffic on adjacent residential parcels through the use of site plan review and improvement standards.

Policy 76. Provide for a mix of land uses which meets the diverse needs of residents; offers a variety of employment opportunities; capitalizes, enhances, and expands upon existing physical and economic assets; and allows for the capture of regional growth.

Policy 79. Provide for an orderly outward expansion of new "urban" development (any commercial, industrial, and residential development having a density greater than one unit per acre) so that it maintains continuity of existing development, allows for the incremental expansion of infrastructure and public services, minimizes impacts on natural environmental resources, and provides a high quality environment for living and business.

Policy 82. Preserve existing significant sound residential neighborhoods, commercial districts, and industrial areas.

Policy 86. Encourage infill of vacant parcels.

Policy 95. When planning for new development, coordinate with utility companies to designate future or potential electrical transmission line corridors as needed to serve the metropolitan area.

Chapter III. Circulation Element

A. Streets

Goals

Goal 1. Provide a safe and efficient street system that links all parts of the area for movement of people and goods.

Goal 2. Provide for safe and efficient motorized, non-motorized, and pedestrian traffic movement.

Goal 3. Minimize the impact of truck traffic on circulation, and on noise sensitive land uses.

Design

Policies

Policy 3. Provide additional right-of-way pavement width to accommodate turn lands at intersections.

Policy 5. Place traffic signals to minimize vehicular delay.

Policy 6. Design and locate site access driveways to minimize traffic disruption where possible considering items such as topography, past parcelization and other factors.

Image

Policies

Policy 12. Maintain the integrity of the circulation system.

Policy 16. Require that truck access to commercial and industrial properties be designed to minimize impacts on adjacent residential parcels.

Policy 17. Require buildings expected to be serviced by delivery trucks to provide off-street facilities for access and parking.

Policy 22. Design transportation improvements to minimize noise impacts on adjacent uses (I-19).

General

Policies

Policy 34. Minimize the impacts of land use development on the circulation system. Review all development plans, rezoning applications, and proposed general plan amendments with respect to their impact on the transportation system, and require revisions as necessary.

Policy 37. Require new development and expansion of existing development to pay for necessary access improvements, such as street extensions, widenings, turn lanes, signals, etc., as identified in the transportation impact report as may be required for a project.

Policy 39. Require new development and expansion of existing development to pay or participate in its pro rata share of the costs of expansions in area-wide transportation facilities and services which it necessitates.

C. Bikeways

Policies

Policy 5. Consider bicycle safety when implementing improvements for automobile traffic operations.

Policy 7. Provide bicycle parking facilities at activity centers such as shopping centers, employment sites, and public buildings

D. Parking

Goals

Goal 1. Provide an efficient parking system to respond to the needs of motorists.

Goal 2. Satisfy parking requirements in all new developments (residential, commercial, industrial, etc.) through off-street facilities.

Policies

Policy 1. Ensure that adequate on-site parking supply and parking lot circulation is provided on all site plans in accordance with the adopted parking standards.

Policy 2. Discourage the intrusion of non-neighborhood parking in residential areas.

Chapter V. Conservation Element

A. Biological Resources

Goal 1. Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources.

Policy 1. Direct development away from "sensitive biological resource" areas, unless effective mitigation measures can be implemented.

C. Soils and Agriculture

Goal 1. Provide for the planned management, conservation, and wise utilization of agricultural land in the planning area.

Policies

Policy 6. Continue implementing land grading ordinances that reduce soil erosion/siltation commonly associated with land development.

Policy 7. Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible.

Policy 12. Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction.

Policy 13. Minimize the alteration of natural drainage and require development plans to include necessary construction to stabilize runoff and silt deposition through enforcement of grading and flood protection ordinances.

Policy 15. Buffers such as setbacks, berms, greenbelts, and open space areas shall be stablished to separate farmland from incompatible urban uses.

Policy 16. Future development which involves in-fill of the urban area as opposed to development on the urban fringes shall be encouraged.

D. Water Resources

Policy 2. Minimize the loss of water which could otherwise be utilized for groundwater recharge purposes and benefit planning area groundwater aquifers from diversion to locations outside the area.

Policy 6. Protect planning area groundwater resources from further quality degradation.

E. Air Quality

Policies

Policy 1: Comply with and promote San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) control measures regarding Reactive Organic Gases (ROG). Such measures are focused on: (a) steam driven well vents, (b) Pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test stations, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance.

Policy 2. Encourage land uses and land use practices which do not contribute significantly to air quality degradation.

Policy 3. Require dust abatement measures during significant grading and construction operations.

Policy 4. Consider air pollution impacts when evaluating discretionary permits for land use proposals. Considerations should include:

- Alternative access routes to reduce traffic congestion.
- Development phasing to match road capacities.
- Buffers including increase vegetation to increase emission dispersion and reduce impacts of gaseous or particulate matter on sensitive uses.

Policy 5. Consider the location of sensitive receptors such as schools, hospitals, and housing developments when locating industrial uses to minimize the impact of industrial sources of air pollution.

Policy 13. Consider establishing priority parking areas for carpoolers in projects with relatively large numbers of employees to reduce vehicle miles traveled and improve air quality.

Policy 15. Promote the use of bicycles by providing attractive bicycle paths and requiring provision of storage facilities in commercial and industrial projects.

Policy 22. Require the provision of secure, convenient bike storage racks at shopping centers, office buildings, and other places of employment in the Bakersfield Metropolitan area.

Policy 23. Encourage the provision of shower and locker facilities by employers, for employees who bicycle or jog to work.

Policy 29. Encourage the use of alternative fuel and low or zero emission vehicles.

Chapter VII. Noise Element

Goals

Goal 1: Ensure that residents of the Bakersfield Metropolitan Area are protected from excessive noise and existing moderate levels of noise are maintained.

Goal 2: Protect the citizens of the planning area from the harmful effects of exposure to excessive noise, and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports and other sources.

Policies

Policy 1. Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in Table VII-2 [Metropolitan Bakersfield General Plan, 2007: VII-9] (Table 4.11-2). The noise exposure contour maps on file at the City of Bakersfield and County of Kern indicate areas where existing and projected noise exposures exceed 65 dB CNEL (exterior) for the major noise sources identified.

Table 4.11-2: Noise Level Performance Standards (Table VII-2)

Category	Cumulative Number of minutes in any one-hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30	55	50
2	15	60	55
3	5	65	60
4	1	70	65
5	0	75	70

Source: Metropolitan Bakersfield General Plan

Note: Each of the noise level standards specified in this table shall be reduced by five (5) dB(A) for pure tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards should be applied at a residential or other noise-sensitive land use and not on the property of a noise-generating land use.

Policy 2. Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into project design to reduce noise to acceptable levels.

Policy 3. Review discretionary industrial, commercial or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses. Additionally, the development of new noise-generating land uses which are not preempted from local noise regulation will be reviewed if resulting noise levels will exceed the performance standards contained within Table VII-2 in areas containing residential or other noise-sensitive land uses.

Implementation Measures:

Implementation 3. Require development of proposed residential or other noise sensitive land uses in noise-impacted area to comply with the noise standards of 65 dB CNEL or less in outdoor activity

areas and 45 dB CNEL or less within interior living spaces and the performance standards within Table VII-2.

Implementation. Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB CNEL and interior noise levels in excess of 45 dB CNEL and so that impacts on noise sensitive uses shall not exceed the performance standards in Table VII-2.

Chapter VIII. Safety Element

Policy 1. The adopted Kern County, California Multi-Hazard Mitigation Plan is incorporated by reference. This multi-jurisdictional plan, approved in compliance with the Disaster Mitigation Act of 2000, provides long-term planning to reduce the impacts of future disasters.

Implementation. The adopted multi-jurisdictional Kern County, California Multi-Hazard Mitigation Plan, as approved by FEMA, shall be used as a source document for preparation of environmental documents pursuant to CEQA, evaluation of project proposals, formulation of potential mitigation and identification of specific actions that could, if implemented, mitigate impacts from future disasters and other threats to public safety.

A. Seismic Safety

Goal 1. Substantially reduce the level of death, injury, property damage, economic and social dislocation and disruption of vital services that would result from earthquake damage.

Policies

Policy 5. Incorporate planning for incidents affecting critical facilities into contingency plans for disaster response and recovery.

Policy 9. Adopt and maintain high standards for seismic performance of buildings, through prompt adoption and careful enforcement of the most current seismic standards of the Uniform Building Code.

Policy 11. Require site-specific studies to locate and characterize specific fault traces within an Alquist-Priolo Earthquake Fault Zone for all construction designed for human occupancy.

Implementation Measures:

Implementation 3. Require structures that are within the plan area and are subject to Building Department review to adhere to the most current seismic standards adopted as part of the Uniform Building Code.

B. Public Safety

Goals

Goal 2. Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development of metropolitan police and fire facilities and services.

Goal 4. Assure that fire, hazardous substance regulation and emergency medical service problems are continuously identified and addressed in a proactive way, in order to optimize safety and efficiency.

Policies

Policy 2. Require discretionary projects to assess impacts on police and fire services and facilities.

Policy 7. Enforce ordinances regulating the use/manufacture/sale/ transport/disposal of hazardous substances, and require compliance with state and federal laws regulating such substances.

Policy 8. The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste.

Policy 12. Where recommended by appropriate local, State or Federal agencies for discretionary projects, soils shall be tested for concentrations of agricultural chemicals prior to grading permit approval, whenever feasible. Contaminated soils shall be excavated and disposed of at a certified hazardous waste disposal facility whenever necessary.

Policy 13. Fugitive dust emissions shall be controlled through applicable requirements (Regulation VIII) set forth by the San Joaquin Valley Unified Air Pollution Control District, including but not limited to; irrigation, paving of construction roads, and limiting grading activities during periods of high wind. These practices would reduce potential adverse health effects resulting from the development of agricultural property.

Policy 15. Fugitive dust emissions shall be controlled through applicable requirements set forth by the San Joaquin Valley Unified Air Pollution Control District (Regulation VIII), including but not limited to; irrigation, paving of construction roads, and limiting grading activities during periods of high wind. These practices would reduce potential adverse health effects as a result of exposure to Coccidioidomycosis.

Policy 16. All new discretionary development projects shall be subject to environmental and design review on a site-specific, project-by-project basis, including but not limited to, an assessment to determine whether hazardous materials present potential health affects to human health as required by the Department of Environmental Services.

Chapter X. Public Services and Facilities Element

A. General Utility Services

Goals

Goal 1. Maintain a coordinated planning and implementation program for the provision of public utilities to the planning area.

Goal 2. Coordinate the planning and implementation of planning area municipal-type utility facilities and services.

Policies

Policy 5. Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent.

B. Water Distribution

Policy 3. Require that all new development proposals have an adequate water supply available.

C. Sewer Service

Goal 1. Ensure the provision of adequate sewer service to serve the needs of existing and planned development in the planning area.

Policy 1. Effect the consolidated collection, treatment, and disposal of wastewater from all urban development within the metropolitan area, discouraging the creation or expansion of separate systems and encouraging the consolidation and interconnection of existing separate systems.

D. Storm Drainage

Goals

Goal 1. Ensure the provision of adequate storm drainage facilities to protect planning area residents from flooding resulting from storm water excess.

Goal 2. Maintain a comprehensive storm drainage system which serves all urban development within the planning area.

Implementation Measures

Implementation 4. Use drainage area retention basins for drainage disposal when direct discharge to a waterway is not available. Combine storm drainage usage with recreational usage when feasible. Incorporate in such basins recessed areas for off-season retention of nuisance flows.

Maintain all basins with the primary purpose of drainage disposal, with recreational usage as a secondary objective.

E. Street Lighting

Goals

Goal 1. Provide uniform and adequate public lighting for all developed and developing portions of the planning area.

Goal 2. Develop uniform planning area street light location and design standards.

Policies

Policy 4. Require developers to install street lighting in all new developments in accord with adopted city standards and county policies.

F. Solid Waste

Goal 1. Ensure the provision of adequate solid waste disposal services to meet the demand for these services in the planning area.

Policy 1: Comply with, and update as required, the adopted county solid waste management plan.

Implementation Measures

Implementation 1. Implement the "Kern County Solid Waste Management Plan-1988", and subsequent updates which will make the Metropolitan Bakersfield Municipal landfill at Bena available to the General Plan area.

Kern County Zoning Ordinance

Title 19 of the Kern County Ordinance provides a description of permitted uses for the various zoning classifications within the County. The Kern County Zoning Ordinance (KCZO) consists of two primary parts: a Zoning Map that delineates the boundaries of zoning districts; and a Zoning Code that explains the purpose of the districts, specifies permitted and conditional uses, and establishes development and performance standards. The intent of the Zoning Code is to protect public health, safety, and the general welfare of residents and visitors in the County. Together with the Zoning Map, the Zoning Code identifies the particular uses permitted on each parcel of land in the County and sets forth regulations and standards for development to ensure that the policies, goals, and objectives of the General Plan are implemented. In addition to land use regulations, the Zoning Code contains development standards that can lessen a new structure's impacts on a location or area. These standards control the height, setbacks, parking, lot coverage, gross floor area, etc. for new structures. The Zoning Code also regulates which uses are permitted in each of the County's zoning districts to ensure compatibility between land uses, and outlines the public hearing process with respect to the requested land use permit. The following is a description of the zone district currently designated within the project area.

Light Industrial (M-1) District

The purpose of the Light Industrial (M-1) District is to designate areas for wholesale commercial, storage, trucking, assembly-type manufacturing, and other similar industrial uses. Processing or

fabrication will be limited to activities conducted within a building that does not emit fumes, odor, dust, smoke, or gas beyond the confines of the building within which the activities occur or produce significant levels of noise or vibration.

Precise Development Combining District

The purpose of the Precise Development (PD) Combining District is to designate areas with unique site characteristics or environmental conditions or areas surrounded by sensitive land uses to ensure that development in such areas is compatible with such constraints. All development in the PD Combining District shall be subject as a minimum to Special Development Standards as specified in Chapter 19.80 of the KCZO; however, a Special Development Standards Plot Plan Review shall not be required. The application of the PD District may be initiated by either the property owner or the County. The PD District may be combined with any base district. The regulations established by the PD District shall be in addition to the regulations of the base district with which the PD District is combined.

Airport Approach Height (H) Combining District

The purpose of the Airport Approach Height (H) Combining District is to minimize aviation hazards by regulating land uses, restricting the height of buildings and vegetation, and specifying design criteria necessary to promote aviation safety and to implement the requirements of the adopted Airport Land Use Compatibility Plan. The H District may be applied to areas within the vicinity of any public or general-use airport as provided for in the adopted Airport Land Use Compatibility Plan. The standards established by the H District shall be in addition to the regulations of the base district with which the H District is combined.

As described previously in **Chapter 3**, *Project Description*, implementation of the proposed Project includes the following requests:

- Precise Development Plan (PD No. 72, Map No. 102) to allow construction and operation an approximate 923,130 square foot warehouse, distribution and logistics facility within two (2) single-story warehouses (Building 1: 655,690 square feet, including 10,000 square foot office area; and Building 2: 267,440 square feet with 5,000 square foot office area) totaling 923,130 square feet, with 15,000 square feet of dedicated office space (Section 19.36.020.E.2 & 19.36.020.D.1) on an approximate 49.05 acre project site across two-(2-) parcels, in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District at the corner of Boughton Drive and Airport Drive.
- Zoning Variance (ZV No. 57, Map No. 102) to allow construction of a 56-foot-tall warehouse building where 35 feet is authorized (Section 19.76.080) in the M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) District.

As such, the basis of approval for the requested Precise Development Plan and Zone Variance as identified in the Kern County Zoning Ordinance are listed below.

Section 19.56.150 Basis for Approval for Precise Development Plan

The decision-making authority may approve or conditionally approve an application for a precise development plan if it finds all of the following:

- The proposed development is consistent with the designations, goals, and policies of the applicable General or Specific Plan.
- The proposed development will not be materially detrimental to the health and safety of the public or to property and residents in the vicinity.

Section 19.106.040 Basis for Approval for Zone Variance

The decision-making authority may approve or conditionally approve an application for a variance if it finds all of the following:

- Special circumstances exist applicable to the subject property, including size, shape, topography, location, or surroundings, such that the strict application of this title deprives such property of privileges enjoyed by other property in the vicinity and in the same zoning district or districts.
- The granting of the variance does not constitute a grant of special privilege inconsistent with the limitations upon other properties in the vicinity and zoning district in which such property is located.
- The granting of the variance will not be materially detrimental to the public health, safety, or welfare or to property or residents in the vicinity.

Regional Transportation Plan

The most recent adopted Regional Transportation Plan (RTP) was prepared by the Kern Council of Governments (COG) and was adopted in 2022. The 2022 RTP is a 24-year blueprint that establishes a set of regional transportation goals, policies, and actions intended to guide development of the planned multimodal transportation systems in Kern County. It was developed through a continuing, comprehensive, and cooperative planning process, and provides for effective coordination between local, regional, State, and federal agencies. Included in the 2022 RTP is the Sustainable Communities Strategy (SCS) required by California's Sustainable Communities and Climate Protection Act, of Senate Bill (SB) 375. The California Air Resources Board (ARB) set targets for Kern's greenhouse gas (GHG) emissions reductions from passenger vehicles and light-duty trucks at 9% per capita by 2020 and 15% per capita by 2035 as compared to 2005. In addition, SB 375 provides for closer integration of the RTP/SCS with the Regional Housing Needs Allocation (RHNA) ensuring consistency between low-income housing needs and transportation planning.

The intent of the SCS is to achieve the State's emissions reduction targets for automobiles and light trucks. The SCS will also provide opportunities for a stronger economy, healthier environment, and safer quality of life for community members in Kern County. The RTP/SCS seeks to: improve economic vitality; improve air quality; improve the health of communities; improve transportation

and public safety; promote the conservation of natural resources and undeveloped land; increase access to community services; increase regional and local energy independence; and increase opportunities to help shape the community's future.

The 2022 RTP/SCS financial plan identifies how much money is available to support the region's transportation investments. The plan includes a core revenue forecast of existing local, State, and federal sources along with funding sources that are considered to be reasonably available over the time horizon of the RTP/SCS. These new sources include adjustments to State and federal gas tax rates based on historical trends and recommendations from two national commissions (National Surface Transportation Policy and Revenue Study Commission and National Surface Transportation Infrastructure Financing Commission), leveraging of local sales tax measures, local transportation impact fees, potential national freight program/freight fees, future State bonding programs, and mileage-based user fees (Kern COG 2022).

Kern County Airport Land Use Compatibility Plan

The Kern County ALUCP was prepared as a result of the California State Legislature amending in 1994 the Aeronautics Law, State Aeronautics Act, Airport Land Use Commission, Public Utilities Code (Chapter 4, Article 3.5). The legislative intent of this statute is expressed as "…to provide for the orderly development of each public use airport in this state and the area surrounding these airports so as to promote the overall goals of the California airport noise standards… and to prevent the creation of new noise and safety problems. It is the purpose of this article to protect public health, safety and welfare by ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards within areas around public airports to the extent these areas are not already devotes to incompatible uses."

The purpose of the Kern County ALUCP is to establish procedures and criteria by which the County of Kern and the affected incorporated cities can address compatibility issues when making planning decisions regarding airports and the land uses around them.

Kern County's Solid Waste Management Plan

The Solid Waste Management Plan is a comprehensive guide for all solid waste management activities in the County. The plan identifies the existing solid waste generation and disposal facilities in Kern County, estimates future solid waste disposal demand, and identifies programs to meet this future need.

Kern County Multi-Hazard Mitigation Plan

The purpose of the multi-hazard mitigation plan is to reduce or eliminate the long-term risk to people and property from natural hazards and their effects in the County. The 2019-20 Update to the Plan is to help Kern County become less vulnerable to losses from future disasters. The multi-jurisdictional plan includes the County and the incorporated municipalities of Arvin, Bakersfield, California City, Delano, Maricopa, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco. The County also encompasses areas of land controlled by federal and State land management agencies, including the California Department of Forestry and Fire Protection, Bureau of Land Management, and Bureau of Reclamation. While other levels of government have jurisdiction in these parts of

the County, the Hazard Mitigation Plan could also be used to document and coordinate mitigation efforts among federal, State, and local jurisdictions. This plan also covers 49 special districts that include school, airport, community service, water, recreation and park, sanitation, and other districts.

Kern County and Incorporated Cities Hazardous Waste Management Plan

State Assembly Bill 2948 (1986) authorized local governments to develop comprehensive hazardous waste management plans. The intent of each plan is to ensure that adequate treatment and disposal capacity is available to manage the hazardous wastes generated within the local government's jurisdiction. The Kern County and Incorporated Cities Hazardous Waste Management Plan (Hazardous Waste Plan) was first adopted by Kern County and each incorporated city before September 1988 and was subsequently approved by the California Department of Health Services. The Hazardous Waste Plan was updated and incorporated by reference into the KCGP in 2004 as permitted by Health and Safety Code Section 25135.7(b), and thus must be consistent with all other aspects of the KCGP.

The Hazardous Waste Plan provides policy direction and action programs to address current and future hazardous waste management issues that require local responsibility and involvement in Kern County. In addition, the Hazardous Waste Plan discusses hazardous waste issues and analyzes current and future waste generation in the incorporated cities, County, and state, and federal lands. The purpose of the hazardous Waste Plan is to coordinate local implementation of a regional action to effect comprehensive hazardous waste management throughout Kern County. The action program focuses on development of programs to equitably site needed hazardous waste management facilities; to promote on-site source reduction, treatment, and recycling; and to provide for the collection and treatment of small quantity hazardous waste generators. An important component of the Hazardous Waste Plan is the monitoring of hazardous waste management facilities to ensure compliance with federal and state hazardous waste regulations. The siting criteria and any subsequent environmental documentation required pursuant to CEQA would also ensure the mitigation of adverse impacts associated with the siting of any new hazardous waste facility.

4.11.4 Impacts and Mitigation Measures

Methodology

The potential impacts associated with the proposed Project are evaluated on a qualitative basis through a comparison of the existing land use and the proposed land uses, in consideration of the applicable planning goals identified above. Compliance with the aforementioned policies is illustrated in consistency tables provided in the project Impacts section below. The change in the land use on the project site is significant if the project results in the effects described in the thresholds of significance below. The evaluation of project impacts is based on professional judgment, analysis of the County's land use policies and the significance criteria established in Appendix G of the CEQA Guidelines, which the County has determined appropriate for this Draft EIR.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant adverse effect on land use.

A project could have a have a significant adverse effect on land use if the project would:

- Physically divide an established community;
- Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

Impacts and Mitigation Measures

Impact 4.11-1: The project would cause a significant environmental impact due to physically dividing an established community.

The proposed Project would be located on vacant, undeveloped land in the central portion of unincorporated Kern County, with its primary function as a warehouse and distribution facility that may require modifications to the interior design.

The overall project would not physically divide an established community. The project vicinity is characterized by industrial and commercial uses (distribution, storage, and shipping centers), transportation, vacant land, and residential uses primarily east of the project site. The residential uses are comprised of single- and multi-family residences, and are located east of the project site, with the nearest residence approximately 100 feet directly east.

The project site is situated approximately 1.4 miles northeast of SR 99. The project site is approximately 1.7 miles north of the incorporated City of Bakersfield and approximately 3.1 miles east of the incorporated City of Shafter. The unincorporated community of Oildale directly abuts the east side of the project site. However, the project would neither physically encroach into nor divide or restrict access to surrounding communities within the region. In addition, no new roadways or other linear elements that would have the potential to restrict existing access or movement within the local community are proposed. The proposed Project would not physically divide or restrict access to the residential development or any other community. Impacts in this regard are less than significant and mitigation is not required.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Impacts would be less than significant for the project.

Impact 4.11-2: The project would cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

As noted previously, the proposed Project would be located on vacant, undeveloped land in the central portion of unincorporated Kern County, with its primary function as a warehouse and distribution facility that may require modifications to the interior design. The Project would be subject to tenant improvements in order to accommodate specialized storage for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, tools, etc., typically found in a modern distribution/logistics facility to demonstrate conformity with the land use intensity established by the M-1 (Light Industrial) District (see Chapter 19.36 of the Kern County Zoning Ordinance). Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. Building Code, Fire Code, Plumbing Code, etc.). Outdoor storage is not proposed as part of this project. As such, specific products and packaged goods that are stored entirely indoors are not expected to conflict with any land use plan, policy, or regulation for the purpose of avoiding or mitigating an environmental effect.

The Metropolitan Bakersfield General Plan and the Kern County Zoning Ordinance establish land use policies and regulations, as well as permitted and conditionally permitted land uses that are applicable to the Project. The following discussion evaluates the Project's conformity to these plans, policies and regulations.

Metropolitan Bakersfield General Plan

Table 4.11-3 presents an evaluation of the project's consistency with the Metropolitan Bakersfield General Plan. The table lists the goals and policies identified above in the regulatory setting and provides analysis on the project's general consistency with overarching policies. Additionally, the table provides goals and policies of issue areas that are presented in more detail in other sections of the Draft EIR. Specifically, the following Policies are required per the Land Use Element of the MBGP:

Policy 36. Require that industrial uses provide design features, such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration.

Policy 37. Street frontages along all new industrial development shall be landscaped.

Implementation of **Mitigation Measure MM 4.1-3** (Section 4.1, *Aesthetics*) will ensure adherence to these policies, requiring the installation of a vegetative barrier along the Airport Drive and Boughton Drive frontages, which would result in a regularly maintained, dense, visual buffer established between the proposed project and the nearest sensitive receptors. This distinct separation from the proposed project from nearby residences will ensure better harmonization of industrial operations near the existing neighborhood.

As evaluated in detail in **Table 4.11-3**, the Project is generally consistent with the goals and policies of the Metropolitan Bakersfield General Plan. Generally, given that land use plans reflect a range of competing interests, a project should be compatible with the plan's overall goals and objectives, but need not be in perfect conformity with every plan policy. Therefore, as demonstrated by the analysis within **Table 4.11-3**, the proposed Project does not result in significant impacts due to a conflict with any land use plan or policy adopted for the purpose of avoiding or mitigating an environmental effect.

Kern County Zoning Ordinance

The existing zoning on-site is classified as M-1 PD H, which includes but is not limited to the following permitted uses: commercial uses and industrial manufacturing or assembly uses. The proposed Project does not include a zone change, and the Project site will remain zoned as M-1 PD H.

Pursuant to Sections 19.36.020.E.2 and 19.36.020.D.1 of the KCZO, the proposed use for industrial storage as a warehouse with incidental office space is permitted on a by-right basis in the M-1 Base District. Areas subject to the PD Combining District overlay typically contain unique site characteristics, environmental conditions, or areas surrounded by sensitive land uses. Therefore, additional review as required under the Precise Development Plan is necessary to ensure development in such areas is compatible with site constraints in addition to the regulations of the base district.

Typically, uses that are permitted on a by-right basis are not required to undergo the public hearing process facilitated by the Kern County Planning and Natural Resources Department – a process that otherwise would be required for conditionally permitted uses. The inclusion of the Precise Development Plan ensures nearby property owners within a 1,000-foot radius of the project, as well as affected departments, agencies and interested parties, are notified of the proposal and allows Planning Department Staff to impose conditions of approval to be considered at a public hearing by the appropriate hearing bodies.

The site's proximity to the Meadows Field Airport requires additional oversight given the H (Airport Approach Height) Combining District overlay, which is intended to minimize aviation hazards by regulating land uses, restricting the height of buildings and vegetation, and specifying design criteria necessary to promote aviation safety and to implement the requirements of the adopted ALUCP. The proposed Project has a maximum height of 56 feet, which conforms to Section 19.36.080, Height Limits, in the M-1 Base District. The M-1 District includes the following development standards relevant to the project site:

- Buildings and structures shall not exceed six (6) stories or seventy-five (75) feet, unless the building is set back from each street, alley, and lot line at least one (1) foot for each three (3) feet of height above six (6) stories or seventy-five (75) feet.
- No building or structure shall exceed ten (10) stories or one hundred and thirty-five (135) feet.

However, Section 19.76.080, Height Limits, of the H Combining District states no building, structure, plant, or tree in an H District shall exceed thirty-five (35) feet in height, except as may be approved pursuant to Sections 19.76.130 and 19.76.140 of the H Combining District chapter, and in no case shall the height exceed the height allowed by the base district with which the H District is combined. Section 19.76.130 lists the Site Development Plan Review process that the proposed project is currently undergoing and Section 19.76.140 lists the minimum requirements for the Site Development Plan Review application, which includes the following particular condition related to height:

- E. For any proposed structure or vegetation that will exceed a height of thirty-five (35) feet, a letter from the Federal Aviation Administration, which shall state that the proposed development does not constitute a hazard to air traffic and does not violate any federal regulations. The letter shall also include any special conditions imposed by the Federal Aviation Administration.

The IPG Kern County 52 Holdings, LLC (Project proponent) has secured letters from the Federal Aviation Administration (FAA) that indicate Determinations of No Hazards to Air Navigation for multiple coordinates within the proposed project site boundary (Appendix G.2). Additional discussion is provided in Section 4.9, *Hazards and Hazardous Materials,* of this Draft EIR.

Nonetheless, the proposed Project includes a request for a Zone Variance to account for the proposed 56-foot-tall warehouse building where 35 feet is authorized. As noted above under the *Regulatory Setting – Local – Kern County Zoning Ordinance* Section, the proposed project must demonstrate conformity with the findings for approval listed for both the Precise Development Plan and Zone Variance that will ultimately be considered by the Board of Supervisors. With the approval of the above-mentioned Precise Development Plan and zone variance, the Project would be consistent with applicable land use policies in the MBGP. Potential impacts related to the variance would include impacts to aviation due to increased height limits, which are also addressed in Section 4.9, *Hazards and Hazardous Materials*. Even with the variance and Precise Development Plan, there would be no environmental impacts associated with increased height, and impacts would be less than significant.

Kern County Airport Land Use Compatibility Plan

As noted previously, the proposed Project is located within the SOI of the Meadows Field Airport, located approximately 0.6 mile west of the project, as shown in **Figure 4.11-3**. Meadows Field Airport is recognized as an Airport Influence Area, in which policies of the Kern County ALUCP apply to the proposed Project.

Previously shown, **Figure 4.11-4** shows the compatibility criteria for land uses in the vicinity of airports. The proposed Project is located in zone B1, Approach/Departure Zone and Adjacent to Runway, and zone C, Common Traffic Pattern, shown in **Figure 4.11-3.** Zone B1 is more restrictive; therefore, will take precedence over zone C. Allowable density for this zone for uses other than residential is 60 people per acre. Required open land for this zone is 30%. Warehousing, truck terminals, two-story office buildings, and automobile parking, all uses in the proposed Project, are normally accepted uses in this zone.

The proposed Project, a logistics facility and associated infrastructure, includes construction of two single-story buildings. These uses are all in line with the normally accepted uses for zone B1. The proposed Project covers 43.2% of the site, allowing for well over the required 30% Open Land. The proposed Project includes an estimated 437 number of employees. Given the project site acreage (49.05), the density for the proposed Project is approximately 8.8 people per acre, well below the allowable 60 people per acre in zone B1. This demonstrates that the proposed Project is compatible with the B1 zone and does not conflict with the Kern County ALUCP.

Outside of the land use compatibility criteria, any buildings and operations within the proposed Project will need to ensure there are no frequency conflicts with the airport operations. Aviation uses radio frequency spectrum resources to communicate and provide a safe and efficient aerospace system. It will be necessary to ensure operations within the proposed project do not conflict with these radio frequencies. The implementation of **Mitigation Measure MM 4.11-1** will reduce potential conflicts with airport operations frequencies to less than significant.

Additionally, because the proposed Project is within the Approach/Departure Zone and Adjacent to Runway, the airspace above the Project location is important and is accounted for with the site zoning containing the H (Airport Approach Height Combining) District. Due to the proposed project's height of 56 feet exceeding the 35-foot height maximum set forth by the combining H District, a Zone Variance request is included as part of the overall project. Nonetheless, per Planning and Natural Resources Development Standards, a standard condition of approval will require an aviation easement to be recorded for the affected portions of the project site within the ALUCP SOI to give Meadows Field Airport air rights over the proposed Project property. An aviation easement is a legal agreement in which property owners surrender air rights over their property to the government. This type of easement restricts property owners from building over a specific height and waives their right to file a suit against the pilots or owners of an aircraft. It also limits the liability of airline/aircraft operators. The implementation of **Mitigation Measure MM 4.11-2** will reduce potential conflicts with air space to less than significant.

Mitigation Measures

MM 4.11 -1 Prior to the issuance of building permits, the operator shall consult with the Meadows Field Airport to identify the appropriate Frequency Management Office officials to coordinate the use of telemetry to avoid potential frequency conflicts with airport operations.

MM 4.11-2 Prior to the issuance of building permits, the project operator shall submit to the Kern County Planning and Natural Resources Department an executed avigation easement, approved as to form by County Counsel, for the benefit of the Meadows Field Airport.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.11-1** and **MM 4.11-2**, impacts would be less than significant.

4.11.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects located in the vicinity of the Project site.

As discussed previously, the proposed Project would be located on vacant, undeveloped land in the central portion of unincorporated Kern County, with its primary function as a warehouse and distribution facility that may require future modifications to the interior design. Similar land uses in the vicinity have undergone similar land use and planning review, and the project is demonstrably compatible with these previously approved uses.

The projects considered in the cumulative analysis for this project are described in **Chapter 3**, *Project Description*, **Table 3-4**, *Cumulative Projects*. The geographic scope for cumulative land use and planning impacts consists of the Metropolitan Bakersfield Plan Area. This geographic scope of analysis is appropriate because land use and planning resources in Kern County are expected to be similar to those in the project site because of their proximity. Additionally, as discussed in Section 4.14, *Population and Housing*, other projects would adhere to MBGP land use policies and implementation measures, including installing landscaping and visual buffers between industrially designated land and the nearest residences and sensitive receptors. The proposed project would implement **Mitigation Measure MM 4.1-3**, requiring installation of a vegetative barrier along the length of the project site that faces the nearest neighborhoods and residences, thereby minimizing the cumulative encroachment of increased industrial development onto residential areas. These foreseeable projects would also be required to adhere to environmental review at a project-level basis, including implementing similar mitigation measures such as **Mitigation Measures MM 4.11-1** and **MM 4.11-2** that are being required of the proposed project, depending on those other project's proximity to the Meadows Field Airport. The Project, in combination with other projects, are consistent with the land use of the area and do not divide the community. Therefore, the Project, with implementation of **Mitigation Measures MM 4.11-1** and **MM 4.11-2**, would result in a less than significant cumulatively considerable impact to land use and planning.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.1-3,** (Section 4.1, *Aesthetics,* for full mitigation measure text), **MM 4.11-1** and **MM 4.11-2** would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.1-3, MM 4.11-1** and **MM 4.11-2**, cumulative impacts would be less than significant after mitigation.

Table 4.11-3: Project Consistency with Metropolitan Bakersfield County General Plan for Land Use

Goals and Policies	Project Consistency
Chapter II. Land Use Element	
Goal 1. Accommodate new development which captures the economic demands generated by the marketplace and establishes Bakersfield's role as the capital of the southern San Joaquin Valley.	CONSISTENT. The proposed Project would develop a warehouse distribution facility. The facility would primarily serve as a high cube and cold storage warehouse to facilitate material handling equipment and storage uses. The proposed Project promotes new development consistent with the economic demands of the area. As describes in Section 3.7.3, *Project Operations and Maintenance Activities,* of the Project Description, the proposed Project would create 437 jobs.
Goal 2. Accommodate new development which provides a full mix of uses to support its population.	CONSISTENT. See Land Use Element, Goal 1, above.
Goal 3. Accommodate new development which is compatible with and complements existing land uses.	CONSISTENT. The proposed Project accommodates new development that, as demonstrated in this chapter, is consistent with exiting land uses. The existing land use designation of the site is LI (Light Industrial) and the Project does not propose any land use designation change.
Goal 4. Accommodate new development which channels land uses in a phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.	CONSISTENT. The proposed Project consists of two two-story buildings and construction is expected to last 24 months. As described in Chapter 3, *Project Description*, the project will include the necessary infrastructure and public improvements.
Goal 6. Accommodate new development that is sensitive to the natural environment, and accounts for environmental hazards.	CONSISTENT. The proposed Project includes the new development of a warehouse distribution facility. As outlined in Section 4.9, *Hazards and Hazardous Materials*, environmental hazards are accounted for and will have less than significant impacts after mitigation.
Goal 7. Establish a built environment which achieves a compatible functional and visual relationship among individual buildings and sites.	CONSISTENT. Aesthetic impacts are evaluated in Section 4.1, *Aesthetics and Visual Resources*, of this Draft EIR. The proposed Project would utilize landscaping and screening to further blend the Project with its surroundings. MM 4.1-1 through MM 4.1.3 require that the proposed Project comply with site review and design and landscaping requirements as required by County regulations. Additionally, MM 4.1-4 and MM 4.1-5 requires that the proposed Project comply with the Dark Skies Ordinance and submit an outdoor lighting plan so as to reduce impacts to glare and lighting as much as possible.
Goal 8. Target growth companies that meet clean air requirements and create sustainable employment in jobs paying higher wages.	CONSISTENT. Impacts to air quality are analyzed in Section 4.3, *Air Quality*, in this Draft EIR. The proposed project would be consistent with all federal, State, and local regulations related to air quality. Impacts related to employment are evaluated in Section 4.14, *Population and Housing*. As stated in Land Use Element, Goal 3, the proposed project would create 437 jobs.

Goals and Policies	Project Consistency
Policy 8. The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste.	CONSISTENT. Impacts to hazardous waste are analyzed in Section 4.9, *Hazards and Hazardous Materials*. The proposed project would be required to comply with all applicable federal, State, and local policies and regulations.
Policy 31. Allow for a variety of industrial uses, including land-extensive mineral extraction and processing, heavy manufacturing, light manufacturing, warehousing and distribution, transportation-related, and research and development uses.	CONSISTENT. The proposed Project will allow for the creation of a warehouse distribution facility, thus fitting into a variety of industrial uses.
Policy 32. Protect existing industrial designations from incompatible land use intrusions.	CONSISTENT. The proposed Project is in an area that has a land use designation of LI (Light Industrial). The proposed Project will not change this land use designation, thus protecting existing industrial designations.
Policy 33. Encourage the efficient use of existing industrial land uses through consolidation of building and storage facilities.	CONSISTENT. The proposed Project makes efficient use of existing industrial land uses in that it includes a two-story warehouse distribution facility, with the primary function being high cube and cold storage warehousing to facilitate material handling equipment and storage uses.
Policy 34. Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors.	CONSISTENT. The proposed Project includes an industrial facility where land uses immediately surrounding the Project site include industrial uses and are surrounded by existing transportation corridors.
Policy 35. Encourage upgrading of visual character of heavy manufacturing industrial areas through the use of landscaping or screening-of visually unattractive buildings and storage areas.	CONSISTENT. With the implementation of MM 4.1.1 through MM4.1.4, the visual character of the proposed Project will be upgraded through the use of landscaping and screening.
Policy 36. Require that industrial uses provide design features, such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration.	CONSISTENT. See Land Use Element, Goal 7, above. With the implementation of MM 4.1.1 through MM 4.1.4, the visual character of the proposed Project will be upgraded through the use of landscaping and screening. Section 4.1, *Aesthetics,* MM 4.1-3, would ensure a vegetative barrier is installed along the Airport Drive and Boughton Drive project frontages, providing a greater visual buffer between the site and the nearby residences.
Policy 37. Street frontages along all new industrial development shall be landscaped.	CONSISTENT. See Land Use Element, Goal 7, and Policy 36 above. With the implementation of MM 4.1-2, landscaping will be required along Airport Drive and Boughton Drive frontages.

Goals and Policies	Project Consistency
Policy 38. Minimize impacts of industrial traffic on adjacent residential parcels through the use of site plan review and improvement standards.	CONSISTENT. The proposed Project has been designed so that no truck docks face the residences located east of the site. Additionally, improvements to roadways would be required to adhere to Kern County Public Works Department development standards.
Policy 76. Provide for a mix of land uses which meets the diverse needs of residents; offers a variety of employment opportunities; capitalizes, enhances, and expands upon existing physical and economic assets; and allows for the capture of regional growth.	CONSISTENT. The proposed Project consists of a facility that would operate 24 hours a day, 365 days a year. The facility would employ approximately 437 employees over the course of up to three shifts, with additional indirect/induced economic impacts from the project supporting approximately 159 additional jobs.
Policy 79. Provide for an orderly outward expansion of new "urban" development (any commercial, industrial, and residential development having a density greater than one unit per acre) so that it maintains continuity of existing development, allows for the incremental expansion of infrastructure and public services, minimizes impacts on natural environmental resources, and provides a high quality environment for living and business.	CONSISTENT. See Land Use Element, Policy 38, above. The proposed Project consists of a logistics facility that would expand “urban” development and allow for the incremental expansion of infrastructure.
Policy 82. Preserve existing significant sound residential neighborhoods, commercial districts, and industrial areas.	CONSISTENT. The proposed Project does not take away any existing residential neighborhoods or commercial districts. The proposed Project is within the MBGP land use designation of LI (Light Industrial) and will remain in this land use designation.
Policy 86. Encourage infill of vacant parcels.	CONSISTENT. The proposed Project site is currently vacant, therefore development on the site encourages infill of vacant parcels.
Policy 95. When planning for new development, coordinate with utility companies to designate future or potential electrical transmission line corridors as needed to serve the metropolitan area.	CONSISTENT. Electricity would be supplied to the Project site by PG&E. The Project proposes to use the existing electricity grid, and service laterals would be extended to the Project site from existing utility facilities along Boughton Drive and Airport Drive. It is anticipated that there are sufficient planned electricity supplies in the PG&E service area for the increase in energy demands resulting from the proposed Project. Additionally, the Project would implement MM 4.19-1, requiring coordination with PG&E staff to determine specific requirements regarding any potential electric service or facility issues needed.
Chapter III. Circulation Element	
Streets	

Goals and Policies	Project Consistency
Goal 1. Provide a safe and efficient street system that links all parts of the area for movement of people and goods.	CONSISTENT. Transportation and traffic analysis is provided in Section 4.17, *Transportation and Traffic*, of this Draft EIR. The proposed Project includes roadway improvements and mitigation measures that will address deficiencies in the roadways and provide a safe and efficient street system that links the Project site to the rest of the area. Implementation of MM 4.17-3, and MM 4.17-4 would ensure the preparation of a Transportation Demand Management Plan and Traffic Control Plan, as well as any off-site intersection improvements required to maintain the level of service standard for the surrounding area.
Goal 2. Provide for safe and efficient motorized, non-motorized, and pedestrian traffic movement.	CONSISTENT. See Circulation Element, Goal 1, above.
Goal 3. Minimize the impact of truck traffic on circulation, and on noise sensitive land uses.	CONSISTENT. See Circulation Element, Goal 1, above.
Policy 3. Provide additional right-of-way pavement width to accommodate turn lands at intersections	CONSISTENT. See Circulation Element, Goal 1, above.
Policy 5. Place traffic signals to minimize vehicular delay.	CONSISTENT. See Circulation Element, Goal 1, above.
Policy 6. Design and locate site access driveways to minimize traffic disruption where possible considering items such as topography, past parcelization and other factors.	CONSISTENT. See Circulation Element, Goal 1, above.
Policy 12. Maintain the integrity of the circulation system.	CONSISTENT. See Circulation Element, Goal 1, above.
Policy 16. Require that truck access to commercial and industrial properties be designed to minimize impacts on adjacent residential parcels	CONSISTENT. See Circulation Element, Goal 1, above.
Policy 17. Require buildings expected to be serviced by delivery trucks to provide off-street facilities for access and parking.	CONSISTENT. As described in Section 3.1, *Project Overview*, the proposed project would include approximately 543 automobile and 312 Truck Trailer on-site parking spaces. Additionally, the proposed project would include 108 EV Charging Stations and 14 ADA Accessible parking spots.
Policy 22. Design transportation improvements to minimize noise impacts on adjacent uses.	CONSISTENT. As described in Section 4.13, *Noise,* the proposed project would not increase construction or operation related noise levels in excess of established standards.

Goals and Policies	Project Consistency
Policy 34. Minimize the impacts of land use development on the circulation system. Review all development plans, rezoning applications, and proposed general plan amendments with respect to their impact on the transportation system, and require revisions as necessary.	CONSISTENT. See Circulation Element, Goal 1, above.
Policy 37. Require new development and expansion of existing development to pay for necessary access improvements, such as street extensions, widenings, turn lanes, signals, etc., as identified in the transportation impact report as may be required for a project.	CONSISTENT. See Circulation Element, Goal 1, above.
Policy 39. Require new development and expansion of existing development to pay or participate in its pro rata share of the costs of expansions in area-wide transportation facilities and services which it necessitates.	CONSISTENT. As described in Section 4.17, *Transportation and Traffic*, the Traffic Study has informed transportation impacts from development. The implementation of MM 4.17-4 would require that the Project prepare and submit a Construction Traffic Control Plan to Kern County Public Works Department – Traffic Division and the California Department of Transportation offices for District 6, as appropriate, for approval. The Construction Traffic Control Plan must be prepared in accordance with both the California Department of Transportation Manual on Uniform Traffic Control Devices and Work Area Traffic Control Handbook.
Bikeways	
Policy 5. Consider bicycle safety when implementing improvements for automobile traffic operations.	CONSISTENT. See Circulation Element, Policy 39, above.
Policy 7. Provide bicycle parking facilities at activity centers such as shopping centers, employment sites, and public buildings.	CONSISTENT. See Circulation Element, Policy 39, above.
Parking	
Goal 1. Provide an efficient parking system to respond to the needs of motorists.	CONSISTENT. See Circulation Element, Policy 17, above.
Goal 2. Satisfy parking requirements in all new developments (residential, commercial, industrial, etc.) through off-street facilities.	CONSISTENT. See Circulation Element, Policy 17, above.

Policy 1. Ensure that adequate on-site parking supply and parking lot circulation is provided on all site plans in accordance with the adopted parking standards.	CONSISTENT. See Circulation Element, Policy 17, above.
Policy 2. Discourage the intrusion of non-neighborhood parking in residential areas.	CONSISTENT. See Circulation Element, Policy 17, above.
Chapter V. Conservation Element	
Goal 1. Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources.	CONSISTENT. As discussed in Section 4.4, *Biological Resources*, the proposed Project would have the potential to significantly affect biological resources in and around the Project site. In response, the proposed Project includes MM 4.4-1 through MM 4.4-13 with the intent to reduce potential impacts to all species both during Project construction and operation. Additionally, the proposed Project would be developed and operated in accordance with all local, State, and federal laws pertaining to the preservation of sensitive species.
Policy 1. Direct development away from "sensitive biological resource" areas, unless effective mitigation measures can be implemented.	CONSISTENT. See Biological Resources, Goal 1, above.
Goal 1. Provide for the planned management, conservation, and wise utilization of agricultural land in the planning area.	CONSISTENT. Impacts to agricultural resources are discussed in Section 4.2, *Agriculture Resources*. Impacts to agricultural resources are less than significant and the Project does not convert any agricultural lands.
Policy 6. Continue implementing land grading ordinances that reduce soil erosion/siltation commonly associated with land development.	CONSISTENT. See Soils and Agriculture, Policy 7, below.
Policy 7. Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible.	CONSISTENT. As described in Section 4.7, Geology and Soils, the proposed Project would be compliant with all applicable ordinances of the Kern County Building Code and the California Building Code (CBC). Additionally, MM 4.7-1 requires the Project proponent to limit grading to the minimum area necessary for construction. Prior to the initiation of construction, the Project proponent shall retain a California registered professional engineer to approve the final grading earthwork and foundation plans prior to construction. For MM 4.7-2, prior to the issuance of building or grading permits, the Project proponent shall conduct a full geotechnical study to evaluate soil conditions and submit the study to the Kern County Public Works Department for review and

Goals and Policies	Project Consistency
	approval. Furthermore, as described in Section 4.10, *Hydrology and Water Quality*, MM 4.10-2 would ensure that prior to any grading, a project-specific hydrologic study and final drainage plan shall be completed, to ensure best management practices that would prevent soil erosion.
Policy 12. Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction.	CONSISTENT: Section 4.10, *Hydrology and Water Quality*, evaluates the potential degradation of surface or groundwater quality. MM 4.10-1 requires that before a grading permit, a Stormwater Pollution Prevention Plan be incorporated into final design specifications and construction contracts. This plan must show the minimization of vegetation removal, and other best management practices for soil erosion prevention, such as implementing sediment controls.
Policy 13. Minimize the alteration of natural drainage and require development plans to include necessary construction to stabilize runoff and silt deposition through enforcement of grading and flood protection ordinances.	CONSISTENT Section 4.10, *Hydrology and Water Quality*, MM 4.10-2 would ensure that prior to any grading, a project-specific hydrologic study and final drainage plan shall be completed, to ensure best management practices that would prevent soil erosion. It requires that engineering recommendations be incorporated into the project design, based on stormwater modeling.
Policy 15. Buffers such as setbacks, berms, greenbelts, and open space areas shall be stablished to separate farmland from incompatible urban uses.	CONSISTENT. As described in Chapter 3, *Project Description*, the proposed project would include 359,26 square feet (8.25 acres) of landscaping and irrigation to provide visual screening between the development and surrounding uses, particularly the residential uses across Airport Drive. Proposed landscaping would exceed the 5 percent landscaping requirement of Section 19.86.060 of the Kern County Zoning Ordinance.
Policy 16. Future development which involves in-fill of the urban area as opposed to development on the urban fringes shall be encouraged.	CONSISTENT. The project is being proposed on an industrially designated and zoned site, with industrially zoned and developed land to the North and South, as well as existing commercial and industrial development to the west and east. Although land to the north and partially to the south are vacant, the proposed use is compatible with the generally urbanized area and will be developed with a similarly intensive land use as a warehouse and logistics facility.
Water Resources	
Policy 2. Minimize the loss of water which could otherwise be utilized for groundwater recharge purposes and benefit planning area groundwater aquifers from diversion to locations outside the area.	CONSISTENT. Section 4.10, *Hydrology and Water Quality*, of this Draft EIR, provides an analysis of water supplies available to serve the project. Unmetered water wells cannot be used as a source of groundwater for the permit activity. Groundwater may only be used in a permitted activity from a water well equipped with a water meter.
Policy 6. Protect planning area groundwater resources from further quality degradation.	CONSISTENT. See Section 4.10, *Hydrology and Water Quality*, of this Draft EIR which evaluates the Project's impact on groundwater quality. MM 4.10-1 would require the implementation of best management practices for pollution control.
Air Quality	

Goals and Policies	Project Consistency
Policy 1. Comply with and promote San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) control measures regarding Reactive Organic Gases (ROG). Such measures are focused on: (a) steam driven well vents, (b) Pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test stations, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance.	CONSISTENT. Impacts to air quality are analyzed in Section 4.3, *Air Quality*, in this Draft EIR. As shown in Tables 4.3-11 and 4.3-12, the proposed Project would not generate ROG emissions in excess of thresholds.
Policy 2. Encourage land uses and land use practices which do not contribute significantly to air quality degradation.	CONSISTENT. See Air Quality, Policy 1, above.
Policy 3. Require dust abatement measures during significant grading and construction operations.	CONSISTENT. Impacts to air quality are evaluated in Section 4.3, Air Quality, in this Draft EIR. As outlined in MM 4.3-2, the proposed Project would be required to prepare a comprehensive Fugitive Dust Control Plan to be submitted and approved by the Kern County Planning and Natural Resources Department prior to issuance of grading and building permits.
Policy 4. Consider air pollution impacts when evaluating discretionary permits for land use proposals. Considerations should include: a) Alternative access routes to reduce traffic congestion. b) Development phasing to match road capacities. c) Buffers including increase vegetation to increase emission dispersion and reduce impacts of gaseous or particulate matter on sensitive uses.	CONSISTENT. See Air Quality, Policy 1, above.
Policy 5. Consider the location of sensitive receptors such as schools, hospitals, and housing developments when locating industrial uses to minimize the impact of industrial sources of air pollution.	CONSISTENT. Impacts to air quality are evaluated in Section 4.3, *Air Quality*, in this Draft EIR. Impacts to sensitive receptors, including schools, hospitals, and housing developments, are evaluated in Section 4.3, *Air Quality*, of this Draft EIR.
Policy 13. Consider establishing priority parking areas for carpoolers in projects with relatively large numbers	CONSISTENT. See Circulation Element, Policy 39, above.

Goals and Policies	Project Consistency
of employees to reduce vehicle miles traveled and improve air quality.	
Policy 15. Promote the use of bicycles by providing attractive bicycle paths and requiring provision of storage facilities in commercial and industrial projects.	CONSISTENT. See Circulation Element, Policy 39, above.
Policy 22. Require the provision of secure, convenient bike storage racks at shopping centers, office buildings, and other places of employment in the Bakersfield Metropolitan area.	CONSISTENT. See Circulation Element, Policy 39, above.
Policy 23. Encourage the provision of shower and locker facilities by employers, for employees who bicycle or jog to work.	CONSISTENT. See Circulation Element, Policy 39, above.
Policy 29. Encourage the use of alternative fuel and low or zero emission vehicles.	CONSISTENT. See Circulation Element, Policy 39, above.
Chapter VII. Noise Element	
Goal 1. Ensure that residents of the Bakersfield Metropolitan Area are protected from excessive noise and existing moderate levels of noise are maintained.	CONSISTENT. Section 4.13, *Noise*, projected noise levels are identified and the industrial uses associated with the proposed Project would not expose sensitive receptors to exterior noise levels that exceed 65 dBA. In order to further reduce impacts to excess noise, the proposed Project would implement MM 4.13-1 through MM 4.13-4, which include limitations on allowed construction hours, operations procedures, the appointment of a Noise Disturbance Coordinator, and applicable rules and regulations to be place on all grading and building permits.
Goal 2. Protect the citizens of the planning area from the harmful effects of exposure to excessive noise, and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports and other sources.	CONSISTENT. See Noise Element, Goal 1, above.
Policy 1. Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in Table VII-2. The noise exposure contour maps on file at the City of Bakersfield and County of Kern indicate	CONSISTENT. See Noise Element, Goal 1, above.

Goals and Policies	Project Consistency
areas where existing and projected noise exposures exceed 65 dB CNEL (exterior) for the major noise sources identified.	
Policy 2. Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into project design to reduce noise to acceptable levels.	CONSISTENT. The project is being proposed on an industrially designated and zoned site, with industrially zoned and developed land to the north and south, as well as existing commercial and industrial development to the west and east. Although land to the north and partially to the south are vacant, the proposed use is compatible with the generally urbanized area and will be developed with a similarly intensive land use as a warehouse and logistics facility. The proposed use is not, by nature, a noise-sensitive land use such as residences, a school or convalescent facility. The Light Industrial (LI) designation and M-1 (Light Industrial) zoning will ensure on-site operations of warehousing will be predominantly enclosed, thereby minimizing noise impacts. In order to further reduce impacts to excess noise, the proposed Project would implement MM 4.13-1 through MM 4.13-4, which include limitations on allowed construction hours, operations procedures, the appointment of a Noise Disturbance Coordinator, and applicable rules and regulations to be place on all grading and building permits.
Policy 3. Review discretionary industrial, commercial or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses. Additionally, the development of new noise-generating land uses which are not preempted from local noise regulation will be reviewed if resulting noise levels will exceed the performance standards contained within Table VII-2 in areas containing residential or other noise-sensitive land uses.	CONSISTENT. The proposed Project currently has a land use designation of Light Industrial (LI). The nearest sensitive receptors are the Park Meadows Apartment community located approximately 102 feet east of the Project site. The industrial uses associated with the proposed Project would not expose sensitive receptors to exterior noise levels that exceed 65 dBA. Furthermore, the CALGreen noise standards which are applied to new construction ensure that building materials would perform to a standard that could demonstrate that interior noise levels do not exceed 50 dBA. In order to further reduce impacts to excess noise, the proposed Project would implement MM 4.13-1 through MM 4.13-4, which include limitations on allowed construction hours, operations procedures, the appointment of a Noise Disturbance Coordinator, and applicable rules and regulations to be place on all grading and building permits.
Implementation Measure 3. Require development of proposed residential or other noise sensitive land uses in noise-impacted area to comply with the noise standards of 65 dB CNEL or less in outdoor activity areas and 45 dB CNEL or less within interior living spaces and the performance standards within Table VII-2.	CONSISTENT. See Noise Element, Goal 1, above.
Implementation Measure 4. Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior	CONSISTENT. Section 4.13, *Noise,* contains mitigation measures that would reduce short-term noise levels (MM 4.13-1) during construction, by requiring equipment staging and laydown to be located at the furthest practical distance from residential uses. Based on the analysis in this section, noise levels would not exceed MBGP noise thresholds.

Goals and Policies	Project Consistency
noise levels in excess of 65 dB CNEL and interior noise levels in excess of 45 dB CNEL and so that impacts on noise sensitive uses shall not exceed the performance standards in Table VII-2.	
Chapter VIII. Safety Element	
Policy 1. The adopted Kern County, California Multi-Hazard Mitigation Plan is incorporated by reference. This multi-jurisdictional plan, approved in compliance with the Disaster Mitigation Act of 2000, provides long-term planning to reduce the impacts of future disasters.	CONSISTENT. As discussed in Section 4.9, *Hazards and Hazardous Materials*, the proposed Project would not have significant impacts, after mitigation, related to hazardous materials, fire, or emergency medical services. Implementation of MM 4.9-1 through MM 4.9-12 ensures that the proposed Project would continue to implement and monitor the proposed handling, storage, transport, and disposal techniques and methods of any hazardous materials on-site in accordance with all applicable State and local health safety codes and would require the preparation and dissemination of a Hazardous Materials Business Plan for the proposed Project.
Implementation. The adopted multi-jurisdictional Kern County, California Multi-Hazard Mitigation Plan, as approved by FEMA, shall be used as a source document for preparation of environmental documents pursuant to CEQA, evaluation of project proposals, formulation of potential mitigation and identification of specific actions that could, if implemented, mitigate impacts from future disasters and other threats to public safety.	CONSISTENT. See Safety Element, Policy 1, above.
Seismic Safety	
Goal 1. Substantially reduce the level of death, injury, property damage, economic and social dislocation and disruption of vital services that would result from earthquake damage.	CONSISTENT. As described in Section 4.7, *Geology and Soils*, the proposed Project could be subject to final design review and required to implement all design requirements included in the project-specific Geotechnical Evaluation encompassing earthwork, site preparation, site-specific seismic design considerations, foundation specifications, exterior flatwork, underground utilities, pavement, soil corrosivity and concrete, drainage, and protection measures for buried metal. In addition, the proposed project would implement MM 4.7-1 through MM 4.7-7, which would require the retention of a qualified California registered professional engineer to design and approve all project plans to be able to withstand probable seismically induce ground shaking, as well as to ensure the building has been stabilized against occurrences of liquefaction.
Policy 5. Incorporate planning for incidents affecting critical facilities into contingency plans for disaster response and recovery.	CONSISTENT. See Public Safety, Goal 2, below.

Goals and Policies	Project Consistency
Policy 9. Adopt and maintain high standards for seismic performance of buildings, through prompt adoption and careful enforcement of the most current seismic standards of the Uniform Building Code.	CONSISTENT. See Seismic Safety, Goal 1, above. Additionally, the proposed Project would be subject to all applicable ordinances of the Kern County Building Code.
Policy 11. Require site-specific studies to locate and characterize specific fault traces within an Alquist-Priolo Earthquake Fault Zone for all construction designed for human occupancy.	CONSISTENT. As described in Section 4.7, *Geology and Soils*, the proposed project is not located within an Alquist-Priolo Earthquake Fault Zone.
Implementation Measure 3. Require structures that are within the plan area and are subject to Building Department review to adhere to the most current seismic standards adopted as part of the Uniform Building Code.	CONSISTENT. See Seismic Safety, Goal 1, above. Additionally, the proposed Project would be subject to all applicable ordinances of the Kern County Building Code.
Public Safety	
Goal 2. Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development of metropolitan police and fire facilities and services.	CONSISTENT. Impacts regarding police and fire services are evaluated in Section 4.15, *Public Services*, of this Draft EIR. Consistent with this measure, impacts to emergency public services are evaluated in accordance with CEQA. This Draft EIR serves to comply with this policy.
Goal 4. Assure that fire, hazardous substance regulation and emergency medical service problems are continuously identified and addressed in a proactive way, in order to optimize safety and efficiency.	As discussed in Section 4.9, *Hazards and Hazardous Materials*, the proposed Project would not have significant impacts, after mitigation, related to hazardous materials, fire, or emergency medical services. Implementation of MM 4.9-1 through MM 4.9-12 ensures that the proposed Project would continue to implement and monitor the proposed handling, storage, transport, and disposal techniques and methods of any hazardous materials on-site in accordance with all applicable State and local health safety codes and would require the preparation and dissemination of a Hazardous Materials Business Plan for the proposed Project.
Policy 2. Require discretionary projects to assess impacts on police and fire services and facilities.	CONSISTENT. See Public Safety, Goal 2, above.
Policy 7. Enforce ordinances regulating the use/manufacture/sale/ transport/disposal of hazardous substances, and require compliance with state and federal laws regulating such substances.	CONSISTENT. See Public Safety, Goal 4, above.

Goals and Policies	Project Consistency
Policy 8. The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste.	CONSISTENT. See Public Safety, Goal 4, above.
Policy 12. Where recommended by appropriate local, State or Federal agencies for discretionary projects, soils shall be tested for concentrations of agricultural chemicals prior to grading permit approval, whenever feasible. Contaminated soils shall be excavated and disposed of at a certified hazardous waste disposal facility whenever necessary.	CONSISTENT. Contaminated soils are discussed in Section 4.9, *Hazards and Hazardous Materials*. A Phase I Environmental Site Assessment (Phase I ESA) was prepared for the proposed project and did not find any current or controlled Recognized Environmental Concerns (RECs) on-site.
Policy 13. Fugitive dust emissions shall be controlled through applicable requirements (Regulation VIII) set forth by the San Joaquin Valley Unified Air Pollution Control District, including but not limited to; irrigation, paving of construction roads, and limiting grading activities during periods of high wind. These practices would reduce potential adverse health effects resulting from the development of agricultural property.	CONSISTENT. Impacts to air quality are evaluated in Section 4.3, *Air Quality*, in this Draft EIR. As outlined in MM 4.3-2, the proposed Project would be required to prepare a comprehensive Fugitive Dust Control Plan to be submitted and approved by the Kern County Planning and Natural Resources Department prior to issuance of grading and building permits.
Policy 15. Fugitive dust emissions shall be controlled through applicable requirements set forth by the San Joaquin Valley Unified Air Pollution Control District (Regulation VIII), including but not limited to; irrigation, paving of construction roads, and limiting grading activities during periods of high wind. These practices would reduce potential adverse health effects as a result of exposure to Coccidioidomycosis.	CONSISTENT. See Public Safety, Policy 13, above.
Policy 16. All new discretionary development projects shall be subject to environmental and design review on a site-specific, project-by-project basis, including but not limited to, an assessment to determine whether hazardous materials present potential health affects to human health as required by the Department of Environmental Services.	CONSISTENT. See Public Safety, Policy 12, above.

Chapter X. Public Services and Facilities Element	
Goal 1. Maintain a coordinated planning and implementation program for the provision of public utilities to the planning area.	CONSISTENT. Impacts to public utilities are evaluated in Section 4.19, *Utilities and System Services*, in this Draft EIR. The proposed Project would not have a significant impact on public utilities. The incremental effects of the Project would also not be substantial enough to result in a cumulatively considerable impact on utilities and service systems with implementation of MM 4.19-1 through MM 4.19-5.
Goal 2. Coordinate the planning and implementation of planning area municipal-type utility facilities and services.	CONSISTENT. See General Utility Services, Goal 1, above.
Policy 5. Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent.	CONSISTENT. MM 4.15-1 ensures that the Project will work with the County to determine how the use of sales and taxes from construction can be maximized. As an alternative, the Project proponent/operator may make arrangements for a guaranteed single payment. This measure requires the development to pay for improvements associated with the Project, in concert with Kern County.
Policy 3. Require that all new development proposals have an adequate water supply available.	CONSISTENT. Impacts to public utilities are evaluated in Section 4.19, *Utilities and System Services*, in this Draft EIR. The proposed project would be served by Oildale Mutual Water Company (OMWC), who would be estimated to have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years. Furthermore, the Project would implement MM 4.19-3, which requires the operator to provide information on any groundwater that will be used. Implementation of MM 4.19-4 would also be required, which consists of installing water meters on all facilities.
Goal 1. Ensure the provision of adequate storm drainage facilities to protect planning area residents from flooding resulting from storm water excess.	CONSISTENT. Section 4.10, *Hydrology and Water Quality*, MM 4.10-2 would ensure that prior to any grading, a project-specific hydrologic study and final drainage plan shall be completed, to ensure best management practices that would prevent soil erosion. It requires that engineering recommendations be incorporated into the project design, based on stormwater modeling.
Policy 1. Effect the consolidated collection, treatment, and disposal of wastewater from all urban development within the metropolitan area, discouraging the creation	CONSISTENT. Impacts to public services are evaluated in Section 4.15, *Public Services*, in this Draft EIR. A will-serve letter is attached as Appendix F.3 that confirms the proposed project would be served by the North of River Sanitary District.

Goals and Policies	Project Consistency
or expansion of separate systems and encouraging the consolidation and interconnection of existing separate systems.	
Storm Drainage	
Goal 1. Ensure the provision of adequate storm drainage facilities to protect planning area residents from flooding resulting from storm water excess.	CONSISTENT. As described in Chapter 3, *Project Description*, the proposed project would install an on-site storm drainage system consisting of inlets, underground piping and surface and underground basins. Runoff would drain to retention basins located on the south side of each building within the boundaries of the Project Site. The basins would be designed to accommodate a 100-year storm event and would detain runoff and release it at a rate no greater than the pre-development condition of the Project site. The proposed Project would be required to retain the stormwater per Kern County's drainage requirements and all other applicable standards.
Goal 2. Maintain a comprehensive storm drainage system which serves all urban development within the planning area.	CONSISTENT. MM 4.10-1 requires that before a grading permit, a Stormwater Pollution Prevention Plan be incorporated into final design specifications and construction contracts. This plan must show the minimization of vegetation removal, and other best management practices for soil erosion prevention, such as implementing sediment controls.
Implementation Measure 4. Use drainage area retention basins for drainage disposal when direct discharge to a waterway is not available. Combine storm drainage usage with recreational usage when feasible. Incorporate in such basins recessed areas for off-season retention of nuisance flows. Maintain all basins with the primary purpose of drainage disposal, with recreational usage as a secondary objective.	CONSISTENT. Section 4.10, *Hydrology and Water Quality*, evaluates impacts on water quality and drainage. MM 4.10-1 requires that before a grading permit, a Stormwater Pollution Prevention Plan be incorporated into final design specifications and construction contracts. This plan must show the minimization of vegetation removal, and other best management practices for soil erosion prevention, such as implementing sediment controls.
Street Lighting	
Goal 1. Provide uniform and adequate public lighting for all developed and developing portions of the planning area.	CONSISTENT. As discussed in Section 4.1, *Aesthetics and Visual Resources*, the proposed Project would be compliant with the County's Dark Skies Ordinance and would be designed to provide the minimum illumination needed to achieve safety and security purposes. Compliance with these requirements is ensured by the inclusion of MM 4.1-4.
Goal 2. Develop uniform planning area street light location and design standards.	CONSISTENT. See Street Lighting, Goal 1, above.

Goals and Policies	Project Consistency
Policy 4. Require developers to install street lighting in all new developments in accord with adopted city standards and county policies.	CONSISTENT. See Street Lighting, Goal 1, above.
Solid Waste	
Goal 1. Ensure the provision of adequate solid waste disposal services to meet the demand for these services in the planning area.	CONSISTENT. Impacts to solid waste are evaluated in Section 4.19, *Utilities and System Services*, in this Draft EIR. The proposed Project would be subject to all federal, State, and local policies and regulations regarding waste management and would be adequately served by the Bena Landfill. Additionally, the Project would implement MM 4.19-5, which requires debris and waste generated shall be recycled to the extent feasible.
Policy 1. Comply with, and update as required, the adopted county solid waste management plan.	CONSISTENT. See Solid Waste, Goal 2, above.
Implementation 1. Implement the "Kern County Solid Waste Management Plan-1988", and subsequent updates which will make the Metropolitan Bakersfield Municipal landfill at Bena available to the General Plan area.	CONSISTENT. See Solid Waste, Goal 2, above.

Key:
ADA = Americans with Disabilities Act of 1990
ESA = Environmental Site Assessment
EV = electric vehicle
CBC = California Building Code
CEQA = California Environmental Quality Act
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
EIR = Environmental Impact Report
FEMA = Federal Emergency Management Agency
LI = Light Industrial
M-1 = Light Industrial
MBGP = Metropolitan Bakersfield General Plan
MM = Mitigation Measure
NOx = Oxides of nitrogen
OMWC = Oildale Mutual Water Company
PG&E = Pacific Gas and Electric
RECs = Recognized Environmental Conditions
ROG = Reactive Organic Gases
SJVUAPCD = San Joaquin Valley Unified Air Pollution Control District

Section 4.12

Mineral Resources

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Section 4.12

Mineral Resources

4.12.1 Introduction

This section of the Draft Environmental Impact Report (Draft EIR) describes the affected environment and regulatory setting regarding mineral resources. It also evaluates the impacts on mineral resources that would result from the implementation of the proposed IPG Industrial Project (Project), and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the California Department of Conservation California Geological Survey, California Geologic Energy Management Division (CalGEM) (Prior to January 1, 2020, CalGEM was known as the California Division of Oil, Gas, and Geothermal Resources), and Kern County publications and maps, as cited throughout this section.

4.12.2 Environmental Setting

This section discusses the existing conditions related to mineral resources within the region and Project area, including the proposed IPG Industrial Project (the Project) site.

Regional Setting

Mineral and petroleum resources are integral to Kern County's economy; Kern County produces more oil than any other county in California. Borax, cement, and construction aggregates constitute major economic mineral resources. The Surface Mining and Reclamation Act of 1975 (SMARA) requires the state geologist to classify land into Mineral Resource Zones (MRZs) according to its known or inferred mineral potential. The state geologist analyzed 2,971 square miles of land in Kern County to determine the location of mineral resource zones throughout the County. The MRZ categories are defined as follows. MRZ-2 is divided into MRZ2a and MRZ-2b based on degree of knowledge, MRZ-2a, and economic factors, MRZ-2b. (CGS 2009):

- **MRZ-1**: Areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources.
- **MRZ-2**: Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists. This zone shall be applied to known mineral deposits or where well-developed lines of reasoning based upon economic-geologic principles and adequate data demonstrate that the likelihood for occurrence of significant mineral deposits is high.

MRZ-2a: Areas underlain by mineral deposits where geologic data indicate that significant measured or indicated resources are present. Areas classified MRZ-2a contain discovered mineral deposits that are either measured or indicated reserves. Land included in MRZ-2a is of prime importance because it contains known economic mineral deposits.

  - **MRZ-2b**: Areas underlain by mineral deposits where geologic information indicates that significant inferred resources are present. Areas classified MRZ-2b contain inferred mineral resources as determined by their lateral extension from proven deposits or their similarity to proven deposits. Further exploration could result in upgrading areas classified MRZ-2b to MRZ-2a.

- **MRZ-3:** Areas containing known or inferred mineral occurrences of undetermined mineral resource significance.
  - **MRZ-3a**: Areas containing known mineral occurrences of undetermined economic significance. Further exploration could result in reclassification of all or part of these areas into the MRZ-2a or MRZ-2b categories.
  - **MRZ-3b**: Areas containing inferred mineral occurrences of undetermined economic significance. Further exploration could result in the reclassification of all or part of these areas into the MRZ-2a or MRZ-2b categories.
- **MRZ-4**: Areas containing no known mineral occurrence.

Table 4.12-1 lists the classified mineral resources within Kern County that are part of the MRZ-2 group and, therefore, have a demonstrated mineral significance (as opposed to the MRZ-3 group, which has an undetermined mineral significance).

Table 4.12-1: Classified Mineral Resources within Kern County

Mineral Resource	MRZ Classification	Number of Areas	Total Acreage
Borates	MRZ-2a and 2b	2	2,564
Limestone	MRZ-2a	4	2,008
Limestone	MRZ-2b	2	157
Silica	MRZ-2a	1	119
Pozzolan (essential cement additive)	MRZ-2b	1	72
Gold	MRZ-2a	3	849
Gold	MRZ-2b	8	6,619
Dimension Stone	MRZ-2a	2	527

Source: CGS 1999.

Key:
MRZ = Mineral Resource Zones

Petroleum Resources

As mentioned above, Kern County produces more oil than any other county in California. The valley floor area of Kern County and the surrounding lower elevations of the mountain ranges contain numerous deposits of oil and gas resources, which are a major economic resource for the County. The proposed Project site is not located within a known oil production field, nor does the site have known active or abandoned wells (CalGEM 2024). The project site is not within the Metropolitan Bakersfield General Plan (MBGP) designation of R-MP (Resource–Mineral and Petroleum). The Project site is not located within the County's Natural Resources (NR) or Petroleum Extraction (PE) Zone Districts (Kern County GIS 2024).

Sand and Gravel

Construction aggregates are a major economic mineral resource for Kern County. Sand and gravel are important resources for construction, development, and physical maintenance, used in projects from highways and bridges to swimming pools and playgrounds. The availability of sand and gravel affects construction costs, tax rates, and affordability of housing and commodities. The State of California has statutorily required the protection of sand and gravel operations. Because transportation costs are a significant portion of the overall cost of sand and gravel, the long-term availability of local sources of this collective resource is an important factor in maintaining the economic attractiveness of a community to residents, business, and industry. The major resources of sand and gravel in Kern County are in stream deposits along the eastern side of the San Joaquin Valley and in the Sierra Nevada foothills, approximately 44 miles northeast of the Project site, and in alluvial fan deposits along the Tehachapi Mountains at the southern end of Kern County, approximately 43 miles southeast of the Project site.

Borax

As discussed in the Conservation/Mineral Resources of the Metropolitan Bakersfield General Plan, borax constitutes a major economic mineral resource for Kern County. Borax, a borate mineral (a compound that contains Boron and oxygen), was discovered and put into production in 1872 in Nevada and in 1881 in Death Valley (U.S. Borax 2022). The discovery of borates in southeastern Kern County in the Kramer District was accidental when a water well penetrated lakebeds containing colemanite (calcium borate) in 1913 (Noble 1926). In 1927, underground mining of the minerals kernite and borax began and continued until 1957, when underground operations ceased and open-pit mining began, eventually becoming the largest open-pit mine in California (U.S. Borax 2022). Annually over 22 million tons of unrefined borax are removed from this mine, which supplies about 30% of the world's supply of borates (U.S. Borax 2016). Other sources of borate in the County include Buckhorn Springs Deposit, China Lake, Cottonball, Cuddy Canyon prospect, El Paso Wells, and Indian Springs prospect.

Limestone

Carbonate rocks were initially quarried in 1888 as a source of lime. By 1909, the limestone resources were used for the manufacture of Portland cement during the construction of the first Los Angeles aqueduct. Limestone has been continuously mined, just northeast of Tehachapi, since

1921. The Tehachapi Plant was joined by California Portland (Cal Portland) Cement Company's Mojave Plant in 1954. The County's limestone resources are in roof pendants of metamorphoses marine sedimentary rocks scattered in intrusive rocks ringing in composition from granite to gabbro. Most of the pendants are located in the eastern portion of the County, which is underlain primarily by granitic rock of the Sierra Nevada batholith. Removal of limestone in the County is exclusively by open pit methods.

Precious Minerals

Gold is the most important metallic mineral commodity, in terms of total dollar value and number of deposits, that has been mined in Kern County. The first lode mining was in 1852 near Lake Isabella, then in 1894 gold was discovered south of Mojave at Randsburg in 1895. These two districts have yielded almost half of the total County production of gold.

The principal sources of silver in Kern County have been deposits in eastern Kern County as a by-product of gold ore. Although gold is the chief mineral in value, silver is predominant by a 5:1 ratio and is an important by-product of the gold ore. According to the Metropolitan Bakersfield General Plan, there is some potential for fossil and gemstone sites in the foothills of the Sierra Nevada. These resources do not represent a major economic resource; however, they could offer scientific and natural history value.

Other Mineral Resources

According to the Kern County General Plan EIR, other mineral resources within the County include uranium, gypsum, antimony, copper, and tungsten. Uranium deposits in the County are in (a) fine-grained marine sedimentary rocks, of Miocene age in the Temblor Range, (b) Mesozoic granitic rocks in the Sierra Nevada, and (c) Tertiary volcanic rocks and non-marine sedimentary rocks near the unincorporated community of Rosamond.

Several hundred thousand tons of gypsum are used annually in the County as a soil conditioner in alkaline soils. Gypsum mined in the County is found in the form of gypsite and gypsum. Gypsite deposits are primarily located in the San Joaquin Valley near Lost Hills and Kern Lake Bed and in the Temblor Range foothills near the unincorporated community of McKittrick.

Antimony deposits are found in several locations within the County, with the major source at Antimony Peak. Significant quantities of copper exist in the unincorporated community of Woody. Copper mines also exist in the El Paso Mountains and the Rademacher Hills area. Tungsten is found in various locations in the eastern part of the County, with most of the mines located in the Sierra Nevada and Rand Mining District, near the border of Kern County and San Bernardino County line. Minerals of lesser importance found in the County include arsenic, asbestos, barite, bismuth, coal and peat, diatomaceous earth, fluorspar, several lesser valued minerals, graphite, iron, lead, lithium, magnesite, manganese, mercury, molybdenum, perite, pumice and pumicite, quartz and feldspar, salt, talc, thorium, tin, wollastonite, and zinc.

Local Setting

The Project vicinity is characterized by industrial and commercial uses (distribution, storage, and shipping centers), transportation, vacant land, and residential uses to the east of the Project site. The Meadows Field Airport is adjacent to the west of the Project site.

The Project site is identified as being within MRZ-3 by the Department of Conservation's State Mining and Geology Board, which are areas containing known or inferred mineral occurrences of undetermined mineral resource significance. The project site is not within the MBGP designation of R-MP (Resource–Mineral and Petroleum). The closest land designated as Map Code 8.4 (Mineral and Petroleum – Minimum 5 Acre Parcel Size) is approximately 2 miles north of the Project site (Kern County GIS 2024). There are no known oil, gas, irrigation, or geothermal wells on the Project site (DOC 2024). According to a database search of active mines listed in the California Department of Conservation, Division of Mine Reclamation database, there are no active or newly permitted (and presumed to be active in the near future) aggregate materials mines in the Project area (DMR 2024). The nearest mapped mine is approximately 5 miles north of the Project site and is indicated to be an open pit with a primary product of stone. **Table 4.12-2** lists the mines within the vicinity of the Project site and the commodity being mined.

Table 4.12-2: Mines Within the Project Vicinity

Mine Title	Mine ID	Operation Type	Primary Commodity	Approximate Distance from Project Site
Kern Front Borrow Pit	91-15-0084	Open Pit	Stone	5 miles northeast
Edison Sand Co., Inc.	91-15-0044	Quarry	Sand and Gravel	16 miles southeast
Caliente Sand & Mineral	91-15-0043	Open Pit	Sand and Gravel	16 miles southeast
Kc Public Works Sand Pit	91-15-0001	Open Pit	Sand and Gravel	16 miles southeast

Source: DMR 2024.

4.12.3 Regulatory Setting

Federal

There are no applicable federal regulations for this issue area.

State

Geologic Energy Management Division

CalGEM, part of the California Department of Conservation, is a state agency that is responsible for supervising the drilling, operation, maintenance, plugging, and abandonment of oil, gas, and geothermal wells. CalGEM's regulatory program promotes the wise development of oil, natural gas, and geothermal resources in California through sound engineering practices, prevention of pollution, and implementation of public safety programs. To implement this regulatory program, CalGEM requires avoidance of building over or near oil and gas wells that have been plugged or abandoned or requires the remediation of wells to current CalGEM standards.

Surface Mining and Reclamation Act of 1975

SMARA, Public Resources Code, Sections 2710-2796 regulates surface mining operation to assure that adverse environmental impacts are minimized, and that mined lands are reclaimed to a usable condition. SMARA encourages the production, conservation, and protection of the state's mineral resources, recognizes that "the state's mineral resources are vital, finite, and important natural resources and the responsible protection and development of these mineral resources is vital to a sustainable California" (Public Resources Code, Section 2711). It also requires the state geologist to classify land into MRZs according to its known or inferred mineral potential. The primary goal of mineral land classification is to ensure that local agencies use the classification information when developing land-use plans and when making land-use decisions that could preclude mining. MRZs are defined in detail in the Regional Setting section, above.

Local

Metropolitan Bakersfield General Plan

The Project is located within the MBGP area; therefore, it would be subject to the applicable policies and measures of the MBGP. The Land Use Element and Conservation Element of the general plan include goals, policies, and implementation measures related to mineral resources that apply to the Project, as described below.

Chapter II. Land Use Element

Policies

Policy 1. Provide for the following types of land uses, as depicted on the Land Use Plan: (I-1) d) Resource: Mineral and Petroleum (R-MP - minimum land use designation size 5-acres): Areas which contain producing, or potentially productive, petroleum fields and mineral deposits. This designation may be used in combination with other designations.

Policy 31. Allow for a variety of industrial uses, including land-extensive mineral extraction and processing, heavy manufacturing, light manufacturing, warehousing and distribution, transportation-related, and research and development uses.

Chapter V. Conservation Element

Mineral Resources

Goals

Goal 1. Protect areas of significant resource potential for future use.

Goal 3. Avoid conflicts between the productive use of mineral and energy resource lands and urban growth.

Policies

Policy 7. Promote development of compatible uses adjacent to mineral extraction areas.

Policy 17. Lands classified as MRZ-2, as designated by the State of California, should be protected from encroachment of incompatible land uses.

Policy 25. Discourage incompatible land use adjacent to Map Code 8.4 Mineral and Petroleum areas.

4.12.4 Impacts and Mitigation Measures

Methodology

Potential impacts of the Project on mineral resources have been evaluated using a variety of sources, including a review of information from the California Department of Conservation, California Geological Survey, and Kern County publications and maps. Using these resources and professional judgment, impacts were analyzed according to California Environmental Quality Act (CEQA) significance criteria described in this subsection.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant adverse effect on mineral resources.

A project could have a significant adverse effect on mineral resources if it would:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state or
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Project Impacts

Impact 4.12-1: The Project would result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State.

The Project site is identified as being within MRZ-3 by the Department of Conservation's State Mining and Geology Board, which are areas containing known or inferred mineral occurrences of undetermined mineral resource significance. The project site is not within the MBGP designation of R-MP (Resource–Mineral and Petroleum). Additionally, any proposed mineral resource extraction would require a Conditional Use Permit to be secured from Kern County. The closest land designated as Map Code 8.4 (Mineral and Petroleum – Minimum 5 Acre Parcel Size) is

approximately 2 miles north of the Project site (Kern County GIS 2024). Additionally, no active mines or petroleum extraction facilities are located within, or immediately adjacent to, the Project site (DMR 2024).

As identified in **Table 4.12-2**, the nearest formerly used mine to the Project site is the Kern Front Borrow Pit, an open pit stone mine approximately 5 miles north. Given this distance, the proposed Project would not interfere with nearby mine sites and would not result in the loss of land designated for mineral resources. Furthermore, based on the absence of historical surface mining in the immediate area, the potential for surface mining at the Project site is considered extremely low.

For these reasons the Project would not result in the loss of availability of a known mineral resource and the potential impact to mineral resources is less than significant.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

Impacts would be less than significant.

Impact 4.12-2: The Project would result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

As stated above, the Project site does not contain any oil or gas wells, is not located on a locally MBGP designation of R-MP (Resource–Mineral and Petroleum) or designated NR (Natural Resources), or PE (Petroleum Extraction) Zone Districts by Kern County's Zoning Ordinance. While there are nearby mineral resource recovery sites, the operation of such sites would not be impeded by the development of the proposed Project.

Therefore, the development of the proposed Project would not result in the loss of availability of a known locally important mineral resource recovery site. Impacts would be less than significant.

Mitigation Measures

No mitigation would be required.

Level of Significance After Mitigation

Impacts would be less than significant.

4.12.5 Cumulative Setting Impacts and Mitigation Measures

Cumulative Setting

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects located in the vicinity of the Project site. The projects considered in the cumulative analysis for this Project are described in Chapter 3, Project Description, Table 3-4: Cumulative Projects.

The geographic scope of impacts associated with mineral resources generally encompasses the Project site and a 0.25-mile radius area around the Project site. This scope is appropriate because of the localized nature of mineral resource impacts. The proposed Project would not result in the loss of a locally important mineral resource recovery site. While the proposed Project could combine with other cumulative projects to create impacts related to the loss of important mineral resource recovery sites, projects within the cumulative geographic context would be required to comply with federal, State, and local laws and policies to address potential impacts related to mineral resources. For these reasons, cumulative impacts to mineral resources would be less than significant.

Furthermore, the project site is not within or located within 0.25-miles of an area with the MBGP designation of R-MP (Resource–Mineral and Petroleum). Additionally, the Project is not located within the Kern County's NR (Natural Resources), or PE (Petroleum Extraction) Zone District.

Therefore, because the proposed Project would not result in any loss of availability of a known mineral resource or a locally important mineral resource recovery site, it would not result in a cumulatively considerable contribution to such impacts within the County.

Mitigation Measures

No mitigation measures.

Level of Significance After Mitigation

Cumulative impacts would be less than significant.

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Section 4.13

Noise

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Section 4.13

Noise

4.13.1 Introduction

This section of the Draft Environmental Impact Report describes the affected environment and regulatory setting regarding noise. It also evaluates existing noise conditions in the proposed IPG Industrial Project (Project) area and analyzes the impacts on ambient noise and ground-borne vibration levels that would result from the implementation of the Project, and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the July 2, 2024, Noise and Vibration Analysis prepared by Urban Crossroads 2024 (Appendix I) and the September 2024 Project-related traffic data provided by David Evans and Associates 2024 (Appendix J).

Terminology

Ambient Noise: the composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent sound level during a 24-hour day, obtained after addition of approximately 5 decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and 10 decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.

Decibel (dB): A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

A-Weighted Sound Level (dBA): The sound pressure level in decibels as measured on a sound meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear.

Equivalent Noise Level (L_{eq}): The sound level containing the same total energy as a time varying signal over a given sample period, or the average A-weighted sound level during the measurement period. L_{eq} is typically computed over 1-hour, 8-hour, and 24-hour sample periods.

Day-Night Noise Level (L_{dn}): The average equivalent sound level during a 24-hour day, obtained after addition of 10 decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.

Noise Exposure Contours: Lines drawn about a noise source indicating constant levels of noise exposure. CNEL and day-night noise level contours are frequently utilized to describe community exposure to noise.

Noise Level Reduction: The noise reduction between indoor and outdoor environments or between two rooms that is the numerical difference, in decibels, of the average sound pressure levels in those areas or rooms. A measurement of a noise level reduction combines the effect of the transmission loss performance of the structure plus the effect of acoustic absorption present in the receiving room.

Sound Exposure Level or Single Event Noise Exposure Level: Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to a duration of one second. More specifically, it is the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on a reference pressure of 20 micropascals and a reference duration of one second.

Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

Sound Power Level (Lw): Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment.

Sound Transmission Class: The single-number rating of sound transmission loss for a construction element (for example, window and door) over a frequency range where speech intelligibility largely occurs.

Sound Fundamentals

The pitch or loudness of sound determines whether a sound is of a pleasant or objectionable nature. Pitch, which is the height or depth of a tone or sound, is louder to humans when it is high-pitched versus low-pitched. The loudness of a sound is determined by a combination of the intensity of the sound waves with the reception characteristics of the ear. Sound is generally characterized by several variables, including frequency and amplitude. Frequency describes the sound's pitch (tone) and is measured in cycles per second (hertz), while amplitude describes the sound's pressure (loudness).

Measurement scales are used to describe sounds. A decibel (dB) is a unit used to describe the amplitude (loudness) of sound, and sound levels are calculated on a logarithmic, not linear, basis. The lowest sound level that an unimpaired human ear can hear is described as zero on the decibel scale. Due to the logarithmic nature of measuring sound levels on the decibel scale, a 10 dB increase represents a tenfold increase in acoustic energy, whereas a 20 dB increase represents a hundredfold increase in acoustic energy. Because a relationship exists between acoustic energy and intensity, each 10 dB increase in sound level can have an approximate doubling effect on loudness as perceived by the human ear.

The most common metric is the overall A-weighted decibel (dBA) measurement that has been adopted by regulatory bodies worldwide. Because A-weighting is designed to emulate the frequency response characteristics of the human ear and reflect the way people perceive sounds, it is widely used in local noise ordinances and State and federal guidelines, including those of the State of California and Kern County. **Table 4.13-1** provides the relative A-weighted noise levels of common sounds measured in the environment and industry for various qualitative sound levels.

Table 4.13-1: Human Reaction to Typical Vibration Levels

Vibration Level Peak Particle Velocity (inches per second)	Human Reaction	Effect on Buildings
0.006-0.019	Threshold of perception, the possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold to which there is a risk of "architectural" damage to normal dwellings (houses with plastered walls and ceilings)
0.4-0.6	Vibrations are considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level that normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Source: Caltrans 2013a.

A-weighted sound levels can be measured or presented as equivalent sound pressure level (L_{eq}). This is defined as the average noise level, on an equal-energy basis for a stated period of time and is commonly used to measure steady-state sound or noise that is usually dominant. Statistical measurements are typically denoted by Ln, where "n" represents the percentile of time the sound level is exceeded. The measurement of L90 represents the noise level that is exceeded during 90% of the measurement period. Similarly, the L10 represents the noise level exceeded for 10% of the measurement period. The maximum noise level is the maximum instantaneous noise level during a specific period.

Of particular interest in this analysis are other descriptors of noise that are commonly used to help determine noise/land use compatibility and predict an average community reaction to adverse effects of environmental noise, including traffic generated, construction, and industrial noise. One of the most universal descriptors is the average day-night noise level (L_{dn}). As a result of a recommendation by the California Health Department and State planning law, this descriptor is used by many planning agencies, including Kern County's Planning and Natural Resources Department. The L_{dn} noise metric represents a 24-hour period and applies a time-weighted factor designed to penalize noise events that occur during nighttime hours when relaxation and sleep disturbance are of more concern for average residents. While noise occurring during the daytime

hours—between 7:00 a.m. and 10:00 p.m.—is measured in decibels, noise occurring between 10:00 p.m. and 7:00 a.m., however, is effectively "penalized" by adding 10 dB to the measured level.

In California, the use of the community noise equivalent level (CNEL) descriptor is also permitted. CNEL is identical to the day-night average sound level metric, except that CNEL adds a 5 dB penalty for noise occurring during evening hours between 7:00 p.m. and 10:00 p.m. in addition to the 10 dB penalty added between 10:00 p.m. and 7:00 a.m.

The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud). As shown in **Table 4.13-2**, changes of 1 to 3 dB are detectable under quiet, controlled conditions, and changes of less than 1 dB are usually not discernible (even under ideal conditions). A 3 dB change in noise levels is considered the minimum change that is detectable with human hearing in outside environments. A change of 5 dB is readily discernible to most people in an exterior environment, and a 10 dB change is perceived as a doubling (or halving) of the sound.

Table 4.13-2: Noise Perceptibility

Noise Level	Listener Perception
± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20	Much quieter or louder

Source: Kern County Planning and Natural Resources Department 2021.

Key:
dB = decibels

Noise and its Effects on People

An understanding of the physical characteristics of sound is useful for evaluating environmental noise. The methods and metrics used to quantify noise exposure, human response, and relative judgment of loudness are also discussed, and noise levels of common noise environments are presented.

Noise is a complex sound produced by various vibrations, often diffused and not harmonic. Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and interferes with or disrupts normal activities. The following factors affect how a noise source is perceived:

- **Sound level**: Louder noise tends to be more annoying. In addition, noise sources that change in sound level over time are more noticeable than those that do not vary over time.
- **Sound duration**: Noise that is fairly steady over time tends to be less noticeable, while short, impulsive noises are more noticeable.

- **Frequency spectrum**: Broadband noise is noise that contains sound energy at many frequencies – is not as noticeable than noise that contains discrete tones. For example, the tone from a backup beeper is more noticeable than noise from a fan, even if they are producing the same overall sound level.
- **Masking effects**: Noise from one source can be masked or made less noticeable by noise from one or more louder sources.

Although exposure to high noise levels has been demonstrated to cause physical (that is, to the body itself) and physiological (that is, to body functions) effects, the primary human responses to typical environmental noise exposure are subjective to the individual receiver and interference with activities.

The subjective responses of individuals to noise events are diverse and influenced by many factors, including the type of noise, the perceived importance of the noise, its appropriateness to the setting, the duration of the noise, the time of day, and the type of activity during which the noise occurs, and individual noise sensitivity. Interference effects of environmental noise refer to those effects that interrupt daily activities and include interference with communications and sleep. Interference in communications can include normal conversations, watching television, and telephone conversations. Sleep disturbance effects can include both awakening from sleep and arousal to a lesser state of sleep. Sleep disturbance can impair both acute and long-term health, ranging from cognitive performance, sleep patterns, and mood to more serious impacts such as hypertension, high blood pressure, and cardiovascular disease (King et al. 2012). The effects of noise on people can be grouped into four general categories:

- Subjective effects (dissatisfaction, annoyance).
- Interference effects (communication and sleep interference, learning).
- Physiological effects (startle response).
- Physical effects (hearing loss).

Vibration Fundamentals

Vibration is defined as the mechanical motion of the ground, buildings, or other types of structures, that is induced by the operation of mechanical devices or equipment. Vibration generally results in an “oscillatory” motion, in terms of the displacement, velocity, or acceleration of the ground (or structure), that causes a person to be aware of the vibration by means such as, but not limited to, sensation by touch or visual observation of moving objects. The effects of ground-borne vibration include movements of building floors, rattling of windows, and shaking of items on shelves or hangings on the walls. In extreme cases, vibration can cause damage to buildings. The noise radiated from the motion of the room surfaces is called ground-borne noise. **Table 4.13-3** presents typical levels of ground-borne vibration, vibration sources, and responses.

Table 4.13-3: Typical Levels of Ground-Borne Vibration

Response	Velocity Level	Typical Sources (at 50 feet)
Minor cosmetic damage to fragile buildings	100	Blasting from construction projects
Difficulty with tasks such as reading a video display terminal screen	90	Bulldozers and other heavy-tracked construction equipment
Residential annoyance, infrequent events	80	Rapid transit, upper range
Residential annoyance, frequent events	70	High-speed rail, typical
Approximate threshold for human perception	60	Bus or truck, typical
None	50	Typical background vibration

4.13.2 Environmental Setting

Existing Noise Environment

The Project site is currently vacant and has a land use designation of light industrial by the Metropolitan Bakersfield General Plan (MBGP), as well as a zone classification of Light Industrial–Precise Development Combining–Airport Approach Height Combining. Existing land uses within the Project vicinity also include light industrial, major and general commercial uses, and public transportation (airport) west of the Project site, and residential areas primarily northeast, east, and southeast of the Project site.

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over 24 hours. By collecting individual hourly noise level measurements, it is possible to describe the equivalent daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The 24-hour CNEL ranges between approximately 62 and 78 dBA. Weighted daytime noise levels ranged between approximately 56 dBA L_{eq} and 73 dBA L_{eq}, and nighttime noise levels ranged between 54 dBA L_{eq} and 70 dBA L_{eq}. **Table 4.13-4** provides a summary of the sound monitoring locations and results, identified by their tag number, as illustrated on **Figure 4.13-1**.

Figure 4.13-1: Sensitive Receptor Sound Monitoring Noise Locations

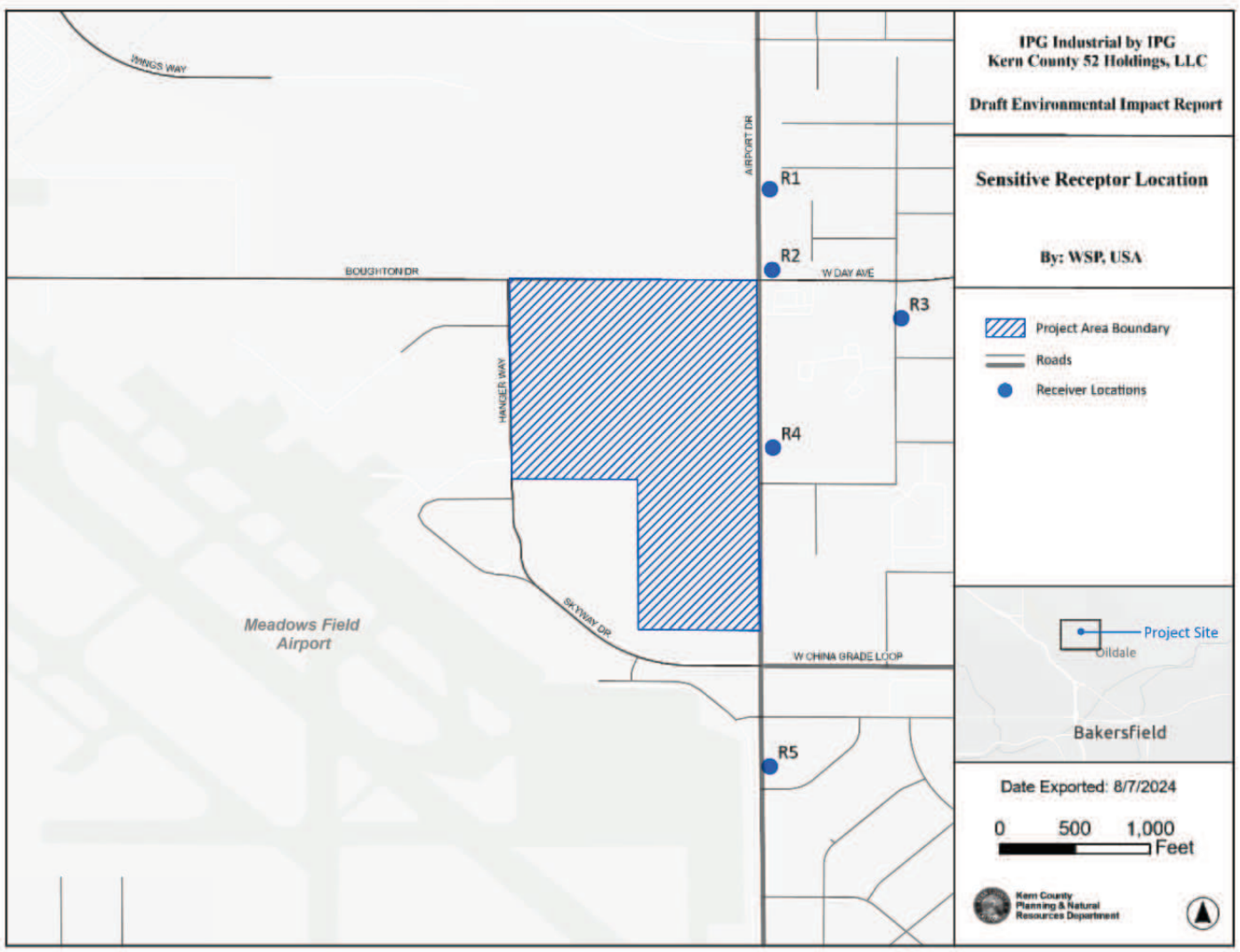

Table 4.13-4: Sound Monitoring Locations and Results

Receptor[(a)]	Description	Energy Average Noise Level (dBA L_{eq}) [(b)]		CNEL (dBA)
		Daytime	Nighttime	
R1	Located northeast of the site near the residence at 855 Greenwood Meadow Lane	73.2	70.4	77.6
R2	Located northeast of the site near the residence at 3117 Alhambra Meadow Court	70.9	65.2	73.4
R3	Located east of the site near the residence at 840 Park Meadows Avenue	56.2	54	61.6
R4	Located east of the site near the Park Meadows Apartments building at 840 Park Meadows Avenue	67.9	66.5	73.5
R5	Located southeast of the site near the residence at 2101 Wingland Drive	71.3	69.4	76.4

Source: Urban Crossroads 2024.

Notes:
(a) See Figure 4.13-1 for noise level measurement locations.
(b) "Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Sensitive Receptors

The nearest sensitive receptors are the Park Meadows Apartment community located approximately 102 feet east of the Project site. All sensitive receptors in the Project area are residential uses, including both single-family and multifamily dwelling units. **Table 4.13-5** lists each sensitive receptor and proximity to the Project site with reference identification illustrated on **Figure 4.13-1**.

Table 4.13-5: Sensitive Noise and Vibration Receptors

Receptor[1]	Existing Land Use Designation	Proximity to Project Area
R1	Low Density Residential	667 feet northeast, on Greenwood Meadow Lane
R2	Low Density Residential	173 feet northeast, on Alhambra Meadow Court
R3	High Density Residential	809 feet east, on Meadow Grove Court
R4	General Commercial (current use is multifamily units)	102 feet east, on Park Meadows Avenue
R5	Low Density Residential	910 feet southeast, on Wingland Drive

Source: Urban Crossroads 2024

Notes: Refer to Figure 4.13-1: Sensitive Receptor Sound Monitoring Noise Locations

Off-Site Traffic Noise Analysis

Table 4.13-6 presents a summary of the exterior traffic noise levels on receiving land uses within the Project area. As shown in **Table 4.13-6**, the ambient noise environment of the Project vicinity is characterized by 24-hour CNEL levels that are attributed to existing traffic on local roadways. The calculated CNEL from actual existing traffic volumes on the analyzed roadway segments ranged from 56 dBA along Hanger Way (traveling south off Boughton Drive) and 75 dBA along Olive Drive (traveling west off State Route (SR) 99 northbound ramps).

The off-site transportation CNEL noise levels were assessed by the development of noise contours associated with traffic volume forecasts provided in the Traffic Study (Appendix J). The noise contours represent the distance to noise levels of a constant value and were measured from the center of the roadway.

Table 4.13-6: Existing Off-Site Noise Levels Without the Project

Road	Segment	Receiving Land Use[(a)]	CNEL (dBA) at Receiving Land Use
Hanger Way	South of Boughton Drive	Nonsensitive	56.2
Airport Drive	South of Merle Haggard Drive	Sensitive	68.2
Airport Drive	South of Boughton Drive	Sensitive	69.8
Airport Drive	North of Norris Road	Sensitive	72.3
Airport Drive	South of Norris Road	Sensitive	72.5
Airport Drive	South of Decatur Street	Sensitive	72.3
Airport Drive	South of Roberts Lane	Sensitive	73.6
Merle Haggard Drive	West of Airport Drive	Nonsensitive	72.9
Olive Drive	West of State Route 99 Northbound Ramps	Sensitive	74.5
Olive Drive	West of Airport Drive	Sensitive	70.7

Source: Urban Crossroads 2024.

Note: (a) The CNEL is calculated at the boundary of the right-of-way of the receiving adjacent land use.
Key: CNEL = community noise equivalent level; dBA = A-weighted decibels

4.13.3 Regulatory Setting

Federal

Federal Interagency Committee on Noise

The Federal Interagency Committee on Noise (FICON) developed guidance to be used for the assessment of Project-generated noise and associated increases in ambient noise levels. The recommendations are based on studies that relate aircraft noise levels to the percent of persons highly annoyed by aircraft noise. While recommendations were made specifically to assess aircraft noise impacts, they are often used in environmental noise impact assessments involving the cumulative noise exposure on the community, such as CNEL and equivalent noise level.

Per FICON, in areas where the ambient noise level without the Project is below 60 dBA, an increase of 5 dBA is readily perceptible and considered significant. In areas where the ambient noise levels are within 60 to 65 dBA, a 3 dBA increase is barely perceptible, and when ambient noise levels already exceed 65 dBA, an increase in 1.5 dBA or greater is considered significant if the noise criteria for a given land use is exceeded, since it would likely contribute to the existing noise exceedance.

Federal Transit Administration

The Federal Transit Administration (FTA) provides technical guidance for conducting noise and vibration analyses for transit projects and incorporation into environmental review documents. The manual presents procedures for predicting and assessing transit noise and vibration impacts.

Noise Control Act of 1972

The Noise Control Act of 1972 (42 United States Code 4910) establishes a national policy to promote an environment for all Americans to be free from noise that jeopardizes their health and welfare. The Act establishes a means for the coordination of federal research and activities in noise control, authorizes the establishment of federal noise emissions standards for products distributed in commerce, and provides the noise-emission and noise-reduction characteristics of such products to the public.

U.S. Environmental Protection Agency, Environmental Noise Levels

The U.S. Environmental Protection Agency (EPA) provided guidance on environmental noise levels in Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety (EPA 1974), commonly referenced as the "Levels Document," that establishes a day/night noise level (L_{dn}) of 55 dBA as the requisite level, with an adequate margin of safety, for areas of outdoor uses, including residences and recreation areas. The Levels Document does not constitute EPA regulations or standards but identifies safe levels of environmental noise exposure without consideration of costs for achieving these levels or other potentially relevant considerations. It is intended to "provide State and local departure for the purpose of decision-making." The EPA is careful to stress that the recommendations contain a

factor of safety and do not consider technical or economic feasibility issues and therefore should not be construed as standards or regulations.

Federal Energy Regulatory Commission, Noise Guidelines

Federal Energy Regulatory Commission Noise Guidelines on Noise Emissions from Compressor Stations, Substations, and Transmission Lines (18 Code of Federal Regulations 157.206(d)(5)) require that the noise attributable to any new compressor stations, compression added to an existing station, or any modification, upgrade, or update of an existing station must not exceed a L_{dn} of 55 dBA at any pre-existing noise-sensitive area (such as schools, hospitals, or residences). This policy was adopted based on the EPA-identified level of significance of 55 dBA L_{dn}.

U.S. Department of Housing and Urban Development, Environmental Standards

The U.S. Department of Housing and Urban Development (HUD) regulations (24 Code of Federal Regulations Part 51) set forth the following exterior noise standards for new home construction assisted or supported by the HUD:

- 65 L_{dn} or less – Acceptable
- Greater than 65 L_{dn} and less than 75 L_{dn} – Normally unacceptable, appropriate sound attenuation measures must be provided
- Greater than 75 L_{dn} – Unacceptable

HUD's regulations do not contain standards for interior noise levels. A goal of 45 dBA L_{dn} is set forth, and attenuation requirements are geared to achieve that goal.

Occupational Safety and Health Administration, Occupational Noise Exposure

Occupational Safety and Health Administration, Occupational Noise Exposure; Hearing Conservation Amendment (Federal Register 1983) stipulates that protection against the effects of noise exposure shall be provided for employees when sound levels exceed 90 dBA over an 8-hour exposure period. Protection shall consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment shall be provided and used to reduce exposure of the employee. Additionally, a Hearing Conservation Program must be instituted by the employers whenever employee noise exposure equals or exceeds the action level of an 8-hour time-weighted average sound level of 85 dBA L_{eq}. The Program requirements consist of periodic area and personal noise monitoring, performance and evaluation of audiograms, provision of hearing protection, annual employee training, and record keeping.

State

California Code of Regulations

California Code of Regulations Title 24 establishes the California Building Code. The most recent building standard adopted by the legislature that will be used throughout the state is the 2022 version, which took effect on January 1, 2023. The State of California's noise insulation standards are codified in the California Building Code. These noise standards are for new construction in California for the purposes of interior compatibility with exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residences, schools, or hospitals, are near major transportation noises, and where such noise sources create an exterior noise level of 60 dBA CNEL, or higher. Acoustical studies that accompany building plans must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL. Proposed projects may use either the prescriptive method (§ 5.507.4.1) or the performance method (§ 5.507.4.2) to show compliance. Under the prescriptive method, a Project must demonstrate transmission loss ratings for the wall and roof-ceiling assemblies and exterior windows when located within a noise environment of 65 dBA CNEL or higher. Under the performance method, a Project must demonstrate that interior noise levels do not exceed 50 dBA $L_{eq(1hr)}$.

The State of California's noise insulation standards for nonresidential uses are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 11, California Green Building Standards Code (CALGreen). CALGreen noise standards are applied to new or renovation construction projects in California to control interior noise levels resulting from exterior noise sources.

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declare that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological and economic damage. It also identifies a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

California Department of Transportation Construction Vibration Guidance Manuel

One of the most recent references suggesting vibration guidelines is the California Department of Transportation (Caltrans) Transportation and Construction Vibration Guidance Manual (Caltrans 2013b). The manual provides guidance for determining annoyance potential criteria and damage potential threshold criteria. These criteria are provided in **Table 4.13-7** and **Table 4.13-8** and are presented in terms of peak particle velocity (PPV) in inches per second.

Table 4.13-7: Caltrans Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (inches per second)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely Perceptible	0.04	0.01
Distinctly Perceptible	0.25	0.04
Strongly Perceptible	0.9	0.1
Severe	2.0	0.4

Source: Caltrans 2013b.

Key:
PPV = peak particle velocity

Table 4.13-8: Caltrans Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (inches per second)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile, historic buildings, ancient monuments	0.13	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Caltrans 2013b.

Key: PPV = peak particle velocity

Local

Metropolitan Bakersfield General Plan

The MBGP (Chapter VII; Noise Element) establishes noise level criteria in terms of the CNEL metric to establish desired noise levels in Kern County. As noted above, the CNEL is the time-weighted energy average noise level for a 24-hour day, with a 5 dB penalty added during evening time (7:00 p.m. to 10:00 p.m.) and a 10 dB penalty added to noise levels occurring during the nighttime hours (10:00 p.m. to 7:00 a.m.).

To ensure that residents are protected from excessive noise levels, the Noise Element includes Policy 3 to "review discretionary industrial, commercial or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses." The MBGP achieves this with Implementation Measure 4, which requires proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise-sensitive land uses to exterior noise levels in excess of 65 dB CNEL and interior noise levels in excess of 45 dB CNEL Furthermore, the MBGP contains standards related to an increase in ambient noise levels on sensitive receptors. Projects that will cause an increase to the following standards are required to adopt practical and feasible mitigation measures. The MBGP states that a significant increase in ambient noise would occur if:

- An increase in ambient noise level of 1dB or more over 65dB CNEL, where the existing ambient level is 65dB CNEL or less; or
- The ambient noise level is less than 60 dB CNEL and the Project increases noise levels by 5 dB or more;
- The ambient noise level is 60 to 65 dB CNEL and the Project increases noise levels by 3 dB or more; The ambient noise level is greater that 65 dB CNEL and the Project increases noise levels by 1.5 dB or more.

These standards would be met with the following goals, policies, and implementation measures.

Goals

Goal 1: Ensure that residents of the Bakersfield Metropolitan Area are protected from excessive noise and existing moderate levels of noise are maintained.

Goal 2: Protect the citizens of the planning area from the harmful effects of exposure to excessive noise, and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports and other sources.

Policies

Policy 1: Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in **Table 4.13-9**. The noise exposure contour maps on file at the City of Bakersfield and County of Kern indicate areas where existing and Projected noise exposures exceed 65 dB CNEL (exterior) for the major noise sources identified.

Table 4.13-9: Noise Performance Standards (Metropolitan Bakersfield General Plan)

Category	Cumulative Number of minutes in any one-hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30	55	50
2	15	60	55
3	5	65	60
4	1	70	65
5	0	75	70

Note: Each of the noise level standards specified in the table above (Table VII-2 from the MBGP) shall be reduced by five (5) dB(A) for pure tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards should be applied at a residential or other noise-sensitive land use and not on the property of a noise-generating land use.

Policy 3: Review discretionary industrial, commercial or other noise-generating land use Projects for compatibility with nearby noise-sensitive land uses. Additionally, the development of new noise-generating land uses which are not preempted from local noise regulation will be reviewed if resulting noise levels will exceed the performance standards contained within Table VII-2 in areas containing residential or other noise-sensitive land uses.

Policy 5: Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise.

Implementation Measures:

Measure 4: Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB CNEL and interior noise levels in excess of 45 dB CNEL and so that impacts on noise sensitive uses shall not exceed the performance standards in Table VII-2 (of the General Plan).

At time of any discretionary approval, such as a request for zone change or subdivision, the developer may be required to submit an acoustical report indicating the means by which the developer proposes to comply with the noise standards. The acoustical report shall:

a. Be the responsibility of the applicant.

b. Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.

c. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.

d. Include estimated noise levels in terms of CNEL and the standards of Table VII-2 (if applicable) for existing and Projected future (10-20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.

e. Include recommendations for appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element.

f. Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, a rationale for acceptance of the Project must be provided.

Measure 5: Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the Project permitting process.

Measure 10: The following standards shall be used to determine the existence of significant cumulative noise impacts expected to result from proposed construction or development Projects. The Projected occurrence of such significant cumulative impacts shall require the adoption of practical and feasible mitigation measures to be identified in an Environmental Impact Report or Negative Declaration, whichever is applicable.

Kern County Code of Ordinances

Section 8.36 (Noise Control) of the Kern County Code of Ordinances focuses on reducing loud and raucous noise. It limits construction to the hours of 6:00 a.m. to 9:00 p.m. on weekdays, and between 8:00 a.m. and 9:00 p.m. on weekends, when construction is within 1,000 feet of a residence. Meanwhile, Section 19.80.030 (Development and performance standards – Commercial and industrial districts) requires certain performance standards for commercial and industrial districts, in which the Project is subject to. This section requires that development shall not generate noise that exceeds an average 65 dB L_{dn} (24-hour median) between the hours of 7:00 a.m. and 10:00 p.m. and shall not generate noise that exceeds 65 dB, or which would result in an increase of 5 dB or more from ambient sound levels, whichever is greater, between the hours of 10:00 p.m. and 7:00 a.m.

Kern County Zoning Ordinance

Section 19.80.030.S(1) of the Kern County Zoning Ordinance (Kern County Planning and Natural Resources Department 2021) restricts noise generated by commercial or industrial uses within 500 feet of a residential use or residential zone district. The commercial or industrial use shall not generate noise that exceeds an average of 65 dB L_{dn} between the hours of 7:00 a.m. and 10:00 p.m. and shall not generate noise that exceeds 65 dB, or that would result in an increase of 5 dB or more from ambient sound levels, whichever is greater, between the hours of 10:00 p.m. and 7:00 a.m. Commercial or industrial facilities that are located in the M-3 zone district are exempt from these noise-generation restrictions.

Kern County Airport Land Use Compatibility Plan

The Meadows Field Airport runway is located approximately 1,500 feet southeast of the Project site. This places the Project site within the Airport Influence Area (AIA) according to the County of Kern Airport Land Use Compatibility Plan (ALUCP). The purpose of the ALUCP is to establish procedures and criteria by which the County of Kern and the affected incorporated cities can address compatibility issues when making planning decisions regarding airports and the land uses around them. In addition, the ALUCP requires that the supporting compatibility criteria consider the future CNEL contours. The Project site is located within the 60 to 65 dBA CNEL noise level

contour boundary of the Meadows Field Airport. Industrial land uses that involve service commercial, wholesale trade, warehousing, and light industrial are considered normally acceptable with an exterior noise level of 60 to 65 dBA CNEL, according to the ALUCP noise compatibility criteria.

4.13.4 Impacts and Mitigation Measures

Methodology

In accordance with the California Environmental Quality Act (CEQA) Guidelines, noise impacts associated with the Project were analyzed against the standards identified in the MBGP with consideration of the specific type of 24-hour operation created by warehouse construction and operational activities. Noise impacts assessed in this section are based primarily on the proposed Project's Noise and Vibration Analysis prepared by Urban Crossroads for Kern County (Appendix I).

An ambient noise survey was conducted in June 2023. At the time the noise analysis was prepared, the future tenants of the Project were unknown; therefore, this noise study includes a conservative analysis of the Project uses, noting that the Project's primary function as a warehouse and distribution facility may require modifications to the interior design and would be subject to tenant improvements to accommodate specialized storage for varied goods and materials used in commerce including finished products, consumer goods, parts, materials, tires, and tools typically found in a modern distribution/logistics facility. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (for example, Building Code, Fire Code, and Plumbing Code) Outdoor storage is not proposed as part of this Project.

Continuous 24-hour noise level measurements were taken at five locations in the Project study area during typical weekday conditions. The sound meters were positioned to the nearest sensitive receptors, as illustrated in **Figure 4.13-1**. Monitoring locations were chosen based on guidance from Caltrans and the FTA. The monitoring locations were placed to characterize the noise environment and were therefore placed as clusters in the residential areas, rather than at each residence. The locations were free of noise contamination such as barking dogs, lawnmowers, pool pumps, and air conditioning.

Short-Term Construction Noise

To quantitively describe short-term construction noise impacts, the noise analysis used reference construction equipment noise levels from the Federal Highway Administration's comprehensive list of noise-generating characteristics for specific types of construction equipment. For construction noise assessment, construction equipment can be considered to operate in two modes: stationary and mobile. As defined, stationary equipment operates in a single location for one or more days at a time, with either fixed-power operation (for example, pumps, generators, and compressors) or variable-power operation (for example, pile drivers, rock drills, and pavement breakers). However, consistent with industry practice, construction activities were evaluated as

mobile sources since these activities tend to vary considerably, not only as the speed and power of the equipment varies, but also as the equipment constantly changes in terms of its distance from the receivers and its relative location. Thus, to assess a more realistic and reasonable worst-case construction scenario while accounting for the dynamic nature of construction activities, the Project construction noise analysis models the equipment with the highest combined reference noise level as a moving point source within the construction area (Project site boundary).

Because each construction phase requires a specific mix of equipment, some phases have higher continuous noise levels than others, and some have higher impact noise levels than others. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site as construction progresses. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower power settings. Impact equipment such as pile drivers are not expected to be used during the construction of this Project. **Table 4.13-10** outlines both the general assessment of common construction equipment combined for the loudest composite construction equipment, assuming they operate at the same time and are measured at 50 feet for reference, as well as the total amount of acoustical energy produced by the source of sound.

Table 4.13-10: Construction Reference Noise Levels

Construction Stage	Reference Construction Equipment[(a)]	Reference Noise Level at 50 feet (dBA L_{eq})	Composite Reference Noise Level (dBA L_{eq})[(b)]	Reference Power Level (dBA L_w)[(c)]
Site Preparation	Tractor	80	84.0	115.6
	Backhoe	74		
	Grader	81		
Grading	Scraper	80	83.3	114.9
	Excavator	77		
	Dozer	78		
Building Construction	Crane	73	80.6	112.2
	Generator	78		
	Front End Loader	75		
Paving	Paver	74	77.8	109.5
	Dump Truck	72		
	Roller	73		
Architectural Coating	Man Lift	68	76.2	107.8
	Air Compressor	74		
	Generator (less than 25 kVA)	70		

Source: Urban Crossroads 2024.

Notes:
(a) Federal Highway Administration Road Construction Noise Model.
(b) Represents the combined noise level for all equipment assuming they operate at the same time.
(c) Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings.
Key: dB = decibels; kVA = kilovolt-ampere ;L_{eq} = Equivalent noise level; Lw = Sound Power Level

Construction Ground-borne Vibration

To analyze vibration impacts originating from the construction of the Project, vibration-generating activities were appropriately evaluated against standards established in the Caltrans Transportation and Construction Vibration Guidance Manual to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise-sensitive buildings adjacent to the Project site can best be described as "older residential structures" with a maximum acceptable continuous vibration threshold of 0.3 PPV (inches per second [in/sec]).

Operational Stationary Source Noise

To fully describe the exterior operational noise levels from the Project, the Study utilized a noise prediction model using the Computer Aided Noise Abatement (CadnaA computer) program. Using the International Organization for Standardization (ISO) 9613-2 protocol, CadnaA calculated the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of the noise level at each receiver and the partial noise level contributions by noise source. Consistent with the ISO 9613-2 protocol, the CadnaA noise prediction model relies on the reference sound power level (Lw) to describe individual noise sources.

While sound pressure levels (for example, L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, Lw are connected to the sound source and are independent of distance. The operational noise level calculations provided in the noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (that is, a point source) generates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the CadnaA noise analysis to account for mixed ground representing a combination of hard and soft surfaces.

To analyze operational noise levels associated with the Project, the Study referenced over 38 individual noise sources to conservatively describe the potential worst-case noise environment scenario. These reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the Project. The references are shown in **Table 4.13-11**.

Table 4.13-11: Reference Noise Level Measurements

Noise Source(a)	Noise Source Height (feet)	Minutes per Hour(b)	Reference Noise Level (dBA L_{eq}) at 50 feet	Sound Power Level (dBA)(c)
		Day	Night	
Outdoor Loading Dock Activity	8	60	60	109.7
Roof-Top Air Conditioning Units	5	39	28	88.9
Trash Enclosure Activity	5	60	30	89.0
Parking Lot Vehicle Movements	5	60	60	87.8
Truck Movements	8	60	60	91.6

Source: Urban Crossroads 2024.

Notes:
(a) As measured by Urban Crossroads, Inc.
(b) Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site. "Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.
(c) Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings. Sound power levels are calculated using the CadnaA noise model at the reference distance to the noise source.
Key: dBA = A-weighted decibel; $L_{eq=}$ equivalent noise level

Outdoor Loading Dock Activity

To describe the outdoor loading dock activities, reference noise level measurements were collected at the Tejon Ranch Commerce Center located west of Interstate 5 in unincorporated Kern County. The 24-hour reference noise level measurements were collected adjacent to the Dollar General Distribution Center loading docks entry gate and represent the typical outdoor operational noise activities associated with the Project warehouse land uses. This includes heavy tractor-trailer truck deliveries, air brakes, backup alarms, trailer docking, and background operation activities. To ensure that the reference noise level accurately describes the peak hourly noise source activities, sixty of the highest 1-minute individual measurements observed over the 1,440-minute or 24-hour measurement period, were used to describe the outdoor loading dock activities. At a uniform distance of 50 feet from the source the outdoor loading dock activities representing multiple concurrent noise sources produced a combined noise level of 64.4 dBA L_{eq}.

Parking Lot Vehicle Movements

To describe the on-site parking lot vehicle movement activity, a long-term 24-hour reference noise level measurement was collected in the center of activity within the employee parking lot of the Dollar General Distribution Center. To ensure that the reference noise level accurately describes the peak hourly noise source activities, sixty of the highest 1-minute individual measurements observed over the 1,440-minute or 24-hour measurement period, were used to describe the parking

lot vehicle movements. At 50 feet from the center of activity, the parking lot produced a reference noise level of 55.7 dBA L_{eq}. Parking activities are expected to take place during the full hour (60 minutes) throughout the daytime and evening hours. The parking lot noise levels are mainly due to cars pulling in and out of parking spaces in combination with car doors opening and closing.

Truck Movements

The truck movements reference noise level measurement was collected on Tejon Industrial Drive at the intersection of Industrial Parkway Drive. The truck movements at this location include the heavy tractor-trailer truck movements associated with Dollar General, Vision Media, and IKEA distribution centers. Using the 60 highest 1-minute measurements collected over 24 hours, the heavy trucks entering and exiting the outdoor loading dock area produced a reference noise level of 59.9 dBA L_{eq} at 50 feet.

Roof-Top Air Conditioning Units

To assess the noise levels created by the roof-top air conditioning units, reference noise level measurements were collected from a Lennox SCA120 series 10-ton model packaged air conditioning unit. At 5 feet from the roof-top air conditioning unit, the exterior noise levels were measured at 77.2 dBA L_{eq}. At the uniform reference distance of 50 feet, the reference noise level is 57.2 dBA L_{eq}. Based on the typical operating conditions observed over a four-day measurement period, the roof-top air conditioning units are estimated to operate for an average of 39 minutes per hour during the daytime hours, and 28 minutes per hour during the nighttime hours. These operating conditions reflect peak summer cooling requirements with measured temperatures approaching 96 degrees Fahrenheit (°F) with average daytime temperatures of 82°F. For this noise analysis, the air conditioning units are expected to be located on the roof of the Project buildings. This reference noise level describes the expected roof-top air conditioning units located 5 feet above the roof for the planned air conditioning units at the Project site.

Trash Enclosure Activity

To describe the noise levels associated with trash enclosure activity, Urban Crossroads collected a reference noise level measurement at an existing trash enclosure containing two dumpster bins. The trash enclosure noise levels describe metal gates opening and closing, metal scraping against concrete floor sounds, dumpster movement on metal wheels, and trash dropping into the metal dumpster. The reference noise levels describe trash enclosure noise activities when the trash is dropped into an empty metal dumpster, as would occur at the Project site. The measured reference noise level at the uniform 50-foot reference distance is 57.3 dBA L_{eq} for the trash enclosure activity. The reference noise level describes the expected noise source activities associated with the trash enclosures for the Project's buildings.

Operational Off-site Traffic Noise

Off-site traffic noise related to the Project was analyzed by considering the existing traffic noise levels plus anticipated traffic generated by the Project. This was accomplished in the noise report by the development of noise contours at land uses adjacent to roadways conveying Project traffic. To describe anticipated roadway noise level within the contours from vehicular traffic associated

with the Project, the Study utilized a computer program that replicates the Federal Highway Administration Traffic Noise Prediction Model to predict the future traffic noise environment. This model accounts for roadway classification, width, total average daily traffic, travel speed, and other adjustments that reflect the California Vehicle Noise (Calveno) Emission Levels. Inputs for traffic modeling include Project-specific truck trips split between daytime, evening, and nighttime predictions varied by vehicle type—autos, medium trucks, and heavy trucks—described in Appendix J. The modeling considers the operational year of 2025 and the cumulative year of 2046.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine whether a Project could have a significant noise-related adverse effect. The thresholds identified in Appendix G of the Guidelines indicate that a Project would normally be considered to have a significant impact if it would result in:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Generation of excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project.
- For a Project located within the Kern County Airport Land Use Compatibility Sphere of Influence, would the Project expose people residing or working in the Project area to excessive noise levels.

Significance Criteria

Significant increase in ambient noise levels must be given to the magnitude of the increase, the existing baseline ambient noise levels, and the location of noise-sensitive receivers to determine whether a noise increase represents a significant adverse environmental impact. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called ambient environment. Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development, summarized in **Table 4.13-12**.

Table 4.13-12: Significance Criteria

Analysis	Condition(s)	Significance Criteria	
		Daytime	Nighttime
Construction	Noise Level Threshold[(a)]	80 dBA L_{eq}	70 dBA L_{eq}
	Vibration Level Threshold[(b)]	0.3 PPV (in/sec)	
Operational	Exterior Noise Level Standards[(c)]	65 dBA CNEL	
	If ambient is < 60 dBA CNEL[(d)]	≥ 5 dBA CNEL Project increase	

Analysis	Condition(s)	Significance Criteria	
		Daytime	Nighttime
	If ambient is 60 – 65 dBA CNEL(d)	≥ 3 dBA CNEL Project increase	
	If ambient is > 65 dBA CNEL(d)	≥ 1.5 dBA CNEL Project increase	
Off-Site Traffic	If ambient is < 60 dBA CNEL(d)	≥ 5 dBA CNEL Project increase	
	If ambient is 60 – 65 dBA CNEL(d)	≥ 3 dBA CNEL Project increase	
	If ambient is > 65 dBA CNEL(d)	≥ 1.5 dBA CNEL Project increase	

Source: Urban Crossroads 2024.

Notes:
(a) Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
(b) Caltrans Transportation and Construction Vibration Manual, April 2020 Table 19
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.
(c) Metropolitan Bakersfield General Plan Noise Element Implementation Measure 4
(d) FICON 1992.
Key: dBA = A-weighted decibel; CNEL = community noise equivalent level; in/sec = inches per second; L_{eq} = equivalent noise level

Project Impacts

Impact 4.13-1: The Project would Generate a Substantial Temporary or Permanent Increase in Ambient Noise Levels in the Vicinity of the Project in Excess of Standards Established in the Local General Plan or Noise Ordinance, or Applicable Standards of Other Agencies

Construction Noise Impacts

Daytime Construction

Temporary noise impacts associated with the Project would be associated with short-term construction activities, which would include the use of various types of equipment commonly associated with site preparation, grading, access corridors, and infrastructure construction. Short-term construction noise impacts would be considered to have a significant impact if construction would exceed applicable noise standards or result in substantial increases in ambient noise levels at the nearest noise-sensitive land uses during the more noise-sensitive evening and nighttime hours.

Per the requirements of Kern County Code of Ordinances, Noise Control, Chapter 8.36, noise-generating construction activities that are audible to a person with average hearing ability at a distance of 150 feet from the construction site, or within 1,000 feet of an occupied residential dwelling, are typically prohibited between the hours of 9:00 p.m. to 6:00 a.m. on weekdays and between 9:00 p.m. to 8:00 a.m. on weekends. The purpose is to limit loud construction noise that disturbs the peace and quiet of any neighborhood or causes discomfort or annoyance to any reasonable person of normal sensitiveness sleeping or residing in the area.

Construction activities typically involve the use of heavy machinery that can be a significant source of noise, and while often temporary, can result in significant impacts. As previously mentioned, the Kern County Code of Ordinance prohibits construction noise perceptible to normal human

perception at 150 feet from construction site during specific hours, however, does not establish a numeric maximum acceptable construction source noise level. For this reason, a numerical construction threshold based on the FTA Transit Noise and Vibration Impact Assessment Manual is used for the analysis of daytime construction impacts. The FTA reasonable threshold for noise-sensitive residential daytime exterior levels is 80 dBA Leq and the nighttime exterior construction noise level is 70 dBA Leq.

Each stage during construction has a specific equipment mix, depending on the work to be completed during that stage. As a result of the equipment mix, each stage has its own noise characteristics; some stages have higher continuous noise levels than others, and some have higher impact noise levels than others. In this case, the site preparation phase associated with the development of the Project generates the highest level of noise. The Project is predicted to generate construction noise levels between approximately 46.7 (architectural coating phase) to 65.1 dBA Leq (site preparation phase) measured at nearby receptor locations. The nearest sensitive receptor (R4) is predicted to receive construction noise levels at 65.1 dBA CNEL and is located approximately 102 feet east of the Project site boundary.

As shown in **Table 4.13-13**, the noise levels associated with daytime construction are estimated to range between 46.7 to 65.1 dBA Leq at existing noise receiver locations. The analysis shows that the unmitigated construction activities will not exceed the FTA 80 dBA L_{eq} noise threshold at all the nearest noise-sensitive receiver locations.

Table 4.13-13: Construction Equipment Noise Levels

Receptor Location[(a)]	Construction Noise Levels (dBA L_{eq})[(b)]					Threshold (dBA CNEL)	Exceedance
	Site Preparation	Grading	Building Construction	Paving	Architectural Coating		
R1	57.1	56.4	53.7	51.0	49.3	80	No
R2	61.2	60.5	57.8	55.1	53.4	80	No
R3	57.2	56.5	53.8	51.1	49.4	80	No
R4	65.1	64.4	61.7	59.0	57.3	80	No
R5	54.5	53.8	51.1	48.4	46.7	80	No

Source: Urban Crossroads 2024.

Notes:
(a) Construction noise source and receiver locations
(b) Construction noise source and receiver locations are based on distance from the construction activity, which is measured from the Project site boundary to the nearest receptor locations.
Key: dBA = A-weighted decibel; CNEL = community noise equivalent level; L_{eq} = equivalent noise level

Nighttime Concrete Pour Noise Analysis

Nighttime concrete pouring is anticipated as part of the Project building construction activities. Nighttime concrete pouring activities are often used to support reduced concrete mixer truck transit times and lower air temperatures than during the daytime hours and are generally limited to the actual building pad area. Since the nighttime concrete pours will take place outside the daytime hours, the Project Applicant will be required to obtain authorization for nighttime work from Kern County.

The reference noise levels describe the expected concrete pour noise sources that may include concrete mixer truck movements and pouring activities, concrete paving equipment, rear-mounted concrete mixer truck backup alarms, engine idling, air brakes, generators, and workers communicating/whistling. To describe the nighttime concrete pour noise levels associated with the construction of the Project, this analysis relies on the reference sound pressure level of 67.7 dBA L_{eq} at 50 feet.

As shown in **Table 4.13-14**, the noise levels associated with the nighttime concrete pour activities are estimated to range from approximately 39 to 50 dBA L_{eq} at the existing noise-sensitive receiver locations. The analysis shows that the unmitigated nighttime concrete pour activities will not exceed the FTA 70 dBA L_{eq} nighttime residential noise level threshold at all the nearest noise-sensitive receiver locations.

Table 4.13-14: Nighttime Concrete Pour Noise Level Compliance

Receptor Location(a)	Concrete Pour Construction Noise Levels (dBA L_{eq})		
	Exterior Noise Levels[b]	Threshold[c]	Exceedance
R1	41.8	70	No
R2	45.9	70	No
R3	41.9	70	No
R4	49.8	70	No
R5	39.2	70	No

Source: Urban Crossroads 2024.

Notes:
(a) Construction noise source and receiver locations are shown on Exhibit 10-A.
(b) Nighttime Concrete Pour noise model inputs are included in Appendix 10.2.
(c) Construction noise level thresholds as shown in **Table 4.13-11**.
Key: dBA = A-weighted decibel; L_{eq} = equivalent noise level

Summary

While the MBGP and Kern County Ordinance do not provide quantitative short-term construction noise level thresholds, the Project would generate acceptable short-term noise levels per FTA construction noise level impacts threshold of 80 dBA. In addition, Project construction would be limited to the allowable Kern County construction hours noted above. Any work outside of allowable hours would require authorization from Kern County. As discussed in Section 4.13.1, noise is often associated with unwanted sounds that are perceptible to the human ear, and, in general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise. Because construction activities are associated with high sound pressure, such as sounds emitting from pile drivers, rock drills, and pavement breakers, the combined potential measured at the source could reach as high as 115.6 dBA during site preparation (Section 4.13.4). While the predicted construction noise levels measured at sensitive receptor locations would not exceed standards of 80 dBA and 70 dBA (daytime and nighttime, respectively), impacts would be considered potentially significant when considering MBGP noise standards. The MBGP prohibits construction noise be audible to a person with average hearing faculties at 150 feet from the construction site during certain hours. **Mitigation Measure 4.13-1** would require

adherence to the Kern County Noise Ordinance, best management practices for equipment staging, equipment noise-reduction features where feasible, and reduce idle time and speeds. **MM 4.13-2** would require the implementation of a noise coordinator to respond to noise complaints. Further **Mitigation Measures MM 4.13-3** and **4.13-4** would require residents to be provided with notice and any grading permits required for the site to have notes concerning noise-reduction methods. Therefore, mitigation is required to reduce excessive noise levels from construction activity to a less than significant impact.

Operational Noise Impacts

Industrial Land Use Compliance

For operational noise, the MBGP Noise Element requires that proposed commercial and industrial uses or operations be designed or arranged so that they will not subject residential or other noise-sensitive land uses to exterior noise levels in excess of 65 dB CNEL and interior noise levels in excess of 45 dB CNEL, and also not exceed the noise performance standards in Table VII-2 of the MBGP. The Project is an industrial use and is therefore subject to this measure. Therefore, an exterior noise level of 65 dBA is utilized in this analysis.

Once operational, the Project's primary function as a warehouse and distribution facility may require modifications to the interior design and would be subject to tenant improvements in order to accommodate specialized storage for varied goods and materials used in commerce including but not limited to finished products, consumer goods, parts, materials, tires, tools. typically found in a modern distribution/logistics facility. Any modification to the interior of the building will be subject to plan check review and require the issuance of a building permit to ensure compliance with applicable codes (for example, Building Code, Fire Code, and Plumbing Code) Outdoor storage is not proposed as part of this Project. As such, noise impacts resulting from specific products and packaged goods that are stored entirely indoors are not expected to contribute to noise impacts, and therefore would not warrant specific mitigation measures in this regard.

However, Project site-related noise would be primarily associated with traffic movement within the site, parking, and loading and unloading of trucks. Other sources include roof-top air conditioning units and trash enclosure activity. The operation of these activities in combination, would result in the total dBA CNEL on sensitive receivers. **Table 4.13-15** the predicted operational source noise levels expected to be generated from the Project at sensitive receivers range between 59.0 dBA and 63.1 dBA CNEL. Based on the projected noise levels generated during operations, when compared to measure 4 of the MBGP, the noise levels measured at sensitive receptors would not exceed the exterior noise level thresholds of 65 dBA CNEL, as shown in **Table 4.13-15**.

Table 4.13-15: Projected Operational Noise Levels

Noise Source	Operational Noise Levels by Receiver Location (dBA CNEL)					Threshold (dBA CNEL)	Exceedance
	R1	R2	R3	R4	R5		
Outdoor Loading Dock Activity	58.9	62.3	54.9	62.6	51.0	65	No
Roof-Top Air Conditioning Units	35.0	37.6	34.6	41.3	30.6	65	No

Noise Source	Operational Noise Levels by Receiver Location (dBA CNEL)					Threshold (dBA CNEL)	Exceedance
	R1	R2	R3	R4	R5		
Trash Enclosure Activity	31.7	36.6	30.4	39.2	28.4	65	No
Parking Lot Vehicle Movements	36.8	43.3	37.9	48.6	33.6	65	No
Truck Movements	38.0	42.6	39.2	51.5	35.0	65	No
Total (all noise sources)	59.0	62.4	55.2	63.1	51.2	65	No

Source: Urban Crossroads 2024.

Key: dBA = A-weighted decibel; CNEL = community noise equivalent level; L_{eq} = equivalent noise level

Ambient Increase

Existing noise levels adjacent to the Project site in the vicinity of the nearest sensitive receptor are documented, in **Table 4.13-16**, to be 73.5 dBA CNEL. Therefore, according to the Noise Element, the applicable significance criteria for a substantial noise increase would be a 1.5 dB or greater increase in ambient noise levels as a result of Project operations as measured at the nearest noise-sensitive receptor land use. To project the increase in ambient Project-associated noise levels, the modeled operational noise level was combined with the existing ambient noise levels per receiver location. This evaluation concluded that the noise levels from Project operations and maintenance activities would not be audible over existing ambient noise levels at any of the sensitive receptor locations. The projected increase ranges from 0.1 to 0.9 dBA. The measured ambient noise levels for each receptor do not increase significantly, based on the increase criteria outlined in the MBGP ambient noise standards. Therefore, the Project would not generate a substantial permanent increase in ambient noise levels.

Table 4.13-16: Daytime Project Operational Noise Level Increase (CNEL)

	R1	R2	R3	R4	R5
Total Project Operational Noise Level[(a)]	59.0	62.4	55.2	63.1	51.2
Reference Ambient Noise Levels[(b)]	77.6	73.4	61.6	73.5	76.4
Combined Project and Ambient[(c)]	77.7	73.7	62.5	73.9	76.4
Project Increase[(d)]	0.1	0.3	0.9	0.4	0.0
Increase Criteria[(e)]	1.5	1.5	5.0	1.5.	1.5
Threshold exceedance	No	No	No	No	No

Source: Urban Crossroads 2024.

Notes:
(a) Total Project operational noise levels as shown in **Table 4.13-14**
(b) Observed ambient CNEL noise levels as shown in **Table 4.13-4**
(c) Represents the combined ambient conditions plus the Project activities
(d) The noise level increase expected with the addition of the Project
(e) Significance increase criteria as shown in **Table 4-1:** Significance Criteria Summary in Appendix I

Key: CNEL = community noise equivalent level

Off-Site Traffic Noise

Noise contours on 10 roadways that convey Project traffic show that existing noise levels without the Project range between 56.2 dBA and 74.5 dBA. Contours and modeling using the methods described above show that with the development of the Project, in the operational year of 2025, the range of traffic-related noise is between 56.2 dBA and 74.8 dBA. This results in a range of 0.0 to 0.7 dBA CNEL increase in traffic noise levels surrounding the Project site in the operational year 2025, as shown in **Table 4.13-17**.

Table 4.13-17: Existing With Project Traffic Noise Level Increases

Road	Segment	Receiving Land Use	CNEL at receiving Land Use[(a)]			Incremental Noise Level Increase Threshold	
			No Project	With Project	Project Addition	Limit	Exceeded
Hanger Way	s/o Boughton Drive	Nonsensitive	55.2	56.9	0.7	5.0	No
Airport Drive	s/o Merle Haggard Drive	Sensitive	68.2	68.3	0.1	1.5	No
Airport Drive	s/o Boughton Drive	Sensitive	69.8	69.8	0	1.5	No
Airport Drive	n/o Norris Road	Sensitive	72.3	72.4	0.1	1.5	No
Airport Drive	s/o Norris Road	Sensitive	72.5	72.5	0	1.5	No
Airport Drive	s/o Decatur Street	Sensitive	72.3	72.4	0.1	1.5	No
Airport Drive	s/o Roberts Lane	Sensitive	73.6	73.6	0	1.5	No
Merle Haggard Drive	w/o Airport Drive	Nonsensitive	72.9	72.9	0	1.5	No
Olive Drive	w/o State Route 99 Northbound Ramps	Sensitive	74.5	74.5	0	1.5	No
Olive Drive	w/o Airport Drive	Sensitive	70.7	70.7	0	1.5	No

Source: Urban Crossroads 2024.

Note:
(a) The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use
Key: CNEL = community noise equivalent level

Summary

The operational noise levels would not contribute to a significant increase in ambient noise levels based on standards outlined in the MBGP. Additionally, Project-related traffic noise would result in a negligible or non-perceptible increase in traffic noise exposure levels along roadways in the Project vicinity. The industrial uses associated with the warehouse would not expose sensitive receptors to exterior noise levels that exceed 65 dBA. As outlined in Section 4.1, *Aesthetics*, the Project would implement **Mitigation Measure MM 4.1-3,** which requires the installation of a vegetative barrier along the Airport Drive and Boughton Drive frontages, which would result in both a visual and noise buffer established between the Project and the nearest sensitive receptors. This distinct separation from the Project from nearby residences will ensure better harmonization

of industrial operations near the existing neighborhood. Furthermore, the CALGreen noise standards which are applied to new construction ensure that building materials would perform to a standard that could demonstrate that interior noise levels do not exceed 50 dBA. Therefore, impacts would be less than significant.

Mitigation Measures

Implement **Mitigation Measure MM 4.1-3** (see **Section 4.1,** *Aesthetics,* for full mitigation measure text), and:

MM 4.13-1 The following measures are required to reduce short-term noise levels associated with project construction:

a. Construction activities at the project site shall comply with the hourly restrictions for noise-generating construction activities, as specified in the Kern County Noise Ordinance (Municipal Ordinance Code 8.36.020). Accordingly, construction activities shall be prohibited between the hours of 9:00 PM to 6:00 AM on weekdays, and between 9:00 PM to 8:00 AM on weekends. These hourly limitations shall not apply to activities where hourly limitations would result in increased safety risk to workers or the public or nighttime concrete pours that have been granted prior authorization from the County.

b. Equipment staging and laydown areas shall be located at the furthest practical distance from nearby residential land uses. To the extent possible, staging and laydown areas should be located at least 500 feet of existing residential dwellings.

c. Where feasible construction equipment shall be fitted with approved noise-reduction features such as mufflers, baffles and engine shrouds that are no less effective than those originally installed by the manufacturer.

d. Haul trucks shall not be allowed to idle for periods greater than five minutes, except as needed to perform a specified function (e.g., concrete mixing).

e. On-site vehicle speeds shall be limited to 15 miles per hour, or less (except in cases of emergency).

f. Back-up beepers for all construction equipment and vehicles shall be broadband sound alarms or adjusted to the lowest noise levels possible, provided that the Occupational Safety and Health Administration and California Division of Occupational Safety and Health's safety requirements are not violated. On vehicles where back-up beepers are not available, alternative safety measures such as escorts and spotters shall be employed.

MM 4.13-2 Prior to the issuance of grading permits,a "Noise Disturbance Coordinator" shall be established. The project operator shall submit evidence of methods of implementation and shall continuously comply with the following during construction:

a. The disturbance coordinator shall be responsible for responding to any local complaints about construction noise.

b. The disturbance coordinator shall determine the cause of the noise complaint (e.g., starting to early, bad muffler, etc.) and shall be required to implement reasonable measures such that the complaint is resolved.

MM 4.13-3 Prior to commencement of any on-site construction activities (i.e., fence construction, mobilization of construction equipment, initial grading, etc.), the project proponent/operator shall provide written notice to the public through mailing a notice, which shall include:

a. The mailing notice shall be to all residences within 1,000 feet of the project site, no sooner than 15 days prior to construction activities. The notices shall include: the construction schedule, telephone number and email address where complaints and questions can be registered with the Noise Disturbance Coordinator.

b. A minimum of one sign, legible at a distance of 50 feet, shall be posted at the construction site or adjacent to the nearest public access to the main construction entrance throughout construction activities that shall provide the construction schedule (updated as needed) and a telephone number where noise complaints can be registered with the Noise Disturbance Coordinator.

c. Documentation that the public notice has been sent and the sign has been posted shall be provided to the Kern County Planning and Natural Resources Department.

MM 4.13-4 The following notes shall be placed on all grading and building permits issued for the project site:

"Construction noise reduction methods such as shutting off idling equipment, installingtemporary acoustic barriers around stationary construction noise sources, maximizing the distance between construction equipment staging areas and occupied residential areas, and use of electric air compressors and similar power tools, rather than diesel equipment, shall be used where feasible.

During construction, stationary construction equipment shall be placed such that emitted noise is directed away from sensitive noise receivers.

All equipment shall be fitted with factory equipped mufflers and be in good working condition. Construction contracts shall specify that all construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers and other state required noise attenuation devices".

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.1-3** (see **Section 4.1,** *Aesthetics,* for full mitigation measure text), and **MM 4.13-1** through **MM 4.13-4**, impacts would be less than significant.

Impact 4.13-2: The Project would Expose Persons to, or Generate, Excessive Ground-borne Vibration or Ground-borne Noise Levels

To assess potential ground-borne vibration impacts associated with the Project, Caltrans' vibration criteria for potential structural damage risks and human annoyance were used in this analysis. Accordingly, ground-borne vibration levels would be considered significant if predicted short-term construction or long-term operational ground-borne vibration levels attributable to the Project would exceed the recommended criteria for structural damage or human annoyance (that is, 0.25 and 0.1 in/sec PPV, respectively) at the nearest off-site existing structure. These thresholds are considered to represent a conservative level at which construction-related activities would result in either structural damage or human annoyance.

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. The operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Based on representative vibration levels presented for various construction equipment types, it is possible to estimate the potential for human response (annoyance) and building damage using the following vibration assessment methods defined by the FTA. Representative vibration associated with construction equipment are listed in **Table 4.13-18**.

Table 4.13-18: Typical Vibration Levels During Construction

Equipment	PPV (inches per second)
Bulldozer (Large)	0.003
Bulldozer (Small)	0.035
Loaded Trucks	0.076
Jackhammer	0.089
Vibratory Roller	0.210

Key:
PPV = peak particle velocity

Table 4.13-19 provides the projected ground-borne vibration on sensitive receptors ranging between 0.001 to 0.025 PPV (in/sec) using the FTA equation for vibration, Caltrans Transportation and Construction Vibration Guidance Manual, and construction reference vibration levels. Based on maximum acceptable continuous vibration threshold of 0.3 PPV in/sec, the typical Project construction vibration levels will fall below the building damage thresholds at all the noise-sensitive receiver locations.

Table 4.13-19: Project Construction Vibration Levels

	Distance to Construction Activity (feet)	Typical Construction Vibration Levels PPV (in/sec)					Thresholds PPV (in/sec)	Exceedance
		Jackhammer	Loaded Trucks	Large bulldozer	Vibratory Roller	Highest Vibration Level		
R1	667	0.0	0.001	0.001	0.002	0.002	0.3	No
R2	173	0.002	0.004	0.005	0.012	0.012	0.3	No
R3	809	0.0	0.000	0.0	0.001	0.001	0.3	No
R4	102	0.004	0.009	0.011	0.025	0.025	0.3	No
R5	910	0.0	0.0	0.0	0.001	0.001	0.3	No

Key: in/sec = inches per second, PPV = peak particle velocity

Once Project construction is complete, it is not expected that ongoing operational activities would result in any ground-borne vibration or noise impacts to sensitive uses. As noted previously, Project's primary function as a warehouse and distribution facility may require modifications to the interior design and would be subject to tenant improvements in order to accommodate specialized storage for varied goods and materials used in commerce including finished products, consumer goods, parts, materials, tires, and tools typically found in a modern distribution/logistics facility. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (that is, Building Code, Fire Code, and Plumbing Code). Outdoor storage is not proposed as part of this Project. As such, noise impacts resulting from specific products and packaged goods that are stored entirely indoors are not expected to contribute to noise impacts. Mitigation measures related to any specific product to be stored on-site and entirely within the proposed warehouses are not warranted in this regard.

Therefore, the Project would not expose sensitive receptors to excessive ground-borne vibration or noise levels, and impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Impacts would be less than significant.

Impact 4.13-3: For a Project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

The Project site is located within the AIA of Meadows Field Airport. The Project site is located within the noise contour boundary of 60-65 dBA CNEL. Based on ALUCP noise compatibility criteria, industrial uses (including service commercial, wholesale trade, warehousing, and light industrial) exposed to exterior noise levels of 60-65 dBA CNEL is considered normally acceptable.

The Project's primary function as a warehouse and distribution facility may require modifications to the interior design and would be subject to tenant improvements to accommodate specialized storage for varied goods and materials used in commerce including finished products, consumer goods, parts, materials, tires, and tools typically found in a modern distribution/logistics facility. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (that is, Building Code, Fire Code, and Plumbing Code). Outdoor storage is not proposed as part of this Project.

Typically, conventional construction methods eliminate most noise intrusions upon indoor activities. Additionally, based on the Study, typical building construction will provide a noise reduction of approximately 20 dBA with windows closed, reducing 65 dBA to 45 dBA for interior exposure. Based on the compatibility of the industrial use (warehouse) and the AIA contour boundary (60 to 65 dBA CNEL), the exposure to noise on those working on the Project is considered normally acceptable. Therefore, impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Less than significant.

4.13.3 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects located in the vicinity of the Project site. Due to the localized nature of noise impacts, cumulative impacts would be largely limited to areas within the general vicinity (that is, within approximately 1,000 feet per Noise Control, Chapter 8.36 of Kern County Code of Ordinances of the Project site). This geographic scope of analysis is appropriate because noise receptors within this area are expected to be similar to those in the Project site because their proximity and similar environments would result in similar land use—and thus, site types.

Impact 4.13-4: Contribute to Cumulative Noise Impacts

Construction

The Project's construction activities, in combination with the construction of other reasonably foreseeable projects in the area, could result in increased short-term construction noise levels in the Project vicinity, depending upon the specific timing of the construction of those other projects and proximity to the Project site. Construction activities associated with other projects in proximity to

the Project site could occur at the same time as the Project. Any future projects would be required to comply with the Kern County Code of Ordinances (Noise Control, Chapter 8.36) which establishes hours of construction and limitations on construction-related noise impacts on adjacent sensitive receptors; noise producing construction activities that are audible to a person with average hearing ability at a distance of 150 feet from the construction site, if the construction site is within 1,000 feet of an occupied residential dwelling, are prohibited between the hours of 9:00 p.m. to 6:00 a.m. on weekdays, and 9:00 p.m. to 8:00 a.m. on weekends. Additionally, implementation of **Mitigation Measure MM 4.13-2** would require a Noise Disturbance Coordinator respond and determine the source of the noise during the construction phase. Residences within 1,000 feet of the Project site should be aware of the construction period, as **Mitigation Measure 4.13-3** would require public noticing to include all residences within 1,000 feet of the Project site.

It is expected that other reasonably foreseeable projects (**Figure 3-7**) in the Project vicinity would be required to go through a project-by-project environmental review to analyze noise impacts consistent with CEQA Guidelines, Appendix G. Where necessary, other projects would be required to meet County standards and mitigate any construction noise impacts. **Mitigation Measure MM 4.13-1** requires idle time for heavy trucks be limited, reduces on-site vehicle speeds, and requires construction equipment be fitted with approved noise-reduction features. This would encourage the reduction of noise if other reasonably foreseeable projects were to conduct construction activity at the same time. Furthermore, **Mitigation Measure MM 4.13-4** requires notes to be placed on all grading and building permits that encourage noise reducing practices such as shutting off idling equipment and directing construction equipment away from sensitive noise receivers.

Cumulative construction may also result in the exposure of people to or the generation of excessive ground-borne vibration. The same receptor as identified for construction noise would be the closest to be impacted by all projects with respect to construction-related vibration as well. Due to these distances, and the rapid attenuation of ground-borne vibration, the project and the nearest related project are not in proximity to this sensitive receptor such that any sensitive receptor would be exposed to substantial ground-borne vibration levels.

Given the proximity and number of other reasonably foreseeable projects in the Project area, as shown in **Figure 3-7,** and assuming a worst-case scenario that cumulative projects would generate noise at the same time, the cumulative construction noise would be significant. Despite the implementation of mitigation, cumulative impacts resulting from temporary noise increases and ground-borne vibration from construction would be significant and unavoidable.

Operation

As discussed previously, the overall Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage and logistics uses, with a secondary application of cold storage occupying up to 20% of the facility. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage and distribution for varied goods and materials used in commerce including finished products, consumer goods, parts,

materials, tires, and tools typically found in a modern distribution/logistics facility consistent with the Light Industrial – Precise Development Combining – Airport Approach Height Combining Zone District. Outdoor storage of bulk and wholesale materials is not proposed as part of this Project. Any modification to the interior of the building will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (that is, Building Code, Fire Code, and Plumbing Code). Outdoor storage is not proposed as part of this Project, and therefore cumulative-level impacts are not expected to increase.

However, the Project, in combination with projects in proximity, has the potential to contribute to cumulative noise impacts in the vicinity of the Project. Once operational, the Project would not increase noise to levels that are greater than 65 dBA CNEL at sensitive receptors. Additionally, the Project design includes the installation of a vegetative barrier along the Project frontage between the site and the nearest residences and sensitive receptors as required by the implementation of **Mitigation Measure MM 4.1-3** (see Section 4.1, *Aesthetics*, for full mitigation measure text), further mitigating any incremental contribution of noise emissions. Based on the Traffic Study, by the horizon year of 2046, noise conditions with the Project would range from 59.0 to 74.7 dBA CNEL, whereas without the Project, noise would range from 58.6 to 74.7 dBA CNEL by 2046. It is expected that other projects would adhere to Kern County standards, MBGP Implementation Measure No. 4, and noise analysis measured in CNEL. As a result of noise monitoring and analysis, projects that would have the potential to increase above the standard, would be required to mitigate to levels that are acceptable. Therefore, the operational cumulative noise impact is less than significant.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.1-3**, (see Section 4.1**,** *Aesthetics*, for full mitigation measure text) and **MM 4.13-1** through **MM 4.13-4** would be required.

Level of Significance After Mitigation

Despite implementation of **Mitigation Measure MM 4.1-3**, (see Section 4.1, *Aesthetics*, for full mitigation measure text), and **MM 4.13-1** through **MM 4.13-4**, cumulative impacts would be significant and unavoidable for construction noise while operational noise impacts would be less than significant.

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Section 4.14

Population and Housing

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Section 4.14

Population and Housing

4.14.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the environmental setting and regulatory settings regarding population, employment, and housing. It also evaluates the impacts on population and housing that would result from the implementation of the proposed IPG Industrial Project (Project) and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the July 2024 Economic and Fiscal Impact Analysis prepared by the Natelson Dale Group, Inc. (Fiscal Study, Appendix L); the Metropolitan Bakersfield General Plan (MGBP); demographic information from the California Department of Finance (DOF) Population and Housing Estimates for Cities, Counties, and the State; and the U.S. Census Bureau. The California DOF and Census Bureau are key sources for the April 2024 Regional Growth Forecast and Demographic Forecast for Kern Council of Governments (Kern COG), 2024–2050 Growth Forecast Update.

4.14.2 Environmental Setting

Existing and Projected Population

Kern County is the third largest county in California with a total area of 8,161 square miles. Within the last decade, the population size in Kern County has grown by roughly 8%, and forecasts project more growth, although the growth has slowed. According to the latest U.S. Census Data (decennial census), the population size in 2020 was estimated to be 909,235 persons, an increase from 839,631 persons (Census 2024). The Regional Growth Forecasts provided by Kern COG project the population size to further grow to 954,199 persons by 2035, which would be a less than 1% increase between 2024 and 2035 (Kern COG 2024). By 2050, the population is projected to increase to 1.2 million people, which would be an annual rate increase of 0.4%.

Existing and Projected Housing

In 2020, Kern County's total housing supply was 301,009 housing units. In 2024, it was 310,784 housing units, which is an approximately 3.1% (9,775 units) increase in housing supply. Of the total units available in 2024, 290,847 were occupied, which is a vacancy rate of approximately 6.4%. The vacancy rate establishes the relationship between housing supply and demand, which indicates whether the County has adequate housing supply. A vacancy rate of 6% is somewhat higher than the state average and reflects a growing housing market (Kern COG 2024).

According to the U.S. Census Bureau, between 2017 and 2021, 58.3% of the housing units in Kern County were owner occupied (Department of Finance 2024). Housing units and occupancy/vacancy rate trends for 2020 through 2024 are reflected in **Table 4.14-1**.

Table 4.14-1: Kern County Housing Unit Trends

Area	Unit Count			Occupancy/Vacancy Rate		
	2020	2024	Change	Occupied 2020	Occupied 2024	Change
Incorporated	188,710	197,385	8,675/ 1.05%	180,479	188,811	8,332/ 1.05%
Balance of the County	112,299	113,399	1,100/ 1.01%	101,019	102,036	1,017/ 1.01%
Total	**301,009**	**310,784**	**9,775/ 2.06%**	**281,498**	**290,847**	**9,349/ 2.06%**

Source: Department of Finance 2024b

Existing and projected housing in the region (including incorporated cities), as reported by the Kern County Regional Transportation Plan/Sustainable Communities Strategy, are presented in **Table 4.14-2**. The total household growth in Metropolitan Bakersfield is expected to increase by 0.8%, totaling 1,594 households by the year 2046. Growth in unincorporated areas is expected to grow by 0.3%, with a total of 364 households in unincorporated Kern County.

Table 4.14-2: Census and Projected Household Trends in Kern County Communities and Unincorporated Areas

Community	Census		Forecast		Forecast Growth 2020-2046	
Year	2010	2020	2035	2046	Rate	Increase
Kern County	254,610	281,498	318,180	350,720	0.8%	2,267
Metro Bakersfield	176,000	187,362	209,000	229,200	0.8%	1,594
Arvin	4,228	4,753	5,500	5,900	0.8%	44
California City	4,102	4,628	4,900	5,200	0.4%	22
Delano	10,260	11,113	12,300	13,010	0.6%	72
Maricopa	414	372	380	390	0.2%	1
McFarland	2,599	3,345	3,500	4,000	0.7%	25
Ridgecrest	10,781	11,186	12,100	13,240	0.6%	78
Shafter	4,230	5,204	7,300	9,470	2.3%	162
Taft	2,254	2,379	2,700	2,960	0.8%	22
Tehachapi	3,121	3,526	4,100	4,450	1.0%	39
Wasco	5,131	6,109	6,800	7,330	0.7%	47
Unincorporated	**96,358**	**101,019**	**106,900**	**110,580**	**0.3%**	**364**

Existing and Projected Employment

According to the California Employment Development Department, the County consistently ranks among the top five most productive agricultural counties in the United States and is the 13th largest petroleum-producing county in the nation. Additionally, because of its unique geographic location, the County has also become a distribution location for some of the world's largest companies, with freight cargo going to and from the Ports of Los Angeles and Long Beach.

Between 2010 and 2023, the County's civilian labor force grew by 5.8% (372,200 and 393,700, respectively). The employed labor force grew by 15.5% between 2010 and 2023 (312,600 and 361,000, respectively) (State of California EDD 2024a). The Kern Economic Development Corporation (KEDC) projects that the fastest growing occupations within Kern County between 2018 and 2028 to be within the Education, Healthcare and Social Assistance industry and the Trade, Transportation and Utilities industry (KEDC 2023). Based on the KEDC 2023 Market Overview, industry employment in the County is projected to reach 382,900 by 2028, an increase of 9.4% over the 10-year period.

It is projected that the total number of jobs will continue to grow by the year 2050 in Kern County, including incorporated, unincorporated, and Metropolitan Bakersfield Area (Kern COG 2024). By 2050, the unincorporated areas will have an estimated 129,818 jobs available, and Metropolitan Bakersfield Area will have 269,961 jobs available. This represents a 12% growth from 2024 for unincorporated Kern County, and a 46% growth in jobs for Metropolitan Bakersfield Area.

While the number of people employed in Kern County is increasing, the unemployment rate remains high. As of June 2024, the number of individuals participating in the Kern County civilian labor force was 393,900; of these, 358,800 were employed while 35,200 were unemployed, for an unemployment rate of 8.9%. Kern County's 8.9% unemployment rate is significantly higher than the State of California's unemployment rate (5.3%), as well as the rate of unemployment for the U.S. (4.3%) (State of California EDD 2024a). Out of 58 counties, Kern County ranks 54th for its unemployment rate (State of California EDD 2024b).

According to the Kern COG Regional Housing Data Report, there were 1.10 jobs per housing unit for incorporated areas of Kern County in 2010. That ratio increased to 1.18 in 2013 and was projected to decrease to 1.03 by 2023. Similarly, the ratio of jobs to housing units in unincorporated areas of Kern County was expected to decrease from 1.13 (2013) to 0.83 (2023) (Kern COG 2024).

4.14.3 Regulatory Setting

Federal

There are no applicable federal regulations for this issue area.

State

California State law requires each city and county to adopt a general plan for future growth that contains at least seven mandatory elements, including a housing element, to qualify for allocation of State regional housing funding. To receive regional housing funds, the housing element, unlike other general plan elements, is required to be updated every five to eight years and is subject to detailed statutory requirements and mandatory review by the California Department of Housing and Community Development (HCD) (HCD 2022).

The HCD plays the critical role of reviewing every local government's housing element to determine whether it complies with State law and submitting written findings back to each local government. The HCD's approval is required before a local government can adopt its housing element as part of its overall General Plan. The option to use an eight-year schedule was created to better align with the schedule local governments (also known as "COGs" or metropolitan planning organizations) have to meet to update their Regional Transportation Plans. Regional Transportation Plans are updated every four years and are now mandated to align with housing plans in Regional Sustainable Communities Strategies.

California's housing element requirement acknowledges that, for the private market to adequately address the housing needs and demands of Californians, local governments must adopt plans and regulatory systems that provide opportunities for (and do not unduly constrain) housing development. As a result, housing policy in California rests largely on the effective implementation of local general plans and, particularly, local housing elements (HCD 2022).

Housing elements in general plans must identify housing needs for all economic segments. The plans must also provide opportunities for housing development to meet existing and projected housing needs, including a fair share of the regional housing needs. At the state level, the HCD estimates the relative share of California's projected population growth that could occur in each region of the State. These estimates are based on DOF population projections and historic growth trends. In areas where there is a regional Metropolitan Planning Organization or COG (as in Kern County), the HCD provides the regional housing need to the COG, which then assigns the fair share of the regional housing need to each of its cities and counties in the region. The process of assigning shares provides cities and counties the opportunity to comment on the proposed allocations. The HCD oversees the process to ensure that the COGs distribute their share of the State's projected housing need.

Before adopting an update to its housing element, the city or county must submit a draft to the HCD for review. The HCD advises the local jurisdiction as to whether its housing element complies with the provisions of California's Housing Element Law.

The COGs are required to assign regional housing shares to the cities and counties within their regions on a similar five-year schedule. At the beginning of each cycle, the HCD provides population projections to the COGs, which then allocate shares to their cities and counties. The shares of the regional need are allocated before the end of the cycle so that the cities and counties can amend their housing elements by the deadline.

Regional Housing Need Allocation Process

The Regional Housing Need Allocation (RHNA) is the State-mandated process for identifying the total number of housing units (by affordability level) that each jurisdiction must accommodate in its housing element of the general plan. As part of this process, the California Department of HCD identifies Statewide housing needs and assigns a jurisdiction a share, in a manner that is consistent with the development pattern included in the SCS of the 2014 RTP that was adopted in June 2014. This process was revised in 2008 with the approval of Senate Bill (SB) 375, which amended the RHNA schedule and methodology, requiring due dates for local governments updating their housing elements to be no later than 18 months from the date that Kern COG adopts the RTP, which occurred on June 19, 2014 (California Government Code Section 65584 et seq.). The RHNA for January 1, 2013, through December 31, 2023, was adopted June 19, 2014, as Appendix H of the 2014 RTP.

Senate Bill 375 Sustainable Communities Strategy

SB 375 (Chapter 728, Statutes of 2008) directs the California Air Resources Board to set regional targets for the reduction of greenhouse gas (GHG) emissions, in coordination with Assembly Bill (AB) 32, California's Global Warming Solutions Act of 2006. SB 375 is designed to enhance existing regional planning efforts by coordinating regional transportation planning with the RHNA to reduce GHG emissions from cars and light-duty trucks through the provision of incentivized land use strategies by willing local governments and development applicants. Under the SB 375 process, cities and counties maintain their existing authority over local planning and land use decisions.

Under SB 375, GHG reduction is addressed through the reduction of vehicle miles traveled by passenger vehicles and light-duty trucks through land-use strategies and improved transportation opportunities implemented by local governments. This is done by

(a) connecting regional land use planning to regional transportation planning

(b) coordinating regional housing needs

(c) providing incentives for local governments to implement regional plans through funding opportunities

(d) providing incentives to developers whose proposals are consistent with regional plans to receive streamlined California Environmental Quality Act (CEQA) processing.

SB 375 is implemented through the development of an SCS, which undertakes a planning program that sets forth a forecasted development pattern and GHG reduction policies and programs. These policies and programs are designed to reduce air emissions from passenger vehicles and light-duty trucks to help meet GHG reduction targets.

Local

2022 Regional Transportation Plan/Sustainable Communities Strategy

On July 21, 2022, the Kern COG adopted the 2022 RTP/SCS for the Kern region, including Chapter 4, the SCS, which implements Senate Bill (SB) 375, California's Sustainable Communities and Climate Protection Act. The SCS integrates transportation planning, greenhouse gas reductions from passenger vehicles and light-duty trucks, and regional housing needs with a forecasted development pattern that acknowledges the County's and incorporated cities' general plan programs.

Kern County General Plan

The Kern County General Plan (KCGP) is a policy document with planned land use maps and related information. It is designed to provide long-range guidance to County officials making decisions affecting development and the resources of unincorporated Kern County, excluding the Metropolitan Bakersfield planning area. The KCGP ensures that day-to-day decisions conform to long-range policies, which are designed to protect and further the public interest related to the County's growth and development.

Although the proposed IPG Industrial Project (the Project) site is located within the MBGP planning area, a discussion of the Kern County Housing Element of the KCGP is also included herein as it relates to the Project's potential impacts on population and housing.

Kern County General Plan Housing Element 2015–2023

The KCGP Housing Element covers the unincorporated portions of the County and the KCGP area. The housing element is one of the seven mandated elements of the local general plan. Housing element law, enacted in 1969, mandates that local governments adequately plan to meet the existing and projected housing needs of all economic segments of the community. The law acknowledges that, for the private market to adequately address housing needs and demand, local governments must adopt land use plans and regulatory systems that provide opportunities for, and do not unduly constrain, housing development.

As a result, housing policy in the State rests largely upon the effective implementation of local general plans, particularly local housing elements. Housing element law also requires the HCD to review local housing elements for compliance with State law and to report its written findings to the local government. The Kern County Housing Element was updated, as required by State law, and was adopted by the Kern County Board of Supervisors and approved by the State on April 26, 2016.

To receive regional housing funds, each jurisdiction must update its housing element every eight years. The housing element must incorporate policies and identify potential sites that would accommodate the County's fair share of the regional housing needs. The 6th Cycle Kern County Housing Element (2024-2031) is currently in review with the HCD for certification. Because the Project would not include new housing, the goals and policies of the Housing Element do not apply to the Project, but rather are used in this section of the Draft EIR to conceptualize growth projections.

Kern Council of Governments

Kern COG is an association of city and county governments created to address regional issues while protecting the integrity and autonomy of each jurisdiction. Its member agencies include Kern County and the 11 incorporated cities within Kern County.

The HCD provides each regional COG with its share of the Statewide housing need through the RHNA. As described above, future housing needs refer to the projected amount of housing a community is required to plan for during a specified planning period. The HCD provides this figure to regional COGs on a five-year schedule; COGs, in turn, are required by State law to determine the portion allocated to each jurisdiction within the region. This allocation process is known as the RHNA in the Kern COG region.

The RHNA determines housing needs with a special emphasis on ensuring adequate housing for persons in the very low-, low-, and moderate-income ranges. This assessment allows communities to anticipate growth so that they can grow in a way that enhances quality of life; improves access to jobs, transportation, and housing; and does not adversely affect the environment. Kern COG has determined that the total number of units needed in the County by 2031 is 57,650, as detailed in **Table 4.14-3**. For the unincorporated areas, 9,243 units, or 16.03% of the County total, are needed by 2031, as illustrated in **Table 4.14-4.**

Table 4.14-3: Total Adopted Regional Housing Needs Assessment by Income Category for Kern County

Income Category for Kern County	Number of Housing Units	Percent of Total Regional Housing Need Allocation
Very Low Income	14,658	25.4%
Low Income	9,328	16.2%
Moderate Income	9,299	16.1%
Above Moderate Income	24,365	42.3%
TOTAL	**57,650**	**100%**

Source: Kern COG 2022.

Table 4.14-4: Adopted Regional Housing Needs Assessment by Income Category for Unincorporated Areas

Income Category for Kern County	Number of Housing Units	Percent of Total Regional Housing Need Allocation
Very Low Income	3,599	6.24%
Low Income		
Moderate Income	5,643	9.79%
Above Moderate Income		
TOTAL	**9,2423**	**16.03%**

Source: Kern COG 2022.

Metropolitan Bakersfield General Plan

The City of Bakersfield is the largest incorporated area in Kern County. Bakersfield is the county seat and the focus of much of the business activity in the County. Accordingly, Kern County and the City of Bakersfield have separately adopted a coordinated general plan for the metropolitan area (Metropolitan Bakersfield General Plan) that provides further information on planned land uses, policies, and implementation programs for the unincorporated portions of the metropolitan plan area. The 409 square miles of the plan area are also part of the City of Bakersfield's adopted Sphere of Influence. The policies, goals, and implementation measures in the MBGP for population and housing applicable to the Project are provided below.

The MBGP is a policy document with planned land use maps and related information. It is designed to provide long-range guidance to County officials making decisions affecting development and the resources of unincorporated areas within the Metropolitan Bakersfield sphere of influence. The MBGP helps to ensure that day-to-day decisions conform to long-range policies designed to protect and further the public interest related to the County's growth and development.

The Land Use Element of the MBGP achieves planned growth through two basic principles that govern the plan: the focusing of new development into distinctive centers which are separated by low land use densities and the siting of development to take advantage of the environmental setting. These principles are defined as the "centers" and "resource" concepts, respectively. Per the MBGP, the "centers" concept provides for a land use pattern consisting of several concentrated mixed-use commercial and high-density residential centers surrounded by medium density residential uses. Centers may be differentiated by functional activity, density/intensity, and physical character. Single-family residential uses are primarily located between these mixed-use commercial/residential centers.

Chapter II: Land Use Element

Goals

Goal 1: Accommodate new development which captures the economic demands generated by the marketplace and establishes Bakersfield's role as the capital of the southern San Joaquin valley.

Goal 2: Accommodate new development which provides a full mix of uses to support its population.

Goal 3: Accommodate new development which is compatible with and complements existing land uses.

Goal 4: Accommodate new development which channels land uses in a phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.

Industrial Development

Policies

Policy 31: Allow for a variety of industrial uses, including land-extensive mineral extraction and processing, heavy manufacturing, light manufacturing, warehousing and distribution, transportation-related, research and development.

Policy 34: Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors.

Policy 35: Encourage upgrading of visual character of heavy manufacturing industrial areas through the use of landscaping or screening-of visually unattractive buildings and storage areas.

Policy 36: Require that industrial uses provide design features such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration.

Policy 37: Street frontages along all new industrial development shall be landscaped.

Policy 38: Minimize impacts of industrial traffic on adjacent residential parcels through the use of site plan review and improvement standards.

4.14.4 Impacts and Mitigation Measures

This section describes the methodology used in conducting the CEQA impact analysis for population and housing; the thresholds of significance used in assessing impacts to population and housing; and the assessment of impacts on population and housing, including relevant mitigation measures, where applicable.

Methodology

The potential impacts on population growth and housing associated with the Project were evaluated on a qualitative basis. Population, housing, and employment in the Project area were evaluated by reviewing the most current data available from the U.S. Census Bureau, DOF, California Employment Development Department, KCGP, the Kern Economic Development Strategy, and the Kern COG. Using these resources and professional judgment, impacts were analyzed according to the CEQA significance criteria described below.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, state that a Project would have a significant impact on population and housing if it would:

- Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through the extension of roads or other infrastructure).
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

Project Impacts

Impact 4.14-1: The project would induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).

The Project would require both a temporary construction workforce and a permanent operational workforce. The Project would generate direct jobs, where employees would report directly to the Project site for either construction of the Project, or to assist in the day-to-day operations of the warehouse facility. As described in Chapter 3, *Project Description*, the Project's primary function would be to facilitate the handling of goods and materials. This production would encourage job growth where the jobs would support the primary function of the Project, and would thereby create approximately indirect jobs, where employees would be associated with the goods and materials associated with the facility. Furthermore, the Project would encourage consumer spending of goods

and services (e.g., retail purchases, local services) from employees associated with the Project, which is referred to as induced jobs.

The Project would generate a temporary workforce during construction of the project, which would last approximately 24 months. The number of onsite construction workers would result in 503 direct jobs, which would largely depend on the specific phase of construction. It is anticipated that, during construction, the project would create a total of 46 indirect jobs and 122 induced jobs, for a total of 671 jobs during construction phase, according to the Fiscal Analysis Report (Appendix L). Construction workers are likely to commute to the Project site from various local communities and not relocate to the area. Additionally, **Mitigation Measure (MM) 4.15-2**, as included in Section 4.15, *Public Services*, would encourage a 50% local workforce for construction, reducing the number of workers commuting into the area for work. If temporary housing should be necessary, it is expected that accommodations would be available in the nearby hotels. Given that the increase in employment during construction phase of the Project is temporary, the short-term direct employment of construction workers on-site would not result in the building of new residences.

The Land Use Element of the MBGP (unincorporated planning area) embraces a "centers" concept, which are differentiated by functional activity, density/intensity, and physical character. The Project site is located within an identified center, and is surrounded by medium density residential, as well as low-density. These single-family residential uses are located throughout the planning area between the planned centers, which encourages people to live and work in the same area. Once constructed, the Project would create 437 direct jobs, 74 indirect jobs, and 85 induced jobs, for a total of 596 jobs that would need to be filled. The Project supports this intensified growth and is surrounded by residential development to support the operations of the Project, as identified by the MBGP.

While the Project would encourage substantial job growth in vicinity of the Project, this growth is encouraged and planned for, per the MBGP "centers" concept. The MBGP has designated zones within the planning area to facilitate growth within these identified centers, which are supported by surrounding medium- and low-density residential neighborhoods. This land use pattern has been considered in the adoption of the MBGP, in which the Project is consistent with the land use designation (Light Industrial) within this center. Therefore, impacts associated with population growth and housing resulting from operation of the Project are in conformance with the planned growth identified in the MBGP, and impacts are considered less than significant. Additionally, impacts would be further reduced with the implementation of **Mitigation Measure MM 4.15-2**, as included in Section 4.15, *Public Services*, which would encourage all contractors of the Project site to hire at least 50% of their workers from local Kern County communities.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.15-2** (see Section 4.15, *Public Services*) would be required.

Level of Significance After Mitigation

With the implementation of **Mitigation Measure MM 4.15-2,** impacts would be less than significant after mitigation.

Impact 4.14-2: The project would displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.

The Project would not displace substantial numbers of existing people or housing because the Project site is undeveloped and located within an industrially designated area surrounded by similar industrial- and commercial-type development, with the exception of existing residential neighborhoods located entirely east of the site across Airport Drive. Further, the Project would not require the extension of roadways, utilities, or other infrastructure off-site that would result in the loss of existing housing or displacement of people. Therefore, the Project would not displace or require the removal of substantial numbers of existing people or housing, which would necessitate the construction of replacement housing elsewhere, and no impact would occur.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

No impact would occur.

4.14.5 Cumulative Setting Impacts and Mitigation Measures

Cumulative Setting

Cumulative impacts are two or more individual impacts that, when considered together, are considerable, that compound, or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects located in the vicinity of the Project site. The geographic scope for cumulative impacts to population and housing consists of a 6-mile buffer around the Project site, as viewed in Chapter 3, *Project Description*, **Figure 3-15**.

These 29 projects may have the potential to induce population growth. However, it is likely they would be able to be staffed by the existing regional workforce within Kern County, as cumulative projects would be required to address potential environmental impacts as part of their individual project review. To this extent, and as noted in Section 4.14.2, the unemployment rate in Kern County remains higher than state and nation averages, at nearly 9% in 2024. Projections also indicate the population will continue to grow to 1.2 million people by 2050. Job availability from this Project and combined projects would potentially reduce the unemployment rate and support planned growth in population in Kern County and surrounding communities.

The Land Use Element of the MBGP (unincorporated planning area) anticipates the northeast Bakersfield area will experience significant growth, based on their "centers" concept, in which this Project and several other reasonably foreseeable projects are located. According to the Kern County Housing Element, projections indicate that the unincorporated population will increase by 15.5% and the housing supply would increase by 23% from 2013 to 2023 (Kern County 2015-2023 Housing Element 2015). Because the Project is in conformance with the MBGP land use designation, and thereby planned growth, the Project would not contribute to unplanned growth, either directly, indirectly, or induced. Similarity, cumulative projects would be required to address potential environmental impacts as part of their individual project review. Together, these projects would facilitate the planned and anticipated growth as projected.

Additionally, temporary impacts would be further reduced with the implementation of **Mitigation Measure MM 4.15-2**, as included in Section 4.15, *Public Services*, which would encourage all contractors of the Project site to hire at least 50% of their workers from local Kern County communities. This would ensure a workforce hired from within Kern County communities and reduces likelihood of workers commuting or relocating from outside Kern County for jobs and population growth.

Because the Project, combined with other projects, would support the anticipated growth in outlined in the MBGP, the Project would result in less than significant cumulatively considerable impacts to population and housing.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.15-2** (see Section 4.15, *Public Services* for full mitigation measure text) would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.15-2,** cumulative impacts would be less than significant after mitigation.

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Section 4.15

Public Services

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Section 4.15

Public Services

4.15.1 Introduction

This section of the proposed Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding public services, which include the fire department and law enforcement, schools, parks, and other public facilities. It also evaluates potential impacts on public services that would result from implementation of the proposed IPG Industrial Project (Project), and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by multiple online sources and published documents, as cited herein. For impacts to parks and other recreational facilities, please refer to Section 4.16, *Recreation*.

4.15.2 Environmental Setting

Kern County (County) is geographically California's third largest county, encompassing 8,161 square miles at the southern end of the Central Valley. The regional area for the proposed IPG Industrial Project (the Project) is bounded by Kings and Tulare Counties to the north, Santa Barbara and San Luis Obispo Counties to the west, the Tehachapi Mountains and the Sierra Nevada Mountains to the east, and the northern boundary of the Los Padres National Forest to the south.

Fire Protection

Fire protection in Kern County is a cooperative effort. The Kern County Fire Department (KCFD) provides firefighting services to many cities throughout the County. In addition, operating agreements with the U.S. Forest Service, U.S. Department of the Interior, Bureau of Land Management, U.S. Fish and Wildlife Service, and the California Department of Forestry and Fire Protection (CAL FIRE) also provide wildland fire protection within the County.

According to the KCFD's 2021 Strategic Fire Plan, the Project site is within Battalion 6, which is predominantly designated as a Local Responsibility Area (LRA) to the south and east sides of Bakersfield. There are some State Responsibility areas (SRAs) in the eastern portion of the battalion that adjoins the Sequoia National Forest; however, the Project site is not located within an SRA. According to the 2007 CAL FIRE, Kern County Fire Hazard Severity Zones Maps for the LRAs, the Project site is classified as LRA Unzoned. An Unzoned designation indicates that the area is urbanized and not susceptible to wildland conflagrations.

The Project site is within an LRA where Kern County is responsible for providing fire protection, so it would be served by the nearest KCFD fire station to the site. This station would be the primary responder to a fire or emergency at the proposed Project site; however, in the event of a major incident, other nearby stations would be called on to respond as necessary.

Fire Station No. 63 (Highland), located at 101 Universe Avenue, is approximately 1 mile southeast of the Project site and would be the primary responder to a fire or other emergency at the Project site. In the event of a major fire, or when the station is short-staffed, other stations would be called on to respond as necessary, including Fire Station No. 64 (Riverview), located at 101 E. Roberts Lane, and Fire Station No. 61 (Norris), located at 6400 Fruitvale Avenue. The average response time for the KCFD is 8.4 minutes (CPSM 2019). Information on the four closest fire stations to the Project site is included in **Table 4.15-1**.

Table 4.15.1: List of Nearby Fire Stations

Agency	Facility	Address	Approximate Distance from Project Site
KCFD	Station No. 63	101 Universe Ave., Bakersfield, CA 93308	1.0 mile southeast
KCFD	Station No. 64	101 E. Roberts Ln., Bakersfield, CA 93308	2.32 miles southeast
KCFD	Station No. 61	6400 Fruitvale Ave., Bakersfield, CA 93308	2.43 miles southwest

Key:
KCFD = Kern County Fire Department

The Kern County Fiscal Year 2023–2024 Recommended Budget of the Fire Department is approximately $216,183,498, which is a 19.46% increase from the fiscal year 2022–2023 adopted appropriations (Kern County 2023). The 2023–2024 Recommended Budget continues to make funding of the Fire Department a top priority in Kern County.

Kern County has 14 mutual-aid agreements with neighboring fire suppression organizations to further strengthen emergency services (KCFD 2024). The KCFD has a mutual aid agreement with the Los Angeles County Fire Department (LACFD) in the event that KCFD is unable to be the primary responder to an emergency. The LACFD has 177 fire stations throughout Los Angeles County. The LACFD is divided into 22 battalions with over 4,947 personnel. The nearest LACFD fire station to the Project site is Station No. 77, located at 46833 Peace Valley Road, Gorman, approximately 50 miles south of the Project site (LACFD 2024).

Emergency Services

The Kern County Emergency Medical Services Division (EMS) is the lead agency for the emergency medical services system in Kern County. It is responsible for coordinating all system participants in the County, which include the public, fire departments, ambulance companies, other emergency service providers, hospitals, and Emergency Medical Technician (EMT) training programs throughout the County. The EMS includes a system of services organized to provide rapid response to serious medical emergencies, including immediate medical care and patient transport to a hospital setting. EMS covers day-to-day emergencies, disaster medical response planning and preparation, and preventative health care. The department also provides certification and re-certification for EMTs, paramedics, specialized nurses, and specialized dispatchers. (Kern County Public Health Services Department 2024). The nearest hospitals are the Dignity Health – Memorial Hospital, located at 420 34th Street approximately 3 miles southeast of the Project site,

and the Adventist Health Bakersfield, located at 2615 Chester Avenue approximately 3.3 miles south of the Project site.

Law Enforcement Protection

Kern County Sheriff's Department

The Kern County Sheriff's Office (KCSO) provides basic law enforcement services in the unincorporated areas of the County, which includes the Project area. The KCSO enforces local, State, and federal laws. It is also responsible for crime prevention, field patrol (ground and air), crime investigation, the apprehension of offenders, regulation of noncriminal activity, and related support services such as, patrolling off-highway vehicle recreation areas in the desert and mountainous areas of the County. Traffic and parking control functions are also provided, along with some investigations of property damage reports and traffic accidents. Complete investigations are conducted for accidents such as those involving injury or fatalities, intoxication-related accidents, and hit and run accidents.

The Kern County Sheriff is the County's chief law enforcement officer. The KCSO has 1,202 sworn and civilian employees. There are 567 authorized deputy sheriff positions deployed in patrol, substation, detective, courts services, and special investigations units (KCSO 2024a). The Kern County Sherriff's headquarters is in Bakersfield and consists of 15 substations that provide patrol services to remote areas of Kern County, such as the desert and mountainous regions, as well as other areas that need law enforcement services. The Kern County Sheriff's Office is located at 1350 Norris Road, approximately 1.3 miles southwest of the Project site. The East Bakersfield Substation is located at 1726-1798 Flower Street, approximately 5.3 miles southeast of the Project site. Other substations near the Project site include the Mojave Substation, Tehachapi Substation, and Boron Substation. Information on the four closest substations to the Project site is included in **Table 4.15.2**.

Table 4.15.2: List of Nearby Sheriff Substations

Agency	Facility	Address	Approximate Distance from Project Site
KCSO	Lamont Substation	12022 Main St. Lamont, CA 93241	15 miles southeast
KCSO	Wasco Substation	748 F St. Wasco, CA. 93215	19 miles northwest
KCSO	North Area Substation	181 East First Buttonwillow, CA 93206	24 miles west
KCSO	Delano Substation	455 Lexington St Delano, CA 93215	24 miles north

Key:
KCSO = Kern County Sheriff's Office

The KCSO strives to respond to calls as quickly as possible. Life-threatening calls are given priority. Response time is defined as the time required to respond to a call for service, measured from the time a call is received until the time a patrol car arrives at the scene. Response times naturally vary depending on the severity of the call, available staff, and location of a patrol car. Average response time for the KCSO is 5 minutes or less for an emergency or immediate-response incident (e.g., a crime that is in progress and/or a life-or-death situation) and 8 to 10 minutes for routine calls (e.g., a crime that has already occurred and/or an incident that is not life-threatening).

Response time to an emergency at or near the Project site would vary depending on the level of demand at the substation at the time of the call. If demand is high, the response time would be longer than the average times given above. The response time for a nonemergency call could be 8 minutes or more, depending on staffing and the number of other calls for service. In some areas, response may not occur at all for nonemergency calls due to funding deficiencies.

The Kern County Fiscal Year 2023–2024 Recommended Budget (Kern County 2023) shows a $10,839,934, or 17%, decrease in the County's General Fund from Fiscal Year 2022–2023. The 2023–2024 Recommended Budget continues to make funding of the Sheriff's Department, District Attorney's Office, the Public Defender's Office, the Probation Department, and the Fire Department a top priority.

California Highway Patrol

The California Highway Patrol (CHP) provides traffic regulation enforcement, oversees responses to emergency incidents on California's highways (or assists other public agencies responding to emergency incidents), and promotes the safe and efficient movement of people and goods on California highways to minimize injuries, property damage, and loss of life. CHP officers patrol state highways and implement the CHP's other law enforcement activities (e.g., drug interception, vehicle theft investigation and prevention, vehicle inspections, accident investigations, and public awareness campaigns), with the support of the non-uniformed personnel assigned to area and division offices.

The CHP has eight divisions that provide services throughout California. Kern County is in both the Central and Inland Division service areas. The Project site is in the Central Division service area. The nearest Central Division office to the Project site is at 9855 Compagnoni Street in Bakersfield, approximately 12.1 miles south of the Project site (CHP 2024).

Schools/Parks/Other Public Facilities

The Project site is located within the Beardsley School District, which consists of Beardsley Elementary School, San Lauren Elementary School, North Beardsley School, and Beardsley Junior High School. Other school districts located in the vicinity include Standard School District, Bakersfield City School District, and Norris School District (Kern County Superintendent of Schools 2021). The closest school to the Project site is Wingland Elementary School, located approximately 0.9 miles south of the Project site.

Parks

The Kern County Parks & Recreation Department manages an extensive system of large regional parks designed to serve the entire countywide population, and small neighborhood and community parks intended primarily to meet the recreational needs of nearby residents in unincorporated communities. Kern County Parks & Recreation manages eight regional parks, 40 neighborhood parks, and 25 public buildings, supervises three golf courses, and landscapes 76 county buildings (Kern County Parks & Recreation 2024). There are no parks or trails within Project site boundaries.

The Project site is also within the boundaries of the North of the River (NOR) Recreation and Park District. NOR Recreation and Park District's mission is to provide recreation programs and facilities for the benefit of the NOR community. The community is 215 square miles in size, with a population of approximately 153,000 residents, and encompasses five school districts. There are 24 park sites, totaling 269.8 developed acres, within the NOR Recreation and Park District service boundaries. The major sources of revenues for the NOR Recreation and Park District are property taxes, program fees, and grants.

Other Public Facilities

Other public facilities include library facilities, post office facilities, and courthouses. The Kern County Library has 24 branches and 2 mobile libraries, which serve 850,000 residents within the County, including incorporated municipalities (Kern County Library 2023). Additionally, there are currently 46 post offices that serve the County (Postal Locations 2024). Furthermore, there are currently 11 facilities that serve the Superior Court of California in Kern County (Superior Court of California 2024).

The Kern County Fiscal Year 2023–2024 preliminary recommended budget shows an increase in funding for libraries and parks (Kern County 2023).

4.15.3 Regulatory Setting

Federal

No federal regulations, plans, or public service standards applicable to the Project have been identified.

State

California Fire Code

The 2022 California Fire Code (Title 24, Part 9 of the California Code of Regulations) establishes the minimum requirements—consistent with nationally recognized good practices—to safeguard public health, safety, and general welfare from the hazards of fire, explosion, or dangerous conditions in new and existing buildings, structures and premises, and to provide safety and assistance to fire fighters and emergency responders during emergency operation. Chapter 6

(Building Services and Systems) of the Code focuses on building systems and services, as they relate to potential safety hazards, and when and how they should be installed. Building services and systems are addressed include emergency and standby power systems, electrical equipment, wiring and hazards, and stationary storage battery systems. Chapter 33 (Fire Safety During Construction and Demolition) of the Code outlines general fire safety precautions to maintain required levels of fire protection, limit fire spread, establish the appropriate operation of equipment, and promote prompt response to fire emergencies. Features regulated include fire protection systems, fire fighter access to the site and building, means of egress, and the storage and use of hazardous materials, temporary heating equipment and other ignition sources.

The California Department of Forestry and Fire Protection

In addition to wildland fires, CAL FIRE's planning efforts involve responding to other types of emergencies that may occur daily, including residential or commercial structure fires, automobile accidents, heart attacks, drowning victims, lost hikers, hazardous material spills on highways, train wrecks, floods, and earthquakes.

Under Title 24, Regulations Development, the Office of the State Fire Marshal is responsible for promulgating regulations that promote fire and life safety for inclusion into the State Building Codes, including the California Building Code, California Fire Code, California Electrical Code, California Mechanical Code, California Plumbing Code, and California Historical Building Code. These documents are also referred to as California Code of Regulations, Title 24. The process incorporates a great deal of public participation and is guided by the State Building Standards Law.

Local

Metropolitan Bakersfield General Plan

Bakersfield is the largest incorporated area in Kern County. Bakersfield is the County Seat and the focus of much of the business activity in the County. Accordingly, Kern County and the City of Bakersfield have jointly adopted a general plan for the metropolitan area (Metropolitan Bakersfield General Plan [MBGP]) that provides further information on planned land uses, policies, and implementation programs for the unincorporated portions of the metropolitan planning area. The Project is located within the MBGP area; therefore, it would be subject to applicable policies and measures of the MBGP. The Land Use, Safety, Public Services and Facilities and Parks Elements of the MBGP include goals, policies, and implementation measures related to public services that apply to the Project, as described below.

Chapter II. Land Use Element

Policies

Policy 50. Coordinate with the appropriate agencies so that adequate land and facilities are set aside for schools, parks, police/fire, libraries, cultural facilities, recreational facilities and other service uses to serve the community.

Policy 54. The developer shall be responsible for all on-site costs incurred as a result of the proposed Project, in addition to a proportional share of off-site costs incurred in service extension or improvements. The availability of public or private services or resources shall be evaluated during discretionary project consideration. Availability may affect project approval or result in a reduction in size, density, or intensity otherwise indicated in the general plan's map provisions.

Policy 6. The County will ensure adequate fire protection to all Kern County residents.

Policy 7. The County will ensure adequate police protection to all Kern County residents.

Chapter VIII. Safety Element

Public Safety

Goals

Goal 2. Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development of metropolitan police and fire facilities and services.

Policies

Policy 1. Identify future site locations, projected facility expansions, projected site acquisition costs, construction costs and operational costs in a manner that would maximize the efficiency of new public safety services.

Policy 2. Require discretionary projects to assess impacts on police and fire services and facilities.

Chapter X. Public Services and Facilities Element

General Utility Services

Policies

Policy 5. Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent.

Chapter XI. Parks Element

Goals

Goal 2. Supply neighborhood parks at a minimum of 2.5 acres per 1,000 persons throughout the plan area.

Goal 3. Provide four acres of park and recreation space for each 1,000 persons (based on the most recent census) for general regional recreation opportunity as a minimum standard. Parks and recreational space includes mini-parks, neighborhood parks, community parks and regional parks.

Goal 7. Require that the costs of park and recreation facilities and programs are borne by those who benefit from and contribute to additional demand.

Policies

Policy 1. Require that neighborhood parks be developed at a minimum rate of 2.5 acres per 1,000 population. This requirement may be met all or in part by on-site recreation for such developments as Planned Unit Developments. The City of Bakersfield may allow credit to meet the neighborhood parks requirement.

Policy 3. Require all developers to dedicate land, provide improvements and/or in lieu fees to serve the needs of the population in newly developing areas.

Kern County Multi-Jurisdiction Hazard Mitigation Plan

The purpose of the multi-hazard mitigation plan is to reduce or eliminate the long-term risk to people and property from natural hazards and their effects in the County. The 2019–2020 Update to the Plan aims to help Kern County become less vulnerable to losses from future disasters. Hazard mitigation is the use of sustained, long-term actions to reduce the loss of life, personal injury, and property damage that can result from a disaster. The multi-jurisdictional plan includes the County and the incorporated municipalities of Arvin, Bakersfield, California City, Delano, Maricopa, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco. The County also encompasses areas of land controlled by federal and State land management agencies, including the CAL FIRE, the Bureau of Land Management, and the Bureau of Reclamation. While other levels of government have jurisdiction in these parts of the County, the Hazard Mitigation Plan could also be used to document and coordinate mitigation efforts among federal, State, and local jurisdictions. This plan also covers 49 special districts that include school, airport, community service, water, park and recreation, sanitation, and other districts (KCFD 2020).

Among the items assessed, the plan evaluates the risks associated with seismic events, dam failure, severe weather, and wildfire. The plan also provides an inventory of critical facilities, which have the potential to cause disruption of vital socioeconomic activities if they are destroyed, damaged, or functionally impaired. These include police stations, fire stations, hospitals, elder care facilities, day care facilities, buildings containing hazardous materials, schools, transportation infrastructure, utilities, and government buildings.

Kern County Fire Code

Kern County applies and utilizes the National Fire Code set forth by the National Fire Protection Association, the California Fire Code, the California Building Code, and Chapter 17.32 of the Kern County Code of Building Regulations (Fire Code) to regulate fire safety.

Kern County has adopted, by reference, portions of the California Building Standards Code and the Uniform Fire Code, with modifications and amendments, in Chapter 17.32. The purpose of this code is to prescribe the minimum requirements necessary to establish a reasonable level of fire

safety to protect life and property from hazards created by fire, explosion, and dangerous conditions.

The Kern County Fire Code defines a hazardous fire area as any land that is covered with grass, grain, brush, or forest and situated so that a fire originating upon such land would present an abnormally difficult job of suppression, such as an inaccessible location, and would result in great and unusual damage through fire or the resulting erosion.

Kern County Fire Department Strategic Fire Plan

The KCFD's 2021 Strategic Fire Plan was developed collaboratively between federal, State, city, and County agencies to identify and prioritize pre-fire and post-fire management strategies and tactics meant to reduce the loss of values at risk within the department. Similar to other plans, this document includes stakeholder contributions and priorities and identifies strategic targets for pre-fire solutions, as defined by people who are familiar with local fire behavior and risk. The plan is designed to be an assessment and planning tool only, and it is the responsibility of those implementing the projects to ensure that all environmental compliance and permitting processes are met, as necessary. The plan gives an overview of KCFD Battalions and ranks these areas in terms of priority needs, as well as identifies the SRA. According to the plan, 69% of Kern County is within an SRA. The County is broken up into six different fuel management areas: Tehachapi, Western Kern, Northern Kern, Mount Pinos Communities, Kern River Valley, and the Valley. (KCFD 2022).

Kern County Community Wildfire Protection Plan

The Kern County Community Wildfire Protection Plan (CWPP) was developed in response to the federal Healthy Forests Restoration Act. The CWPP was adopted in March 2022. It addresses hazards and risks of wildland fire throughout the County and makes recommendations for fuel reduction projects, public outreach and education, structural ignitability reduction, and fire response capabilities. The goal of the CWPP is to enable local communities to improve their wildfire-mitigation capacity, identify high fire-risk areas, and prioritize areas for mitigation, fire suppression, and emergency preparedness. The CWPP enhances public awareness by helping residents better understand the natural- and human-caused risk of wildland fires (SWCA 2022).

Kern County Emergency Operations Plan

The Kern County Emergency Operations Plan (EOP), adopted May 1, 2022, is an all-hazards document that facilitates the integration and coordination of planning efforts of the County with those of its cities, special districts, and the State region. The purpose of the EOP is to provide the basis for a coordinated response before, during, and after a disaster affecting the County or other jurisdictions in the EOP's Operational Area. The EOP establishes policies, stipulates an emergency management organization, and assigns roles and responsibilities to ensure the effective management of emergency operations. The EOP also identifies sources of external support which might be provided through mutual aid and specific statutory authorities by other jurisdictions, State and federal agencies, and the private sector (County OES 2022).

4.15.4 Impacts and Mitigation Measures

Methodology

The methodology used to evaluate potential public services impacts includes the following:

(1) evaluation of existing fire and police services and personnel for the fire and law enforcement stations serving the Project site

(2) determination of whether the existing fire and law enforcement services and personnel are capable of servicing the Project, in addition to the existing population and building stock

(3) determining whether the Project's contribution to the future service population would cause fire or police station(s) to operate beyond service capacity.

The determination of the significance of the Project on public services considers the ability of the service providers to provide and maintain acceptable levels of service, which in turn would require the construction of new or expansion of existing facilities. The methodology for this analysis included a review of published information pertaining to KCFD and KCSO.

Thresholds of Significance

The Kern County California Environmental Quality Act (CEQA) Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant adverse effect on public services.

A project could have a significant adverse effect on public services if it would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:
  - Fire Protection
  - Police Protection
  - Schools
  - Parks
  - Other Public Facilities

Project Impacts

Impact 4.15-1: The Project would result in the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection services or police protection services.

Fire Protection

Construction

The on-site construction workforce would consist of up to 503 full-time equivalent jobs; however, the average daily workforce would vary depending upon the stage in construction. It is anticipated that the construction workforce would commute to the Project site each day from local communities and report to the designated construction staging yards prior to the beginning of each workday.

During construction of the Project, service demands as a result of added personnel on-site would occur. Typically, service demands per employee are less than service demands per resident. Nevertheless, the addition of construction personnel on the Project site could result in an increase in demand for fire protection services. While this would be an increase above existing levels, the presence of construction workers on the site would be temporary, as the construction period for the Project would last approximately 24 months. Therefore, it would not substantially increase the service demand for fire protection services in Kern County. Furthermore, the Project would implement **Mitigation Measure (MM) 4.9-11** (see Section 4.9, *Hazards and Hazardous Materials* for full mitigation measure text), which requires the development and implementation of a Fire Safety Plan. This plan ensures that procedures and emergency fire precautions are implemented. The Fire Safety Plan would be for use during the construction period and would include emergency fire precautions for vehicles and equipment, as well as implementing fire rules and trainings so temporary employees are equipped to support handling fire threats.

Additionally, in accordance with **MM 4.15-1**, the IPG Kern County 52 Holdings, LLC (Project proponent) would work with the County to determine how the use of sales and use taxes from construction of the Project can be maximized to support public facilities in the County. **MM 4.15-2** would require the Project proponent to submit a letter detailing the hiring efforts prior to commencement of construction, which encourages all contractors of the Project site to hire at least 50% of their workers from local Kern County communities. This would minimize potential impacts due to an increase in fire service demands from temporary workers. No new or physically altered KCFD or CAL FIRE facilities would be required to accommodate the proposed Project during construction, and no significant environmental impacts would result. Therefore, construction-related impacts would be less than significant.

Operation

The proposed Project would include the development of a 923,130 square foot two-story warehouse distribution facility and associated improvements on approximately 49.05 acres. The facility would employ approximately 437 employees over the course of three shifts. Therefore, implementation of the proposed Project would potentially increase the demand for existing fire and emergency services.

The proposed Project's primary function would be a high cube transload warehouse storage to facilitate material handling equipment, storage and logistics uses, with up to 20% of the facility used for cold storage. The warehouses would serve trucks exclusively and would require truck doors of various types. Interior warehouse design would be subject to tenant improvements to accommodate specialized storage, handling and distribution for varied goods and materials used in commerce, including but not limited to finished products, consumer goods, parts, materials, tires, and tools typically found in a modern distribution/logistics facility consistent with M-1 PD-H Zone District.

Any modification to the interior of the building (i.e., tenant improvements) will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (e.g., Building Code, Fire Code, Plumbing Code, etc.). Outdoor storage is not proposed as part of this Project. It is possible that certain goods and products allowed by the Zone District would require fire protection measures for warehousing and distribution from the Project site. This includes additional coordination with the Fire Department for tire storage and distribution, which would be coordinated through the tenant improvement approval process.

All uses permitted in the Project will be required to comply with the application sections of the Fire Code (and all codes) prior to the issuance of a building permit for those tenant improvements. Fire protection requirements are based on the number of residents and workers in the KCFD primary service areas. Service demand is primarily tied to population, not building size, because emergency medical calls are typically the majority of responses provided by the fire department. As the number of residents and workers increases, so does the number of emergency medical calls. There are no residential uses proposed as a part of the Project. Therefore, no residents would occupy the Project site, and an increase in service demands as a result of an increase in residential uses would not occur.

Furthermore, the Project would be in conformance with the MBGP land use designation and county zoning classification for the site. Therefore, buildout of the industrial uses at this location would have already been accounted for in County's long-range projections for demands on fire and emergency services.

The potential increase in demand for fire and emergency services would be mitigated through preparation of a Fire Safety Plan, implemented per **MM 4.9-11** (see Section 4.9, *Hazards* and Hazardous Materials for full mitigation measure text) and would help reduce fire risks onsite. In addition, all Project facilities would be designed and constructed in accordance with the 2022 California Fire Code and Kern County Fire Code, such that fire hazards are reduced and/or avoided,

and the facilities would be required to have a fire rating in conformance with County and California Building Code standards. Therefore, with implementation of **MM 4.9-11**, **MM 4.15-1** and **MM 4.15-2**, the proposed Project would not result in the need for new or physically altered KCFD facilities, and significant environmental impacts would not result. Impacts would be less than significant.

Law Enforcement Protection

Construction

As described above in Section 4.15.2, *Environmental Setting*, the KCSO provides primary law enforcement protection services for the Project site and surrounding areas. The Kern County Sheriff's Office is located at 1350 Norris Road, approximately 0.66 miles southwest of the Project site. The East Bakersfield Substation is located at 1726-1798 Flower Street, approximately 5.3 miles southeast of the Project site. The need for police protection services would potentially increase during construction of the proposed Project, similar to fire protection services.

The Project site is in a relatively urban location surrounded by a variety of uses. Due to the nature of the Project, it may attract vandals or present other security risks that would make Project facilities susceptible to crime. Fences would be installed around the perimeter of the proposed Project area to help reduce unauthorized access for safety and security purposes, and temporary pole lighting would also be used. All fencing shall comply with applicable requirements of the Kern County Public Works Department/Building Inspection Division. Thus, a substantial increase in demand for law enforcement services is not expected.

Construction activities may temporarily increase traffic volumes along Airport Drive and Merle Haggard Drive. The added traffic associated with workers commuting to the Project site, haul routes, deliveries, and other Project-related traffic would be temporary; therefore, would it not have a significant adverse effect on the KCSO protective service provision or CHP's ability to patrol the highways.

While construction of the Project would increase the number of people on the Project site, the increase would be temporary, would not substantially increase the service demand for law enforcement protection services in Kern County, and would not result in the need for new facilities. Therefore, new or physically altered KCSO facilities would not be required to accommodate the proposed Project, and significant environmental impacts are not anticipated. Impacts would be less than significant.

Operation

Project operation could attract vandals or present other security risks. As described above, Project facilities could be susceptible to crime due to the nature of the proposed Project as a warehouse and distribution facility. Project site security features would include an 8-foot metal fence enclosing the entire developed area, with 8' sliding fence and sliding gate to enclose truck trailer parking. An 8-foot metal fence and sliding gate is also proposed along the perimeter of the project site. All fencing shall comply with applicable requirements of the Kern County Public Works Department/Building

Inspection Division. Thus, a substantial increase in demand for law enforcement services is not expected.

The proposed Project would generate approximately 371 daily truck trips, with a total of 1,430 daily vehicle trips. Ingress to the proposed Project would be taken from five entrances off of Airport Drive and three off of Hanger Way. The additional volume of worker vehicles and trucks accessing the Project site during daily operations may result in a decrease in level of service at some surrounding intersections and may cause some delay in the flow of traffic (see Section 4.17, *Transportation and Traffic*). Traffic delay impacts associated with development of the Project will be addressed through **Mitigation Measures MM 4.17-1, MM 4.17-2**, **and MM 4.17-3**. **MM 4.17-1** which would reduce level of service deficiency through the construction of intersection improvements. Any additional improvements would be addressed through the payment of Transportation Traffic Impact Fees required by **MM 4.17-2**. To further reduce traffic delay, **MM 4.17-3** would require the preparation of a Transportation Demand Management program to reduce Vehicle Miles Traveled associated with employee trips.

Furthermore, the Project would be in conformance with the MBGP land use designation and county zoning classification for the site. Therefore, buildout of the industrial uses at this location would have already been accounted for in County's long-range projections for demands on emergency services and law enforcement. Therefore, while some increased delay may result in surrounding traffic patterns, impacts to law enforcement and emergency response would be less than significant.

The proposed Project would not result in the need for new or physically altered governmental facilities—the construction of which could cause significant environmental impacts—in order to maintain acceptable service ratios, response times, or other performance objectives for law enforcement services.

Schools, Parks, and Other Public Facilities

Construction

As stated previously, the on-site construction workforce would consist of up to 503 individuals; however, the average daily workforce would vary depending upon the stage in construction. The presence of construction workers would be temporary and is anticipated to last approximately 24 months. These construction workers would likely come from an existing local and/or regional construction labor force and would not likely relocate their households as a consequence of working on the Project. Additionally, implementation of **Mitigation Measure MM 4.15-2** would encourage all contractors of the Project site to hire at least 50% of their workers from local Kern County communities. If temporary housing should be necessary, it is expected that accommodations would be available in the nearby hotels. Due to the short-term nature of increased employment of construction workers on the Project site, as well as the anticipation that at least 50% of construction workers would be sourced from local communities, a notable increase in the residential population and therefore the use of schools, parks, and other public facilities in the surrounding area is not expected.

Accordingly, there would not be a corresponding demand or use of the local schools, parks, or public facilities. Thus, Project construction workers would not increase demand for local schools, parks, or other public facilities such that substantial physical deterioration of such facilities would occur, nor result in substantial environmental impacts associated with the construction of new or physically altered facilities in order to maintain acceptable service ratios. Impacts during construction would be less than significant.

Operation

As described above, the facility would employ approximately 437 employees over the course of three shifts. The proposed facility would operate 24 hours a day, 365 days a year. A portion of employees are anticipated to be drawn from the local labor force and would commute to the Project site. Though it is unlikely that the proposed Project would bring in employees from outside of the region during the operational phase, the potential does remain. If employees were hired from out of the area and had to relocate to eastern Kern County, the resulting addition of potential families to this area would not result in a substantial increase in the demand on schools, parks, and other public facilities, as accommodations for housing would be available in the nearby communities, including the greater Bakersfield area as well as Oildale, Lamont, and Buttonwillow.

Furthermore, the Project would be in conformance with the MBGP land use designation and county zoning classification for the site. Therefore, buildout of the industrial uses at this location would have already been accounted for in County's long-range projections for demands on schools, parks, and other public facilities.

To ensure impacts would be less than significant, the Project would implement **Mitigation Measure MM 4.15-1**, where the Project proponent would work with the County to determine how the use of sales and use taxes from construction of the Project can be maximized to support public facilities in the County. Additionally, **Mitigation Measure MM 4.15-2** would be implemented, which would encourage all contractors of the Project site to hire at least 50% of their workers from local Kern County communities.

Therefore, staff required during operation would not increase demand for public facilities such that substantial physical deterioration of such facilities would occur, nor would Project operation require the construction or expansion of public facilities which might result in significant environmental impacts. No new or physically altered park, school or community facilities would be required to accommodate the proposed Project, as jobs would be drawn from local areas. Thus, the proposed Project would not result in substantial environmental impacts associated with the construction of new or physically altered facilities in order to maintain acceptable service ratios, and impacts would be less than significant.

Mitigation Measures

Implement **Mitigation Measure MM 4.9-11** (see Section 4.9, *Hazards and Hazardous Materials*), and **MM 4.17-1, MM 4.17-2, MM 4.17-3** (see Section 4.17, *Transportation and Traffic*).

MM 4.15-1 The Project proponent/operator shall work with the County to determine how the use of sales and use taxes from construction of the Project can be maximized. This process shall include, but is not necessarily limited to, the Project proponent/operator obtaining a street address for the Project Site which is within the unincorporated portion of Kern County for acquisition, purchasing and billing purposes, and registering this address with the State Board of Equalization, so that the sales tax is received by unincorporated Kern County. As an alternative to the aforementioned process, the Project proponent/operator may make arrangements with Kern County for a guaranteed single payment that is equivalent to the amount of sales and use taxes that would have otherwise been received (less any sales and use taxes actually paid); with the amount of the single payment to be determined via a formula approved by Kern County. The Project proponent/operator shall allow the County to use this sales tax information publicly for reporting purposes.

MM 4.15-2 Prior to the issuance of any building permits on the property, the Project operator shall submit a letter detailing the hiring efforts prior to commencement of construction, which encourages all contractors of the Project site to hire at least 50 percent of their workers from local Kern County communities. The Project operator shall provide the contractors a list of training programs that provide skilled workers and shall require the contractor to advertise locally for available jobs, notifying the training programs of job availability, all in conjunction with normal hiring practices of the contractor.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.9-11** (*Hazards and Hazardous Materials)*, **MM 4.17-1, MM 4.17-2, MM 4.17-3** (see Section 4.17, *Transportation and Traffic*) **MM 4.15-1**, and **MM 4.15-2** impacts would be less than significant after mitigation.

4.15.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects located in the vicinity of the Project site. The cumulative impact analysis area for public services includes the service areas for each of the fire, police, schools, parks, and other public facilities serving the Project site. For both the KCSO and the KCFD, service areas comprise unincorporated areas of Kern County. Construction of the proposed Project would consist of up to 503 full-time equivalent jobs, and operation would consist of approximately 437 employees. As previously discussed, based on the additional employees, implementation of the proposed Project would increase the demand for existing fire and emergency services. To reduce any potential impacts, **Mitigation Measures MM 4.9-11, 4.15-1**, and **4.15-2** would be implemented. **Mitigation Measure MM 4.9-11** requires implementation of a Fire Safety Plan during Project construction and operation that would include notification procedures and emergency fire precautions to help reduce fire risks and the consequential need for fire protection services onsite. **Mitigation Measure MM 4.15-1** requires the proponent/operator to work with the County to determine how the use of sales and use taxes from construction of the Project can be maximized to support public facilities in the County. **Mitigation Measure MM 4.15-2** encourages all contractors of the Project site to hire at least 50% of their workers from Kern County communities. Therefore, with the inclusion of the aforementioned mitigation measures, impacts of the Project would be less than significant.

Additionally, other projects within the cumulative study areas also would be expected to avoid or mitigate impacts on public services. The proposed Project and cumulative projects would be required to comply with the goals, policies, and implementation measures of the MBGP. Therefore, the Project's incremental effect is not cumulatively considerable when viewed in connection with the effects of other closely related past projects, the effects of other current projects, and the effects of probable future projects. The Project would not create a cumulatively considerable impact related to public services with the incorporation of **Mitigation Measures MM 4.9-11, 4.15-1**, and **4.15-2**.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.9-11** (see Section 4.9, *Hazards and Hazardous Materials*), **MM 4.15-1 and MM 4.15-2** would be required.

Level of Significance After Mitigation

Cumulative impacts would be less than significant.

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Section 4.16

Recreation

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Section 4.16

Recreation

4.16.1 Introduction

This section of the Draft Environmental Impact Report describes the affected environment and regulatory setting regarding parks and recreation facilities. It also describes the impacts on parks and recreation facilities that could result from implementation of the proposed IPG Industrial Project (Project), and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the Metropolitan Bakersfield General Plan (MBGP) and Housing Element, the 2022 Kern County Housing Element Annual Report, the Kern County Parks and Recreation Master Plan, and demographic information from the California Department of Finance and the U.S. Census Bureau.

4.16.2 Environmental Setting

National Parks and Trails

Several National Parks are located in California's southern Sierra Nevada Mountains and southern desert region, which are within and/or accessible from Kern County. The Sequoia National Park is located in Kern County and is approximately 76 miles northeast of the project site. Death Valley National Park, Kings Canyon National Park, and Mojave National Preserve are all accessible from Kern County and are all at least 100 miles from the project site. The Pacific Crest Trail also traverses Kern County along a route that lies east of Tehachapi and Lake Isabella and is approximately 44 miles from the project site.

State

California State Parks owns, maintains, and operates one State Park (Red Rock Canyon), two State historic parks (Fort Tejon and Tomo-Kahni), and one State reserve (Tule Elk) in Kern County. The closest of these is the Tule Elk State Reserve, which is approximately 20 miles from the project site. All other parks are over 20 miles away. In the adjacent Los Angeles County to the south, there are two State parks (Antelope Valley Indian Museum and Saddleback Butte), one State historic park (Antelope Valley Indian Museum), and one State reserve (Antelope Valley California Poppy Reserve).

Regional Setting

The Kern County Parks and Recreation Department operates and maintains eight regional parks (Buena Vista Aquatic Recreational Area, Greenhorn Mountain Park, Leroy Jackson Park, Kern River County Park, Lake Isabella, Lake Woollomes, Metro Recreation Center, and Tehachapi

Mountain Park). These parks provide more than 4,282 acres of parkland for recreational purposes (Kern County Parks and Recreation, 2010).

As shown in the Kern County Parks and Recreation Department Master Plan, Kern River County Park is the closest regional park to the Project (approximately 8.36 miles east of the project site) and would be the primary regional park proximate to the project site. The Kern River County Park is a 1,012-acre recreational complex just north of Bakersfield that includes two group camping areas and a group picnic area. The park also contains Hart Memorial Park and Lake Ming. The Buena Vista Aquatic Recreational Area is farther out (approximately 19.34 miles southwest of the project site) and would be another regional park to service the project site. Buena Vista is a human-made site approximately 25 miles southwest of Bakersfield and contains two lakes. Lake Webb has an elongated shape of 873 acres available for boating, jet-skiing, and fishing and an additional 125 acres for jet-skiing. Buena Vista also houses the 86-acre Lake Evans, which is used for sailing, fishing, and boating at no more than 5 miles per hour. The park also includes sand volleyball courts, horseshoe pits, concession building, a picnic area, a boat ramp, and a fuel station.

Local Setting

The Kern County Parks and Recreation Department operates and maintains 35 neighborhood parks throughout the County, as well as several public buildings that are used for recreational purposes (Kern County Parks and Recreation, 2010). The neighborhood parks closest to the project site are North Highlands Park (approximately 0.57 mile northeast) and North Meadows Park (approximately 0.59 mile southeast) (Kern County Parks and Recreation, 2010).

4.16.3 Regulatory Setting

Federal

As the Project is not located wholly or partially within any federal recreational facilities, there are no federal recreation regulations applicable to this Project.

State

As the Project is not located wholly or partially within any federal recreational facilities, there are no State recreation regulations applicable to this Project.

Local

Metropolitan Bakersfield General Plan

The Project is located within the administrative boundaries of the MBGP area and therefore would be subject to the MBGP's applicable policies and measures.

Chapter XI – Parks Element

Goals

Goal 1: Provide parks and recreation facilities to meet the planning area's diverse needs.

Goal 2: Supply neighborhood parks at a minimum of 2.5 acres per 1,000 persons throughout the plan area.

Goal 3: Provide four acres of park and recreation space for each 1,000 persons (based on the most recent census) for general regional recreation opportunity as a minimum standard. Park and recreational space includes mini-parks, neighborhood parks, community parks and regional parks.

Goal 4: Provide a diversity of programs and facilities to meet the needs of the full range of citizen groups including the elderly, handicapped, and economically disadvantaged.

Goal 5: Coordinate development of park facilities and trail systems throughout the plan area which enhance the centers concept and complement unique visual or natural resources.

Goal 6: Ensure that all park and recreation facilities are adequately designed, landscaped, and maintained.

Goal 7: Require that the costs of park and recreation facilities and programs are borne by those who benefit from and contribute to additional demand.

Goal 8: Provide safety, accessibility, and compatibility between parks and adjacent residential areas through "good neighbor" park practices.

Goal 9: Coordinate efforts by volunteer agencies, civic organizations, private enterprise, and all government entities to assure the provision of a complete range of recreation opportunities for all residents of the planning area.

Policies

Policy 1: Require that neighborhood parks be developed at a minimum rate of 2.5 acres per 1,000 population. This requirement may be met all or in part by on-site recreation for such developments as Planned Unit Developments. The City of Bakersfield may allow credit to meet the neighborhood parks requirements.

Policy 33. Monitor the parkland dedication ordinance with in-lieu fee provisions.

Kern County Parks and Recreation Master Plan

The Kern County Parks and Recreation Master Plan (Master Plan) was published in 2010 with the primary purpose of guiding decision-makers in the development of the Kern County park system through 2028 (Kern County Parks and Recreation Department, 2010). The recommendations, goals, and strategies presented in the Master Plan were developed according to an assessment of

all existing County parks and public input to identify community priorities. The project site is located within Kern County Area 3: Greater Bakersfield and within the North of the River (NOR) Recreation and Park District (Kern County Parks and Recreation Department, 2010:II-6). This central portion of Area 3: Greater Bakersfield is served by two regional parks, 13 local/neighborhood parks, two golf courses, and seven public buildings. Altogether, Area 3 encompasses 1,718 acres of park land.

Policies

Policy 1: Provide a quality park and open space system that supports opportunities for active and passive recreation to meet the wide-ranging recreational and social needs of the diverse, varied communities of Kern County.

Policy 2: Maximize resources and expand opportunities for the County-wide parks and recreation system by reforming the financial support structure for the park system, enhancing organizational capabilities, and pro-actively engaging other organizations and the community at large through partnerships and other cooperative arrangements.

Goals

Goal 2: Provide a minimum standard 5 acres of park land per 1,000 residents. This standard would apply to regional parks serving the entire County, as well as local parks in unincorporated areas of the County not served by a local park district.

Goal 7: Achieve sustainable long term financial viability for the Kern County park system to satisfy operational needs, capital requirements and desired recreation services.

- Consider the use of park impact fees and if implemented periodically evaluate those fees to ensure that rates are sufficient to meet increased recreation needs caused by development.
- Evaluate fees received from the rental of the County's parks and recreational facilities, including community/recreation buildings, so as to minimally cover the cost of operating and managing those facilities.

North of the River Recreation and Park District

The Project is also within the boundaries of the NOR Recreation and Park District. NOR Recreation and Park District's mission is to provide recreation programs and facilities for the benefit of the NOR community, which is 215 square miles in size, has a population of approximately 153,000 residents, and encompasses five school districts. Included within the NOR Recreation and Park District service boundaries are 24 park sites totaling 269.8 developed acres. The major sources of revenues for NOR Recreation and Park District are property taxes, program fees, and grants.

4.16.4 Impacts and Mitigation Measures

Methodology

Recreational facilities and opportunities in the area were evaluated to determine whether they would be adversely affected by the Project. This evaluation included consideration of the overall number and area of parklands or other recreational facilities and proximity to the Project, and whether the Project would result in overuse and deterioration of existing facilities or necessitate the construction of new facilities.

Thresholds of Significance

The Kern County California Environmental Quality Act (CEQA) Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant adverse effect on recreation. A project could have a significant adverse effect on recreation if it would include or require either of the following:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or
- Include Recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

Project Impacts

Impact 4.16-1: The project would result in increased use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would occur or be accelerated.

The Project would result in a temporary increase in population within the site vicinity during construction as a result of the influx of construction workers. The on-site construction workforce would consist of up to 503 full-time equivalent jobs; however, the average daily workforce would vary depending upon the stage in construction. The temporary increase in use of recreation facilities during construction that might be caused by an influx of workers would be minimal. Any construction workers who relocate to the area may use the neighborhood and regional parks in the vicinity of the project site. Given that there are several parks in the project vicinity (including Kern River County Park), the limited addition of people to the area, and the short-term duration of construction, the potential temporary increase in use by project personnel at any one park is not anticipated to be significant or result in a detectable physical deterioration of parks. Furthermore, the NOR Recreation and Park District submitted a comment letter (Appendix A.2) in response to the circulation of the Notice of Preparation and stated the Project would have no impact on the

services or facilities of its District. Therefore, a less than significant impact would occur in this regard.

The Project would operate 24 hours a day and 365 days a year, and it would employ approximately 437 employees over the course of three shifts. The resulting addition of families to this area would potentially increase the number of users at local parks. However, as described in Section 4.15, *Public Services,* **Mitigation Measure MM 4.15-2** will require the project proponent hire a minimum of 50% of its workforce locally. Section 4.13, *Population and Housing*, further discusses that the permanent employees required for the Project are expected to predominantly come from the surrounding areas within the Bakersfield Metropolitan Statistical Area, without the need for relocation. Temporary construction employees and permanent employees needed during the operational phase of the Project could also be provided by Kern County, without the need for relocation, given the high unemployment rate in the region. Operation of the Project would not result in a substantial influx of people (such as a new residential development, school, or other use that would result in large volumes of people residing or traveling to the project site); therefore, the potential increase in use by project personnel at any one neighborhood and/or regional park is not anticipated to be significant or result in a detectable physical deterioration of parks. Impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Impacts would be less than significant.

Impact 4.16-2: The project would include recreational facilities or require construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

As described previously, the Project would employ approximately 437 employees over the course of three shifts, operating 24 hours a day, 365 days a year. Some employees are anticipated to be drawn from the local labor force and would commute to the project site. Though it is unlikely that the Project during the operational phase would bring in employees from outside of the region, the potential does remain. If employees were hired from out of the area and had to relocate to Kern County, the resulting addition of potential families to this area would not result in a substantial increase in the demand on surrounding parks and other public recreational facilities, as accommodations for housing would be available in the nearby communities, including the greater Bakersfield area as well as Oildale, Lamont, and Buttonwillow, where such facilities already exist.

Furthermore, the Project would conform with the MBGP land use designation and county zoning classification for the site. Therefore, buildout of the industrial uses at this location would have already been accounted for in County's long-range projections for demands on parks and other public recreational facilities.

There is no intended construction or expansion of recreational facilities with Project construction. Implementation of the Project would not result in substantially increased demand for parks or recreational facilities and would therefore not require construction of new or expanded recreational facilities. No impact would occur.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

No impact would occur.

4.16.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects and the effects of other projects in the vicinity of the project site. The geographic scope for cumulative impacts on recreation resources includes portions of the MBGP area and the City of Shafter that fall within the 6-mile radius of the project site, which includes a total of 29 projects.

The Project's incremental impact of an increased use of parks would be minimal because of the relatively small number of permanent employees working on-site and the temporary nature of the workers involved in construction of the Project. With the need for more jobs as shown by the high unemployment rate of 8.9% in Kern County (California Employment Development Department, 2024), the population is not anticipated to substantially increase, but rather, a need can be met.

The Project, in combination with the other projects is not anticipated to increase the need for recreational facilities. The approximate 503 employees needed to construct the Project would meet the need of jobs in the surrounding unincorporated communities and the approximate 437 full-time employees would further serve that need, meaning that the population would likely increase only slightly and use of recreational facilities would not increase substantially. Therefore, the Project's contribution to increased park usage would be negligible. The MBGP Parks Element also sets forth goals by the County to ensure adequate park and recreational facilities are in place to serve residents. This includes providing 4 acres of park and recreation space for each 1,000 persons and ensuring that all park and recreation facilities are adequately designed, landscaped, and maintained. Existing local parks and recreational facilities are also being maintained, having undergone renovation from 2023 to 2024 to ensure that facilities are updated and accessible to current and future residents (City of Bakersfield, 2024). Though a slight increase in population is expected as a result of the Project, it is expected for the County to accommodate this by upgrading existing parks or constructing new facilities based on population growth for the entire

unincorporated County. Therefore, the Project would not combine with impacts from cumulative projects to result in a significant impact.

There is no new construction or expansion of parks proposed as a part of this Project; therefore, the Project would result in little to no impact in this regard. Furthermore, impacts of the Project would not have the potential to combine with impacts from cumulative projects to result in a significant impact.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Cumulative impacts would be less than significant.

Section 4.17

Transportation and Traffic

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Section 4.17

Transportation and Traffic

4.17.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding transportation. It also evaluates the impacts on transportation that would result from implementation of the proposed IPG Industrial Project (Project), and identifies mitigation measures that would reduce these impacts, if necessary.

A description of the environmental setting (affected environment) for transportation is presented below in Section 4.17.2, *Environmental Setting*, including discussion of the regional and local facilities, existing conditions, other transportation facilities, and military aviation facilities in the vicinity. The regulatory setting applicable to Transportation is presented in Section 4.17.3, Regulatory Setting. Section 4.17.4, *Impacts and Mitigation Measures*, discusses project impacts and associated mitigation measures.

This section is informed by the September 17, 2024, Traffic Impact and Vehicle Miles Traveled (VMT) Analysis Report and December 9, 2024, Supplemental Truck Routing Assessment prepared by David Evans and Associates, Inc. (Traffic Study, Appendix J), as well as the February 18, 2025, memo containing recommend road improvements from the Kern County Public Works Department. The Traffic Impact and VMT Analysis Report provides an analysis of existing and proposed traffic conditions whereas the supplemental assessment identifies preferred routes for heavy truck trips during construction and operation. Potential transportation impacts to intersections and roadways were determined for both development/construction and operation of the Project using the most recently published roadway traffic volumes and project-related vehicle trip calculations. Discussion and evaluation of transportation facilities, including pavement conditions, are based on site surveys with applicable thresholds and impacts identified. Additional impacts to the airport system are also discussed.

4.17.2 Environmental Setting

The Project site is located on vacant land within Kern County, approximately 1.7 miles north of the nearest administrative boundaries of incorporated City of Bakersfield. The circulation system in the Project vicinity is made up of a combination of both State and County facilities. State Route 99 is located west of the Project site, which provides regional access to the Project. Local roads that would provide access to the site include Airport Drive, which is a north to south collector bordering the eastern boundary of the Project site and Boughton Drive, a local road which borders the northern boundary of the Project site. Hanger Way and Skyway Drive border the southern and western boundaries of the Project site, respectively.

Regional and Local Roadway Facilities

Regional Roads

State Route 99 and State Route 65 are both within the vicinity of the Project. SR 99 is located to the west of the Project vicinity and runs southeasterly, and SR 65 terminates at SR 99 to the west of the Project vicinity. SR 178 is located south of the Project site in the City of Bakersfield. SR 99 and SR 65 would provide general access to the Project vicinity during the construction and operational phases.

State Route 99 (SR 99) is a major, four to six lane freeway that connects with Interstate 5 extends north from the Mexican border to the Canadian border and provides access for goods movement, shipping, and travel. This highway crosses the central portion of Kern County and is designated as an arterial/major highway by the Circulation Element of the Kern County General Plan. Access to the Project Site from SR 99 is provided by interchanges at State Road and Olive Drive. State Route 99 is sometimes referred to as the "Golden State Highway."

State Route 65 (SR 65) is a major highway that runs in a north-south direction and is composed of two segments in the Central Valley. It starts at SR 99 in unincorporated Oildale north of Bakersfield and continues into Tulare County. SR 65 is a two-lane highway with an interchange at SR 99. It is designated as a four-lane expressway from SR 99 to Imperial Avenue. Access to the Project Site from SR 65 is provided by interchanges at Merle Haggard Drive

State Route 178 (SR 178) begins at SR 99 just west of downtown Bakersfield and continues northeast to Lake Isabella. SR 178 runs in an east-west direction and is a divided four- to six-lane freeway that becomes a two-lane highway east of Miramonte Drive towards East Bakersfield.

Interstate 5 (I-5) is a major, four-lane, divided freeway that extends north from the Mexican border to the Canadian border and provides access for goods movement, shipping, and travel. This freeway crosses the western portion of Kern County and is designated as an arterial/major highway by the Circulation Element of the Kern County General Plan and is under the jurisdiction of Caltrans.

Local Roads

County roads that are expected to provide access to the Project site, and also serve as links for regional traffic, include Airport Drive and merle Haggard Drive. Primary access to the Project site would be via Airport Drive and Boughton Drive. Both of these primary access roads, along with other nearby local roads are described more thoroughly below:

Airport Drive is an arterial highway per the Metropolitan Bakersfield General Plan (MBGP) Circulation Element with a 110-foot right-of-way to accommodate a six-lane traveled way. It extends north through Oildale from its interchange connection at SR 99. It operates as a four-lane roadway with a raised median between SR 99 and West China Grade Loop. Airport Drive provides access to residential, commercial and industrial land uses, and passenger terminal for Meadows Field Airport.

Boughton Drive is designated as a collector in the MBGP Circulation Element with a 55-foot half-width right-of-way to accommodate a four-lane traveled way. It begins at Meadows Field Airport and runs east to terminate at Airport Drive to connect to West Day Avenue.

Norris Road is classified as an arterial highway per the MBGP Circulation Element and accommodates a four-lane traveled way.

Hanger Way is designated as a collector in the MBGP Circulation Element with a 90-foot right-of-way to accommodate a four-lane traveled way. It is approximately 0.35 mile and runs north to south to connect Boughton Drive to the north and Skyway Drive to the south.

Decatur Street accommodates a four-lane traveled way and generally extends east to west. Decatur provides access to primarily residential, commercial and industrial uses.

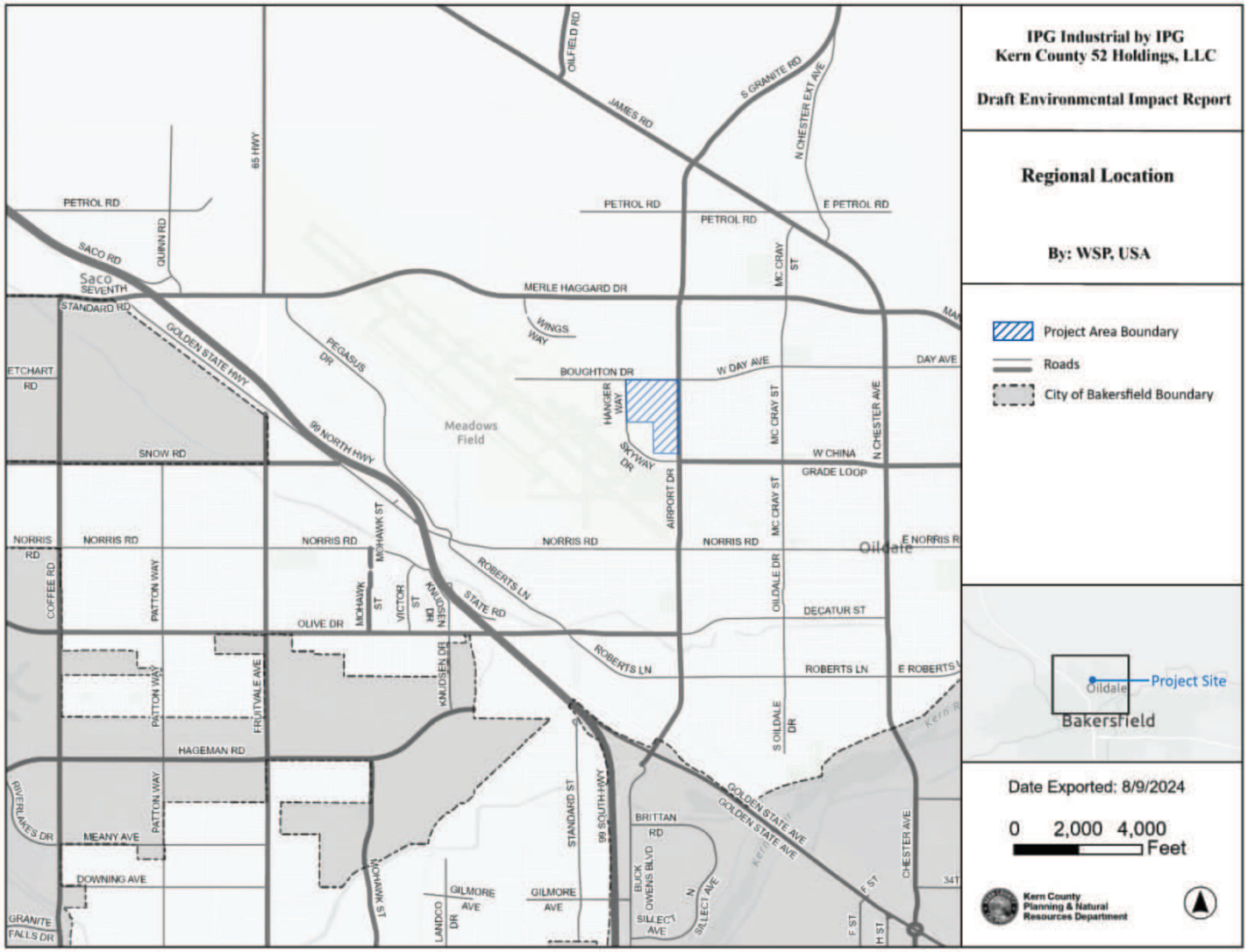
Roberts Lane accommodates a four-lane traveled way and generally extends east to west. Decatur provides access to primarily residential, commercial and industrial uses.

Merle Haggard Drive is a major east-west route in the north metropolitan Bakersfield area. It extends from west of Interstate 5 (I-5) to Chester Avenue and Manor Street in Oildale. It is designated as an expressway between Santa Fe Way and SR 99 and as an arterial road for the remaining segments This corridor provides access to residential, commercial, industrial and agricultural land uses.

Olive Drive is an east-west arterial road with an interchange connection at SR 99. It is a major access route for traffic between SR 99 and commercial and residential areas to the west and the community of Oildale to the southeast.

China Grade Loop is an east-west arterial road that extends from Airport Drive to the east. In the Project vicinity, it is a four-lane fully improved facility and as a two-lane facility east of Manor Street. China Grade Loop provides access to residential and industrial land uses.

Figure 4.17-1: Regional Location



Other Transportation Facilities

Public Transit

Public transportation in Kern County is generally provided by Kern Regional Transit, which offers 13 fixed routes throughout the County for passenger bus service. Based on the Kern County Active Transportation Plan (ATP), Metropolitan Bakersfield is a major destination for regional public transit routes. However, there are no accessible public transit stops within the vicinity of the Project site. The nearest route serviced by Kern Regional Transit is Route 110 Delano – Bakersfield, which runs north and south on SR 99. Route 110 serves Delano, McFarland, Wasco, Shafter, and Bakerfield. The closest bus stop is located approximately 6.5 miles away in the City of Bakersfield, at F Street at 30th Street. While the Project site is located outside of the service area of the Kern Transit Dial-A-Ride services, available services start at the southeast intersection of Airport Drive at West China Grade Loop.

Golden Empire Transit District also operates fixed daily bus routes within the City of Bakersfield and surrounding unincorporated areas (GetBus 2024. The nearest bus route serviced by Golden Empire Transit District is the 45 route (Oildale/Foothill) which has stops along McCray Street (east of Airport Drive) and a peak-hour service frequency of no less than 30 minutes. The closest bus stop on the route is located 0.5 mile east of the Project at the intersection of China Grade Loop and McCray Street.

Non-Motorized Transportation

According to the ATP, the Metropolitan Bakersfield area contains nearly 260 miles of existing bicycle facilities within the Bakersfield Metro Northeast Area. Key regional connections in Metropolitan Bakersfield include the Kern River Parkway Path extending 32 miles along the Kern River from China Grade Loop to Enos Lane, and the bicycle lanes on Chester Avenue linking Oildale with Bakersfield.

There are bicycle facilities near the Project site; however, there are no existing facilities on roadways adjacent to the site. There are Class II bike lanes that terminate at Airport Drive directly east of the Project. The bike lanes run along China Grade Loop and terminate at Skyway Drive, and along West Day Avenue that terminate at Boughton Drive. A Class III bike route terminates at Merle Haggard Drive and Airport Drive.

There are no dedicated pedestrian facilities in the vicinity of the Project site, or along the surrounding roadways. The nearest pedestrian facilities, such as protected cross walks and sidewalks, are across the street at the corner of Airport Drive and West Day Avenue, with the nearest bike lanes, along McCray Street, approximately 0.5 mile east of the site.

Railway

Amtrak provides passenger rail service from Bakersfield north to Sacramento with their San Joaquin Train service (Amtrak 2023). Rail service from Bakersfield to Los Angeles is provided via San Francisco. A direct connection to the south through Los Angeles is not currently provided, but

high-speed rail service between San Francisco and Los Angeles via Bakersfield may be available by 2029 (Amtrak 2023; California High-Speed Rail Authority 2023). The high-speed rail would provide connections through this corridor via Fresno to Bakersfield, Bakersfield to Palmdale, and Palmdale to Los Angeles.

Freight service is provided by the San Joaquin Valley Railroad, which operates throughout the San Joaquin Valley and interchanges with the Union Pacific Railroad and the Burlington Northern Santa Fe Railroad in Bakersfield. Commodities transported by the San Joaquin Valley Railroad include petroleum and agricultural products.

Aircraft and Military Aviation

Public Airports

The closest airport facility is the Meadows Field Airport, located at 3701 Wings Way, less than 0.5 miles west of the Project site. This airport is County-owned and operated, encompasses 1,357 acres, and supports two runways. Kern County has adopted an Airport Land Use Compatibility Plan (ALUCP) to comply with the State Aeronautics Act (Public Utilities Code commencing with Section 21670), which identifies the Project site within the Sphere of Influence. Direct flights are available to Los Angeles, San Francisco, Phoenix, Houston, and other U.S. cities.

Bakersfield Municipal Airport is located in the south-central Bakersfield area. Other public airports include Delano Municipal Airport, Wasco-Kern County Airport, Shafter Airport-Minter Field in northern Kern County, and Taft-Kern County Airport in southwestern Kern County. Smaller public airports (averaging less than 100 aircraft operations per month) are also located in western Kern County, including Lost Hills-Kern County Airport, Elk Hills-Buttonwillow Airport, and Poso-Kern County Airport (AirNav2024).

Private Airports

A number of private airstrips are located throughout western Kern County, including Tejon Ag and Paradise Lakes airfields south of Bakersfield, Majors Airfield north of Bakersfield, Joe Gottlieb Field Airport west of Bakersfield, and Cashen Airport northwest of Wasco. There are no private airports within the vicinity of the Project site (AirNav 2024).

Military Aviation

Kern County has two military aviation installations: the China Lake Naval Air Weapons Station and Edwards Air Force Base, both of which are located in the eastern part of the County. Nearby, in Kings County, is the Lemoore Naval Air Station, located in the central San Joaquin Valley. Each installation has unique flying operations and their primary mission is to test military aircraft and weapon systems. Due to the military bases' required flying mission, aircraft fly beyond the boundaries of the installations at supersonic speeds and sometimes as low as 200 feet above the ground. In order to minimize flight hazards to non-military aircraft, the military aircraft from these installations fly within restricted airspace known as the Joint Service Restricted R-2508 Complex. This complex is considered an extension of the airspace for these military aviation installations and

their flying missions. Mojave Air and Space Port and Inyo Kern Airport both provide civilian flight testing and drone testing capabilities. Mojave Air and Space Port is also the first Federal Aviation Administration (FAA) licensed civilian space flight testing facility in the United States. There are no military airports within the vicinity of the Project site (AirNav n.d.) and due to the Project site's location within western kern, there is overlap between the Project site and the Eastern Kern airports and military airspace.

Bicycle and Pedestrian Facilities

According to the 2018 Kern Region ATP, the Kern region's bikeway network is not consistent throughout the Plan area. The Plan area includes the following cities and unincorporated areas: Arvin, Metropolitan Bakersfield (including Oildale, Lamont, and Weedpatch), Bodfish, Buttonwillow, California City, Delano, Ford City, Frazier Park, Greater Taft Area (City of Taft, Ford City, South Taft, and Taft Heights), Lake Isabella, Maricopa, McFarland, Mojave, Ridgecrest, Rosamond, Shafter, Tehachapi, and Wasco. Some cities and communities have networks that provide opportunities for safe and comfortable travel both on street and off-street, while others lack formalized bicycle infrastructure. Additionally, significant gaps remain in the system, and closing these gaps is critical to providing good connectivity for people bicycling both within each community and while traveling between neighboring communities.

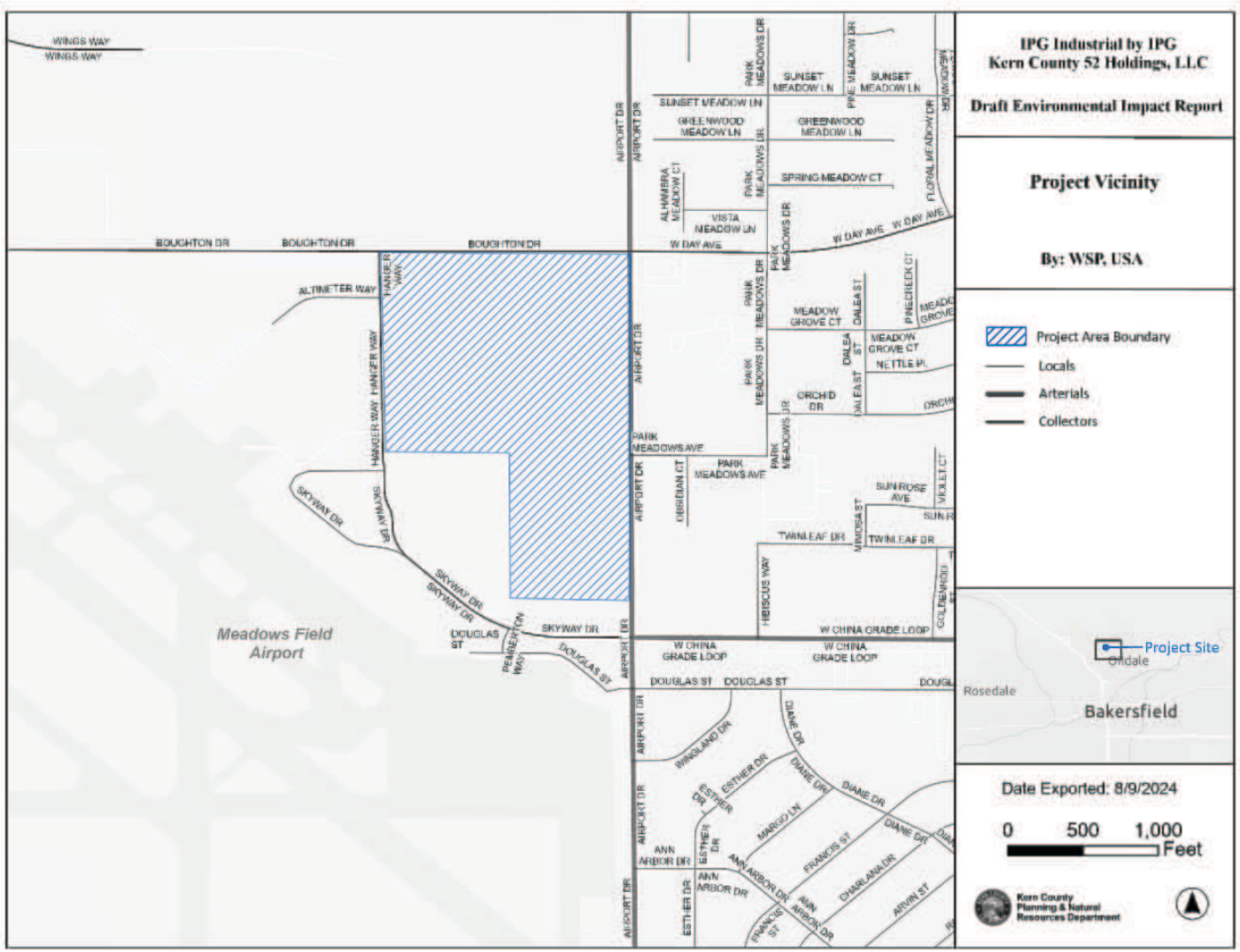
Like the Kern region's existing bikeway network, the region's pedestrian conditions vary widely. Some communities have a comprehensive sidewalk network with crossings and signage, while infrastructure is limited in other locations.

There are Class II Bike lanes that terminate at two intersections adjacent to the Project site (Airport Drive at West Day Avenue and Airport Drive at Hanger Way/Skyway Drive), per the Kern County ATP (Northeast Area). Additionally, the Project contains five driveways along Airport Drive, which is identified as containing a Class II Bike Lane along the roadway, per the 2012 Bicycle Master Plan.

Local Setting

The approximately 49.05-acre site consists of vacant, undeveloped land. As discussed previously and as shown on **Figure 4.17-2**, the Project site is bound to the north by Boughton Drive; to the south by Skyway Drive; to the east by Airport Drive and to the west by Hanger Way. Primary site access would be from Airport Drive, via five commercial width driveways. Access would be to the site's parking lots, and, indirectly, internal roads on the western and eastern sides of the building. Two driveways of the five would provide access to Building 1's secure gated loading dock and truck/trailer parking areas. Access from Hanger Way would be provided via three driveways. One of the three driveways would provide automobile access to the parking lots, and the other two would provide primary truck access to Building 1's secure gated loading dock and truck/trailer parking area with direct connections to the loading dock access gates.

Figure 4.17-2: Local Circulation System



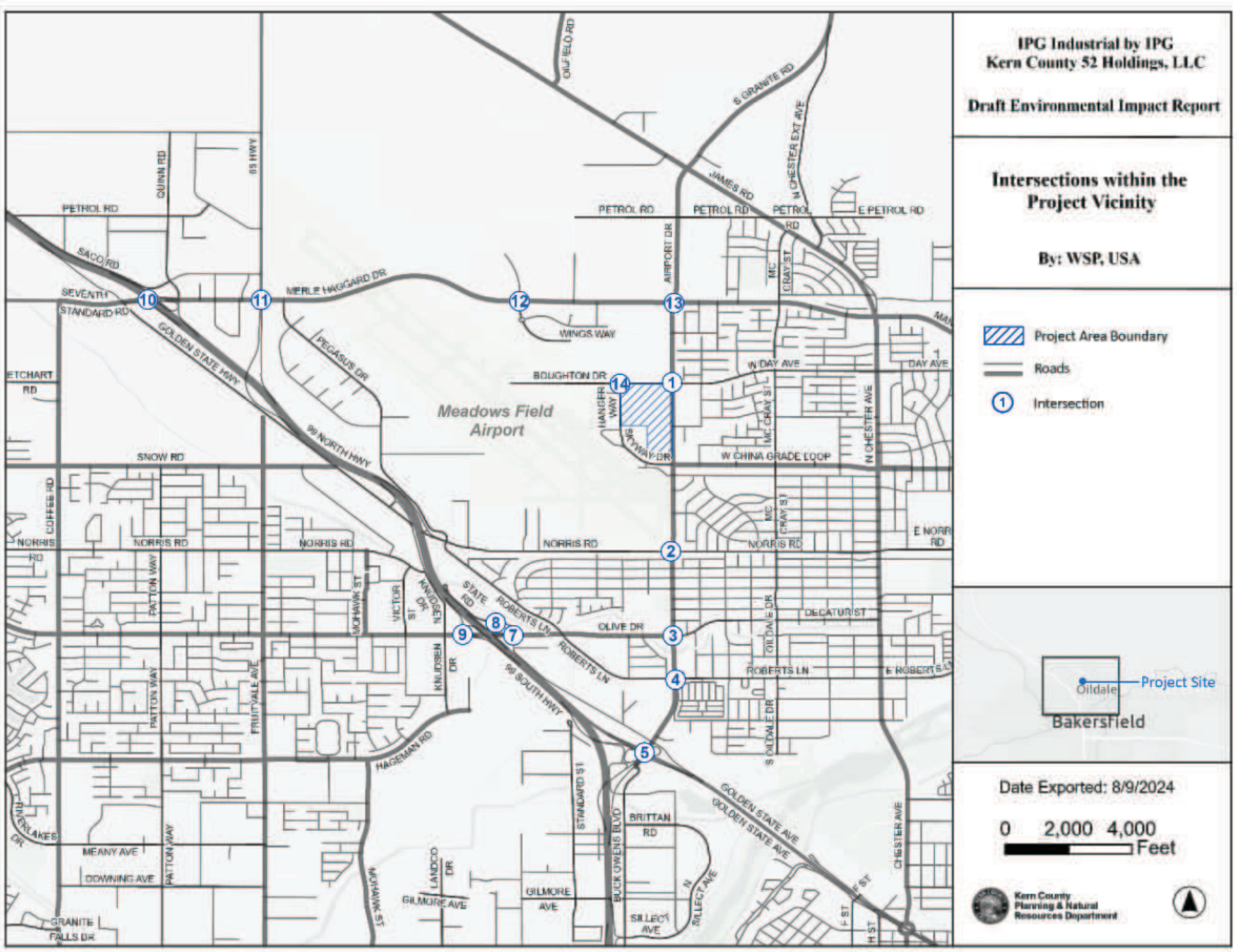
Study Area Intersections

As discussed earlier, the LOS analysis is being presented for information and MBGP Consistency. Considering the access routes described above, the traffic impact analysis evaluated 14 study intersections in the vicinity of the Project site, where Project traffic would contribute to traffic volumes and vehicle turning movements. The Study conducted an analysis of these key intersections utilizing Synchro software which implements methods of the Highway Capacity Manual, 6th Edition (HCM 6) used in this report.

Fourteen intersections were analyzed in the study:

- Airport Drive/Boughton Drive/West Day Avenue
- Airport Drive/Norris Road
- Airport Drive/Olive Drive/Decatur Street
- Airport Drive/Roberts Lane
- Airport Drive/State Road/SR 99 northbound (NB) off-ramp
- Olive Drive/Roberts Lane
- Olive Drive/State Road
- State Road/SR 99 NB ramps
- Olive Drive/SR 99 SB ramps
- Golden State Highway SB ramps/7th Standard Road
- SR 99 Connector to Highway 65/Merle Haggard Drive
- Merle Haggard Drive/Wings Way
- Airport Drive/Merle Haggard Drive
- Boughton Drive/Hanger Way

Figure 4.17-3: Intersections within Project Vicinity



Existing Level of Service

As illustrated below in **Table 4.17-4**, most intersections in the study area operate at acceptable levels. However, three intersections operate at a LOS below "C". These include the following: Olive Drive and Robets Lane, Olive Drive and SR 99 SB ramps, and Golden State Highway SB ramps and 7th Standard Road. The intersection of Golden State Highway SB ramps and 7th Standard road operates at level E for both peak hours, while the other two intersections operate at below acceptable levels (D and E) at PM peak hours, respectively. It is important to note that these intersections are operating below LOS C today, without the Project.

4.17.3 Regulatory Setting

Federal

Federal Aviation Administration

The FAA regulates aviation at the Meadows Field Airport and other regional, public, private, and military airports. The FAA regulates objects affecting navigable airspace and structures taller than 200 feet according to Federal Aviation Regulation 14 Code of Federal Regulations (CFR) Part 77. For structures of this size, both the U.S Department of Transportation and the California Department of Transportation (Caltrans) require the proponent to submit FAA Form 7460-1, Notice of Proposed Construction or Alteration.

As described in 14 CFR 77.9 (Construction or Alteration Requiring Notice), each sponsor who proposes any of the following construction or alteration scenarios shall notify the FAA in the form and manner as follows:

If requested by the FAA, or if you propose any of the following types of construction or alteration, you must file notice with the FAA:

(a) Any construction or alteration that is more than 200 feet above ground level at its site.

(b) Any construction or alteration that exceeds an imaginary surface extending outward and upward at any of the following slopes:

  (1) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway more than 3,200 feet in actual length, excluding heliports.

  (2) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway no more than 3,200 feet in actual length, excluding heliports.

  (3) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport described in paragraph (d) of this section.

(c) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of

Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a) or (b) of this section.

(d) Any construction or alteration on any of the following airports and heliports:

(1) A public use airport listed in the Airport/Facility Directory, Alaska Supplement, or Pacific Chart Supplement of the U.S. Government Flight Information Publications.

(2) A military airport under construction, or an airport under construction that will be available for public use.

(3) An airport operated by a Federal agency or the U.S. Department of Defense.

(4) An airport or heliport with at least one FAA-approved instrument approach procedure.

(e) A notice for construction or alteration is not needed for the following:

(1) Any object that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height, and will be located in the congested area of a city, town, or settlement where the shielded structure will not adversely affect safety in air navigation.

(2) Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device meeting FAA-approved siting criteria or an appropriate military service siting criteria on military airports, the location and height of which are fixed by its functional purpose.

(3) Any construction or alteration for which notice is required by any other FAA regulation.

(4) Any antenna structure of 20 feet or less in height, except one that would increase the height of another antenna structure.

Per 14 CFR 77.7, notification requirements include sending one executed form set of FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the Manager, Air Traffic Division, FAA Regional Office having jurisdiction over the area within which the construction or alteration will be located. The notice required must be submitted at least 45 days before the earlier of the following dates: (1) the date the proposed construction or alteration is to begin; or (2) the date an application for a construction permit is to be filed.

Failure to comply with the provisions of Federal Aviation Regulation Part 77 is subject to civil penalty under Section 902 of the Federal Aviation Act of 1958, as amended, and pursuant to United States Code Title 49, Section 46301(a).

State

California Department of Transportation (Caltrans) – Encroachment Permits and Transportation Permits (Oversized Permits)

Caltrans has discretionary authority with respect to highways under its jurisdiction and may, upon application and if good cause appears, issue a special permit to operate or move a vehicle or combination of vehicles or special mobile equipment of a size or weight of vehicle or load exceeding the maximum limitations specified in the California Vehicle Code. The Caltrans Transportation Permits Issuance Branch is responsible for the issuance of these special transportation permits for oversize/overweight vehicles on the State Highway System.

California Vehicle Code, Division 15, Chapters 1 through 5 (Size, Weight, and Load)

Includes regulation pertaining to licensing, size, width, and load of vehicles operated on highways. Caltrans has the discretionary authority to issue special permits for the movement of vehicles/vehicle loads that exceed statutory limitations for size or weight on State roadways as specified in Division 15 of the California Vehicle Code.

California Street and Highway Code Section 660, 670-695, and 1450 et seq.

This code requires permits from Caltrans for any roadway encroachment during truck transportation and delivery, includes regulations for the care and protection of State and County highways, provides for the issuance of written permits, and requires permits for any load that exceeds Caltrans weight, length, or width standards for public roads. The project will require use of County and State roadways.

Senate Bill 375

Senate Bill 375 (codified in the Government Code and the Public Resources Code) took effect in 2008 and provides a new planning process to coordinate land use planning, regional transportation plans, and funding priorities in order to help California meet the greenhouse gas (GHG) reduction goals established by Assembly Bill (AB) 32. Senate Bill 375 requires metropolitan planning organizations (MPOs) to incorporate a Sustainable Communities Strategy in their Regional Transportation Plans to achieve GHG emissions reduction targets by reducing VMT from light-duty vehicles through the development of more compact, complete, and efficient communities.

Senate Bill 375 required the California Air Resources Board (CARB) to set regional targets for reducing GHG from passenger vehicle use. In 2010, CARB established targets for 2020 and 2035 for each region in California governed by an MPO. The Kern Council of Governments (Kern COG) is the MPO for the Kern region as designated by the federal government, and the Regional Transportation Planning Agency as designated by the State of California.

Senate Bill 743

Senate Bill 743 was signed into law September 2013, and includes several changes to California Environmental Quality Act (CEQA) for projects located in areas served by transit (for example, transit-oriented development, or TOD). Most notably with regard to transportation and traffic assessments, Senate Bill 743 changes the way that transportation impacts are analyzed under CEQA (see Public Resources Code Section 21099). Senate Bill 743 required the Governor's Office of Planning and Research to amend the CEQA Guidelines to exclude level of service (LOS) and auto delay when evaluating transportation impacts.

With implementation of Senate Bill 743, new criteria have been established to promote the reduction of GHG emissions, the development of multimodal transportation networks, and a diversity of land uses. The Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA provided recommendations for updating the State's CEQA Guidelines in response to Senate Bill 743 and contained recommendations for a VMT analysis methodology in an accompanying Technical Advisory on Evaluating Transportation Impacts in CEQA (Technical Advisory).

The Guidelines, including the Technical Advisory, recommended use of automobile VMT per capita as the preferred CEQA transportation metric, along with the elimination of automobile delay/LOS for CEQA purposes statewide. Public Resources Code Section 21099 and CEQA Guideline Section 15064.3 reflect this change. Under Section 21099, automobile delay, as measured by LOS or similar measures of traffic congestion or vehicular capacity, is not considered a significant effect on the environment. Senate Bill 743 does not prevent an agency from continuing to analyze delay or LOS as part of other plans (that is, a general plan), fee programs, or ongoing network monitoring. So long as the LOS analysis is not a basis for challenging the legal adequacy of an EIR under CEQA. Citizens for Positive Growth & Preservation v City of Sacramento (2019) 43 C5th 609, 624 (LOS-based challenge moot in light of enactment of Guideline 15064,3,) Therefore, the LOS analysis in this EIR is for informational purposes only. Consistency with the General Plan policies pertaining to LOS are addressed in the documents for Precise Development Plan No. 72, Map No. 102, apart from the CEQA process.

Local

Kern COG 2022 Regional Transportation Plan/Sustainable Communities Strategy

Kern COG, as a regional transportation agency, prepares the Regional Transportation Plan (RTP) to examine long-range transportation issues, opportunities, and needs for Kern County. The 2022 RTP is a 24-year blueprint that establishes a set of regional transportation goals, policies, and actions intended to guide development of the planned multimodal transportation systems in Kern County (Kern COG 2022). The 2022 RTP includes a policy element that is shaped by goals, policies, and performance indicators, a description of planning assumptions for regional growth and future needs for travel and goods movement, a Sustainable Communities Strategy that identifies planning strategies and illustrative development patterns that would reduce GHG emissions, and a plan of action for the region to pursue to meet identified transportation needs. The

RTP was developed through a continuing, comprehensive, and cooperative planning process, and provides for effective coordination between local, regional, State, and federal agencies.

The RTP promotes a more efficient transportation system that calls for fully funding alternative transportation modes, while emphasizing transportation demand and transportation system management approaches for new highway capacity. The Constrained Program of Projects (included in the 2022 RTP, Chapter 5, Strategic Investments, Table 5-1), includes projects that move the region toward a financially constrained and balanced system. Constrained projects have undergone air quality conformity analyses to ensure that they contribute to the region's compliance with State and federal air quality rules. The project would assist the County with its GHG reduction goals.

Kern COG Congestion Management Program

All urbanized areas with a population larger than 200,000 residents are required to have a Congestion Management System, program, or process. Kern COG refers to its congestion management activities as the Congestion Management Program (CMP). Kern COG was designated as the Congestion Management Agency.

The CMP provides a systematic process for managing congestion and information regarding (1) transportation system performance and (2) alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet State and local needs. The purpose of the CMP is to ensure that a balanced transportation system is developed that relates population growth, traffic growth and land use decisions to transportation system LOS performance standards and air quality improvement. The program attempts to link land use, air quality, transportation, and advanced transportation technologies as integral and complementary parts of this region's plans and programs.

The purpose of defining the CMP network is to establish a system of roadways that will be monitored in relation to established LOS standards. At a minimum, all State highways and principal arterials must be designated as part of the Congestion Management System of Highways and Roadways. Kern County has 18 State-designated highways.

Regional Transportation Improvement Program

The Kern COG RTIP is intended to be a funding mechanism for roadway improvements which are regional in nature, and for which cost sharing by all new development is appropriate. The RTIP is a program jointly developed, approved, and administered by the County and the City of Bakersfield. The program was adopted in the 1980s and has been updated periodically to reflect the latest development growth patterns and construction costs. The current version of the RTIP is the fourth update to the program and was adopted in 2009. The current version has been held in place for an extended period as a stable reference for projects within the Thomas Roads Improvement Program. With the program nearly completed, the County is working on an update to the RTIP, which would reflect current development conditions, particularly in the vicinity of Meadows Field.

Kern County Airport Land Use Compatibility Plan

An Airport Land Use Commission is required by California law in every county with an airport in its jurisdiction. Each commission must develop a plan for promoting and ensuring compatibility between each airport in the county and surrounding land uses, in the form of an ALUCP. The County of Kern adopted its Airport Land Use Compatibility Plan (ALUCP) on September 23, 1996. Kern County's ALUCP establishes procedures and criteria to assist Kern County and affected incorporated cities in addressing compatibility issues between airports and surrounding land uses. The Project is located adjacent to the County's Meadow Field Airport and within a designated Airport Land Use Compatibility Zone.

Kern COG 2022 Regional Transportation Plan/Sustainable Communities Strategy

As a regional transportation agency, Kern COG prepares the RTP to examine long-range transportation issues, opportunities, and needs for Kern County. The 2022 RTP is a 24-year blueprint that establishes a set of regional transportation goals, policies, and actions intended to guide development of the planned multimodal transportation systems in Kern County (Kern COG 2022). The 2022 RTP includes a policy element that is shaped by goals, policies, and performance indicators, a description of planning assumptions for regional growth and future needs for travel and goods movement, a Sustainable Communities Strategy that identifies planning strategies and illustrative development patterns that would reduce GHG emissions, and a plan of action for the region to pursue to meet identified transportation needs. The RTP was developed through a continuing, comprehensive, and cooperative planning process, and provides for effective coordination between local, regional, State, and federal agencies.

2012 Kern County Bicycle Master Plan

The 2012 Kern County Bicycle Master Plan is an adopted bicycle master plan that covers unincorporated Kern County, including Metropolitan Bakersfield. It provides a broad vision for encouraging bicycle travel, as well as strategies and actions to improve conditions for bicycling, including complete street recommendations. The plan provides direction for expanding the existing bikeway network and connecting gaps for continuous networks.

Metropolitan Bakersfield General Plan

The Project site falls within the jurisdiction of the MBGP. The service goal for roadway facilities within the metropolitan area is LOS "C." Per the MBGP, on streets where the existing LOS is below C, special consideration to identify mitigation measures to prevent and/or delay degradation of the existing LOS would be required. The MBGP goals and policies necessary to achieve this standard and are applicable to the Project are provided below. As noted above, an inconsistency with these polices is not a basis for challenging the legal adequacy of an EIR under CEQA.

Chapter III: Circulation Element

A. Streets

Goals

Goal 1. Provide a safe and efficient street system that links all parts of the area for movement of people and goods.

Goal 3. Minimize the impact of truck traffic on circulation, and on noise sensitive land uses.

Goal 5. Provide a system of freeways which maintains adequate travel times in and around the metropolitan area.

Goal 7. Develop and maintain a circulation system that supports the land use plan shown in the general plan.

Policies

Policy 3. Provide additional right-of-way and pavement width to accommodate turn lanes at intersections.

Policy 5. Place traffic signals to minimize vehicular delay.

Policy 6. Design and locate site access driveways to minimize traffic disruption where possible considering items such as topography, past parcelization and other factors.

Policy 7. Minimize direct and uncontrolled property access from arterials.

Policy 8. Limit full access median breaks on arterials to a maximum of three per mile and include left-turn lanes at each.

Policy 9. Consider the construction of grade separations for intersections unable to meet minimum level of service standards.

Policy 10. Design local streets to conform to topography. Allow for deviation from "grid" system on local streets when they do not interfere with other traffic policies and traffic flows.

Policy 17. Require buildings expected to be serviced by delivery trucks to provide off-street facilities for access and parking.

Policy 23. Provide freeways in a manner similar to that shown on the Circulation Plan Map. Actual alignments to be determined by specific corridor studies.

Policy 24. Identify route alignments and right-of-way needs.

Policy 25. Identify interchange locations and preliminary designs.

Policy 26. Preserve freeway and interchange rights-of-way consistent with corridor study alignments and specifications.

Policy 34. Minimize the impacts of land use development on the circulation system. Review all development plans, rezoning applications, and proposed general plan amendments with respect to their impact on the transportation system, and require revisions as necessary.

Policy 35. Require new development and expansion of existing development in incorporated areas to fully provide for on-site transportation facilities including streets, curbs, traffic control devices, etc. Within unincorporated areas street improvements will be determined by County Ordinance.

Implementation

Implementation 28. Periodic review and if needed, revision of adopted ordinances that includes a Level of Service standard for the city and county to include a definition of Level of Service "C", procedures for how it is measured, and mitigation measures to keep from exceeding the standard.

B. Transit

Goals

Goal 4. Reduce traffic congestion and parking requirements and improve air quality through improved transportation services.

Policies

Policy 8. Encourage businesses and government to use flexible or staggered work hours so that travel demand is spread more evenly throughout the day.

C. Bikeways

Goals

Goal 1. Provide a circulation system which recognizes and response to the needs of bicycle travel.

Goal 2. Provide a circulation system that minimizes cyclist/motorist conflicts.

Goal 3. Provide a continuous easily-accessible bikeway system within the metro area.

Goal 4. Provide mechanisms to ensure the prompt implementation of the bikeway system.

Policies

Policy 5. Consider bicycle safety when implementing improvements for automobile traffic operations.

Policy 11. Construct bike lands in conjunction with all street improvement projects that coincide with the Bikeway Master Plan.

D. Parking

Goals

Goal 1. Provide an efficient parking system to respond to the needs of motorists.

Goal 2. Satisfy parking requirements in all new developments (residential, commercial, industrial, etc.) through off-street facilities.

Policies

Policy 3. Ensure that adequate on-site parking supply and parking lot circulation is provided on all plans in accordance with the adopted parking standards.

E. Airports

Goals

Goal 2. Develop, operate, and maintain Meadows Field and Bakersfield Municipal Airpark to meet aviation needs in the metro area.

Policies

Policy 2. Ensure compatibility between the general plan, airport master plans and airport land use compatibility plan.

4.17.4 Impacts and Mitigation Measures

Methodology

This section describes the impact analysis relating to transportation and traffic for the Project. It describes the methods used to determine the impacts of the Project and lists the thresholds used to determine whether an impact would be significant. Impacts were evaluated based on the Traffic Impact Analysis and VMT attached as Appendix J of this EIR.

Vehicle Miles Traveled

In 2013, the State of California approved legislation (Senate Bill 743) to change the primary basis of evaluation of traffic impacts in CEQA from LOS to VMT. CEQA Guidelines section 15064.3 was approved in December 2018 and became effective in early 2019. Section 15064.3 required agencies to implement the new VMT requirement no later than July 1, 2020.

In November 2017, the Governor's Office of Planning and Research (OPR) released a technical advisory containing recommendations regarding the assessment of VMT, proposed thresholds of significance, and potential mitigation measures for lead agencies to use while implementing the required changes contained in Senate Bill 743. OPR recommends that for most instances a per service population threshold should be adopted and that a 15% reduction below that of existing development would be a reasonable threshold.

The updated guidelines eliminate the use of automobile delay metrics, such as LOS, from determining significant environmental impacts from vehicle travel. In December 2018, the California Natural Resources Agency certified and adopted the CEQA Guidelines update, including a new CEQA Guidelines section implementing Senate Bill 743 (State CEQA Guidelines § 15064.3). VMT has been identified as the most appropriate metric to evaluate a project's transportation impacts, as projects that result in lower than average VMT support goals of reducing GHG emissions, while projects that result in higher than average levels of vehicle travel contribute to an increasing rate of GHG emissions.

Accordingly, as of July 1, 2020, under the statute and CEQA Guidelines, localities are required to rely on VMT instead of traffic delay as the primary metric for evaluating transportation impacts in CEQA documents. The existence of automobile delay impacts, or the adequacy of an LOS analysis, is not a basis under CEQA for challenging an EIR (Citizens for Positive Growth & Preservation v. City of Sacramento [2019] 43CA5th 609, 624). Accordingly, any traffic system improvements required to address LOS will be addressed through the Project Conditions of Approval.

This Section includes a description and discussion summarizing the LOS analysis in the Traffic Impact Analysis prepared for the Project. The included discussion is for information purpose and to make General Plan Consistency Analysis since the General Plan still includes policies regarding LOS levels on roadways.

Because Kern County and Kern COG have not adopted any policies or guidelines/methodologies establishing a threshold of significance for determining VMT analysis, the OPR Technical Advisory was used as the basis for establishing a threshold of significance and screening criteria for the Project.

The Kern COG regional transportation model was used to estimate baseline VMT and project VMT for existing and future cumulative scenarios. The model baseline year is 2020, and the cumulative future year is 2046. The output from the Kern COG model provides a detailed breakdown of the number of employees and trips and VMT by trip purpose and by countywide traffic analysis zone.

Operational Analysis

The area analyzed for the Project's operational analysis is generally bounded by Merle Haggard Drive on the north, the Airport Drive at SR 99 off-ramp on the south, Airport Drive on the east, and SR 99 on the west. The Operational Analysis includes a total of 14 intersections (11 signalized, three unsignalized). The scope of the Operational Analysis was developed in association with the Kern County Public Works Department-Traffic Division and Caltrans District 6.

Turn Movement Counts

Traffic counts were performed over the existing street network to determine existing street network to determine turning movements. These counts were conducted in September 2023 by Newport Traffic Studies, an independent traffic data collection company. These counts were collected during the AM (7:00 a.m. to 9:00 a.m.) and PM (4:00 p.m. to 6:00 p.m.) peak periods. The full existing turn movement counts are included in Appendix J of this EIR.

Project Trip Generation and Design Hour Volumes

The trip generation and design hour volumes for the high cube transload and cold storage warehouse uses were calculated using the Institute of Transportation Engineers (ITE) Trip Generation, 11th Edition. Trip generation and design hour volumes are available in Appendix J of this EIR. Passenger car and truck mode share percentages (percentage of total) were obtained from the South Coast Air Quality Management District High Cube Warehouse Trip Generation Study (2016), which was based on data from eight high cube warehouses in San Bernardino County's Inland Empire. The Average Daily Trip (ADT), AM and PM peak-hour rate equations, and peak-hour directional splits for ITE Land Use Codes 154 (High Cube Transload Warehouse) and 157 (High Cube Cold Storage Warehouse) were used to estimate project traffic. The peak hours of adjacent streets were determined to be 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. for morning and evening peak hours. **Table 4.17-1** presents the results.

Table 4.17-1: Project Trip Distribution

Land Use		Gross Floor Area	Daily	AM Peak Hour of Adjacent Street Traffic			PM Peak Hour of Adjacent Street Traffic		
				In	Out	Total	In	Out	Total
Building 1		738.5	Vehicle Trip Generation Rates (trips per 1,000 square feet of gross floor area)						
	High Cube Transload Warehouse (comprises 80% of building; ITE land use category 154)		1.4	0.06	0.02	0.08	0.03	0.07	0.10
			Total Vehicle Trip Generation						
			1,034	46	14	60	21	53	74
		Mode Share	Project Trip Generation by Vehicle Type						
	Passenger Cars (percentage of total)	74.22%	768	34	10	44	15	40	55
	2-Axle Trucks (percentage of total)	4.55%	48	2	1	3	1	2	3
	3-Axle Trucks (percentage of total)	4.18%	44	2	1	3	1	2	3
	4-Axle Trucks (percentage of total)	17.05%	177	8	2	10	4	9	13
	Total		1,037	46	14	60	21	53	74
Building 2		184.6	Vehicle Trip Generation Rates (Trips per 1,000 Square Feet of Gross Floor Area)						
	High Cube Cold Storage Warehouse (comprises 20% of building; ITE land use category 157)		2.12	0.08	0.03	0.11	0.03	0.09	0.12
			Total Vehicle Trip Generation						
			392	16	5	21	7	16	23

Land Use		Gross Floor Area	Daily	AM Peak Hour of Adjacent Street Traffic			PM Peak Hour of Adjacent Street Traffic		
		Mode Share	Project Trip Generation by Vehicle Type						
	Passenger Cars (percentage of total)	74.22%	291	12	3	15	5	12	17
	2-Axle Trucks (percentage of total)	4.55%	18	1	1	2	1	1	2
	3-Axle Trucks (percentage of total)	4.18%	17	1	1	2	1	1	2
	4-Axle Trucks (percentage of total)	17.05%	67	3	1	4	1	3	4
	Total		1,459	65	20	85	31	74	105
	Combined Total Project Trips								
		Mode Share	Combined Total Project Trip Generation by Vehicle Type						
	Passenger Cars (percentage of total)	74.22%	1,059	46	13	59	20	52	72
	2-Axle Trucks (percentage of total)	4.55%	66	3	2	5	2	3	5
	3-Axle Trucks (percentage of total)	4.18%	61	3	2	5	2	3	5
	4-Axle Trucks (percentage of total)	17.05%	244	11	3	14	5	12	17
	Total Combined Project Vehicle Trips		**1,430**	**63**	**20**	**83**	**29**	**70**	**99**

Key:
ITE = Institute of Transportation Engineers

Trip Distribution and Assignment

The project trip distribution in **Table 4.17-1** represents the most likely travel routes for Project site accessibility. The project distribution patterns were estimated based on major commute routes, truck routes, freight haul corridors, and concentrations of residential and commercial employment centers. Truck trip distribution patterns were specifically determined based on the City of Bakersfield truck route map.

Future Year Traffic Volumes

The cumulative conditions scenario reflects regional growth in traffic up to the year 2046. The growth in traffic is provided from Kern COG model projections. The model includes planned and approved regional improvements which result in traffic diverting to new routes with more capacity. The 2046 model network includes future improvements consistent with the Regional Transportation Improvement Program (RTIP), representing, at a minimum, the fiscally constrained capital improvements projects identified in the RTP.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identifies the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant adverse effect on traffic and transportation.

A project would normally be considered to have a significant impact if it does the following:

- Conflicts with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities
- Conflicts or is inconsistent with CEQA Guidelines § 15064.3 (b)
- Substantially increases hazards due to a design feature (for example, sharp curves or dangerous intersections) or incompatible uses
- Results in inadequate emergency access

Impact 4.17-1: The Project would conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.

The Project is located within the metropolitan plan area of Kern County where the service goal for roadway facilities is LOS "C". Per the MBGP, streets where existing LOS is below "C", requires special consideration for mitigation measures to prevent or delay degradation of the existing LOS. To determine MBGP consistency relating to intersection and roadway LOS, the Traffic Study provides an analysis of the operations of the existing and future street system with the addition of traffic associated with the Project. The operational analysis includes LOS analysis for peak-hour intersection and daily roadway operations, as well as queueing and signal warrant evaluation. The analysis within the Traffic Study also identifies potential LOS or geometric deficiencies related to the Project.

Existing Level of Service (2023)

Table 4.17-2 provides the LOS requirements for signalized intersections by control delay in seconds per vehicle, as provided in the HCM 6 Chapter 19. **Table 4.17-3** provides service for a two-way stop controlled or side-street stop-controlled intersection which is determined by the control delay in seconds per vehicle of the minor-street movement (or shared movement) with the worst LOS. As illustrated, according to the MBGP, an acceptable wait time at a signalized or control stop intersection is less than 25 seconds per vehicle.

Table 4.17-2: Level of Service Criteria for Signalized Intersections

Control Delay (seconds/vehicle)	LOS by Volume-to-Capacity Ratio[1]	
	Volume/Capacity Ratio ≤ 0.99	Volume Capacity Ratio < 1.0
≤ 10	A	F
> 10-15	B	F
> 15-25	C	F
> 25-35	D	F
> 35-50	E	F
> 50	F	F

Source: Traffic Study (Appendix J)

1For approach-based and intersection-wide assessments, LOS is defined solely by control delay (HCM 6 Exhibit 19-8)
Key:
LOS = level of service

Table 4.17-3: Level of Service Criteria for Stop Controlled Intersections

Control Delay (seconds/vehicle)	LOS by Volume-to-Capacity Ratio1	
	Volume/Capacity Ratio ≤ 1.0	Volume Capacity Ratio > 1.0
0-10	A	F
> 10-15	B	F
> 15-25	C	F
> 25-35	D	F
> 35-50	E	F
> 50	F	F

Source: Traffic Study (Appendix J)

1For approaches and intersection wide assessment, LOS is defined solely by control delay (HCM 6 Exhibit 20-1)
Notes: The LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for the uncontrolled major-street approaches or for the intersection as a whole
Key:
LOS = level of service

To determine existing LOS for the intersections within the study area, the study considered existing intersection geometrics and existing AM and PM peak-hour traffic counts for the signalized and stop controlled intersections. Based on the traffic counts at the 14 intersections included in the study area, the delay ranged between 8.7 and 57.0 seconds during AM peak hour and 8.7 and 70.3 seconds during PM peak hours, respectively. The intersection that experienced the greatest delay during both AM and PM peak hours is the Golden State Highway SB ramps and 7th Standard Road, where the AM peak-hour delay was 57.0 seconds, and the PM peak hour was 70.3 seconds. **Table 4.17-4** provides the full range of control delay per intersection and their associated determined LOS, based on existing conditions.

Table 4.17-4: Intersection Level of Service for Existing (2023) Conditions

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
Airport Drive and Boughton Drive/West Day Ave	TS	15.7	B	15.5	B
Airport Drive/Norris Road	TS	32.4	C	26.8	C
Airport Drive/Olive Drive/Decatur Street	TS	26.6	C	30.1	C
Airport Drive/Roberts Lane	TS	34.9	C	34.4	C
Airport Drive/State Road/ SR 99 NB Off-ramp	TS	14.2	B	21.9	C
Olive Drive/Roberts Lane	**TS**	**18.8**	**B**	**39.6**	**D**
Olive Drive/State Road	TS	27.5	C	19.2	B
State Road/SR 99 NB ramps	SSSC	12.7	B	16.8	C
Olive Drive/SR 99 SB ramps	**SSSC**	**24.9**	**C**	**45.5**	**E**
Golden State Highway SB ramps/7th Standard Road	**TS**	**57.0**	**E**	**70.3**	**E**
SR 99 Connector to Highway 65/Merle Haggard Drive	TS	24.4	C	33.4	C
Merle Haggard Drive/Wings Way	TS	12.4	B	18.1	B
Airport Drive/Merle Haggard Drive	TS	19.3	B	29.1	C
Boughton Drive/Hanger Way	SSSC	8.7	A	8.7	A

Source: Traffic Study (Appendix J)

Key:
Delay = seconds per vehicle
LOS = level of service
SSSC = side-street stop-controlled
TS = traffic-signal controlled

Based on LOS criteria and peak-hour traffic counts, the operation analysis determined existing traffic at study area intersections operates either at or below acceptable levels of the MBGP. Of the fourteen intersections analyzed, three intersections are currently operating below acceptable levels; at PM peak hour, the intersection of Olive Drive at Roberts Lane operates at a LOS D, Olive Drive at SR 99 southbound (SB) ramps operates at LOS E, and the Golden State Highway SB ramps at 7th Standard Road operates at level E for both AM and PM peak hours.

Opening Year Conditions with Project

To determine the LOS with the Project traffic by year 2025, the study compares the opening-year conditions (2025) to opening-year conditions with the Project traffic. The opening-year scenario is composed of ambient growth in traffic (traffic generated by development in the area up to the year 2025) with a growth rate of 3.5% annually. To determine the LOS of opening year plus the Project, the scenario adds the Project's estimated traffic generation at buildout year 2025. **.17-5** compares opening-year LOS with opening-year-plus-Project LOS.

Table 4.17-5: Intersection Level of Service for Opening Year and Opening Year Plus Project

Intersection	Control Type	Opening Year Conditions				Opening Year plus Project			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Airport Drive and Boughton Drive/West Day Avenue	TS	16.7	B	16.3	B	15.4	B	14.5	B
Airport Drive/Norris Road	**TS**	**36.9**	**D**	**30.1**	**C**	**36.6**	**D**	**30.1**	**C**
Airport Drive/Olive Drive/Decatur Street	**TS**	**28.2**	**C**	**33.1**	**C**	**30.5**	**C**	**36.1**	**D**
Mitigation: convert eastbound and westbound through lane to shared left-through lane and split phase east-west		**N/A**				**31.6**	**C**	**34.2**	**C**
Airport Drive/Roberts Lane	**TS**	**39.0**	**D**	**38.5**	**D**	**39.0**	**D**	**38.8**	**D**
Airport Drive/State Road/ SR 99 NB off-ramp	TS	14.5	B	23.2	C	14.8	B	23.4	C
Olive Drive/Roberts Lane	**TS**	**19.7**	**B**	**47.8**	**D**	**19.9**	**B**	**50.0**	**D**
Olive Drive/State Road	**TS**	**40.2**	**D**	**20.1**	**C**	**47.4**	**D**	**20.4**	**C**
State Road/SR 99 NB ramps	SSSC	13.2	B	17.9	C	13.2	B	18.5	C
Olive Drive/SR 99 SB	**SSSC**	**27.6**	**D**	**54.3**	**F**	**29.3**	**D**	**57.2**	**F**
Golden State Highway SB ramps/7th Standard Road	**TS**	**62.9**	**E**	**81.7**	**F**	**68.1**	**E**	**84.0**	**F**
SR 99 Connector to Highway 65/Merle	**TS**	**25.7**	**C**	**37.0**	**D**	**26.2**	**C**	**38.2**	**D**
Merle Haggard Drive/ Wings Way	**TS**	**12.8**	**B**	**20.2**	**C**	**12.9**	**B**	**20.8**	**C**
Airport Drive/Merle Haggard Drive	**TS**	**20.4**	**C**	**36.5**	**D**	**21.0**	**C**	**41.2**	**D**
Boughton Drive/Hanger Way	SSSC	8.7	A	8.7	A	8.7	A	8.7	A

Source: Traffic Study (Appendix J)

Key:
Delay = seconds per vehicle
LOS = level of service
NB = northbound
SB = southbound
SSSC = side-street stop-controlled
TS = traffic-signal controlled

As shown in **Table 4.17-5** above, the majority of the study intersections operate at LOS D or better during both peak hours, with the exception of Olive Dr at SR 99 SB ramps and Golden State Highway/SB SR 99 off-ramp at 7th Standard Road. The intersection of Olive Drive at State Route 99 Southbound ramps operates at LOS F during the PM peak hour and the intersection of Golden State Highway/SB SR 99 off-ramp at 7th Standard Road operates at LOS E during the AM peak hour and LOS F during the PM peak hour. These intersections are identified as opening year network deficiencies occurring prior to the addition of Project traffic.

Ultimately, the addition of Project generated traffic causes a deficiency in LOS for one intersection when compared to the opening year, under the no project condition. The intersection of Airport Drive/Olive Drive and Decatur Street would change from a LOS C to a LOS D in the PM peak hour with the Project. However, with improvements (illustrated in **Figure 4.17-4**), the intersection would operate at LOS C as required by **Mitigation Measure MM 4.17-1**. Implementation of **MM 4.17-1** would require the project proponent to coordinate with the Kern County Public Works Department by opening year to fully fund and secure road encroachment permits, which would allow for the conversion of the inside eastbound and westbound through lanes to a shared left-through for eastbound and westbound left-turn movements. This would add capacity for turn movements and improve peak-hour LOS.

Figure 4.17-4: Aerial View of Airport Drive/Olive Drive/Decatur Street with Proposed Mitigation

Nonetheless, the addition of Project-generated traffic to the existing traffic at opening year (2025) would cause a deterioration in traffic operations on the existing street system. With the Project, increased congestion from intersection delay would occur at the intersection of Airport Drive/Olive Drive/Decatur Street.

However, without the Project, eight of the studied intersections are expected to operate below LOS C at opening year during commuter peak periods:

- Airport Drive/Norris Road in the AM peak hour
- Airport Drive/Roberts Lane in both the AM and PM peak hours
- Olive Drive/Roberts Lane in the PM peak hour
- Olive Drive/State Road in the AM peak hour
- Olive Drive/SR 99 SB ramps in both the AM and PM peak hours
- Golden State Highway SB ramps/7th Standard Road in both the AM and PM peak hours
- SR 99 Connector to Highway 65/Merle Haggard Dr in the PM peak hour
- Airport Drive/Merle Haggard Drive in the PM peak hour

Off-Site Improvements

To comply with Kern County Public Works Department roadway standards, the Project would include associated roadway improvements. This includes right-of-way dedication on Airport Drive, Boughton Drive, and Hanger Way. In addition to right-of-way dedication, the road would require right-turn channelization and a drive approach of 35 feet with a median along Airport Drive project frontage. Boughton Drive and Hanger Way would require a 45-foot half width collector. While these improvements along the Project boundary would be required by the development and roadway standards, the Traffic Study (Appendix J) concludes that there are no practical improvements toward which new development could contribute funds to improve the LOS at the two intersections that are expected to operate at LOS "F" by 2025. These intersections are Olive Drive and SR 99 ramps and Golden State Highway SB ramps and 7th Standard Road and discussed in detail below.

At the Olive Drive and SR 99 Southbound on- and off-ramps, the intersection is SSSC, where delay is caused by the traffic turning left from the off-ramp and effects 8% of the traffic entering the intersection. Due to the proximity of the off-ramp to the adjacent side street (Knudson Drive), there is insufficient spacing for a traffic signal at the off-ramp without causing unacceptable delays for the traffic traveling along Olive Drive and Knudson Drive. As such, the Traffic Study noted that there are no feasible improvements to satisfy the left-turn movement for a LOS D or better at the intersection of Olive Drive and SR 99 Southbound on- and off-ramps.

Similarly, the intersection of Golden State Highway and SR 99 Southbound off-ramp at 7th Standard Road would require a major reconstruction and potentially widening of the 7th Standard Road railroad and SR 99 overcrossing structures due to several site constraints. This signalized intersection is raised on an abutment as part of the 7th Standard Road overcrossing of the railroad and the Highway 99 overcrossing. The abutment was constructed with stable slopes down to grade level at the right-of-way line on the west and south sides of the intersection.

The addition of lanes on 7th Standard Road could require widening of the railroad overcrossing structure and/or the Highway 99 overcrossing structure in addition to the construction of a substantial amount of retaining walls to replace the current slopes on the west and south sides of the intersection. Similarly, widening of the southbound off-ramp approach to 7th Standard Road or the Golden State Highway approach and departure lanes south of 7th Standard Road would also require construction of a substantial amount of retaining walls.

Since each approach of the Golden State Highway/SR 99 SB Off-ramp/7th Standard Rd operates at a deficient level of service, multiple approaches would require additional capacity to improve the overall intersection to a LOS D or better. Any capacity improvements that would improve the LOS would require a major reconstruction of the intersection including extensive retaining walls and, potentially, the widening of 7th Standard Road railroad and SR 99 overcrossing structures. Therefore, there are no practical improvements in which new development could contribute funds to improve the operation to a LOS C or better at the Golden State Highway/SR 99 SB off ramp and 7th Standard Rd intersection. Additionally, lane widening could contribute to an increase in VMT, which could result in a potentially significant environmental impact.

Table 4.17-6 provides a summary of the traffic signal warrant analysis.

Table 4.17-6: Summary of Traffic Signal Warrant Analysis at the Intersection of Olive Drive and SR 99 SB ramps

Warrant	Warrant Title	Warrant Analysis Findings
1	Eight-Hour Vehicular Volume	This warrant has three volume conditions that may be met to satisfy the warrant. The intersection of Olive Drive and the SR 99 SB ramps does meet Condition A or Condition B at 100% or 80%. The approach volumes for the minor leg are below the threshold. As such, this warrant would not be met.
2	Four-Hour Vehicular Volume	This warrant includes plotting the highest 4 hours on a chart with a minimum threshold volume. The intersection of Olive Drive and the SR 99 SB ramps is identified as rural due to Olive Drive having a posted speed limit of 50 mph. Figure 4C-2 is utilized and only 2 of the 4 hours plotted above the minimum threshold of 60 vehicles per hour. As such, this warrant would not be met.
3	Peak Hour	This warrant includes plotting the peak hour on a chart with a minimum threshold volume. The intersection of Olive Drive and the SR 99 SB ramps is identified as rural due to Olive Drive having a posted speed limit of 50 mph. Figure 4C-4 is utilized and the plot was below the minimum threshold of 75 vehicles per hour. As such, this warrant would not be met.
4	Pedestrian Volume	The intersection of Olive Drive and the SR 99 SB ramps does not have a marked crosswalk crossing the major street (Olive Drive). There is a pedestrian crosswalk crossing the two-lane SR 99 southbound on-ramp from eastbound Olive Drive for pedestrians using the sidewalk on the south side of Olive Drive who are crossing the overpass. The warrant is typically applied to crossing the major or minor street being considered for signalization. This warrant is not applicable to this intersection.
5	School Crossing	The intersection is not a school crossing. This warrant is not applicable.
6	Coordinated Signal System	This warrant is to determine if a signal is installed and coordinated with other adjacent signalized intersections would it improve vehicle

Warrant	Warrant Title	Warrant Analysis Findings
		platooning and the efficiency of traffic movements within a band of green time in the peak direction. Due to the short distance to the adjacent signal at Knudsen Drive (about 220 feet) a signal at the Olive Drive and the SR 99 SB ramps intersection would be difficult to coordinate and likely worsen the ability to generate platoons of vehicles.
7	Crash Experience	According to the Transportation Injury Mapping System, there have been two injury crashes at this intersection between March 17, 2019, and March 17, 2024. While there may be additional property damage only crashes, but based on two crashes this warrant would not be met.
8	Roadway Network	This warrant requires meeting warrants 1, 2, and 3, which it does not. Therefore, this warrant will not be met.
9	Intersection Near a Grade Crossing	This warrant is not applicable to this intersection.

Source: California Manual on Uniform Traffic Control Devices (CA MUTCD), 2014 Edition, Revision 6 (March 30, 2021). Section 4C.01 Studies and Factors for Justifying Traffic Control Signals. Refer to Chapter 8 of Traffic Impact Analysis (Appendix J) for more detailed discussion.

Key:
SB = southbound

Summary

Vehicle Miles Traveled

Senate Bill 743 changed the primary basis of the evaluation of traffic deficiencies in CEQA from LOS to VMT. With CEQA Guidelines Section 15064.3 in effect, the provisions of the statute specifying that automobile delay (as measured by LOS or similar standards) will not be considered a significant impact on the environment govern the analysis of traffic impacts under CEQA. [Pub Res C §21099 (b) (2).]

Level of Service

As noted above, the LOS analysis is presented for information and General Plan consistency and is not a basis for determining significant environmental impact. Specifically, *Citizens for Positive Growth & Preservation v City of Sacramento* (2019) 43 C5th 609, 624 (LOS-based challenge moot in light of enactment of CEQA Guideline 15064.3).

The addition of Project-generated traffic to the future street system would result in the addition of one deficient intersection when compared to no project operations. However, the LOS deficiency is not an adequate threshold to determine a significant environmental impact. In order to improve LOS at deficient intersections adjacent to the Project, **Mitigation Measure MM 4.17-1** would address these deficiencies by allowing for greater capacity for turn-movements. Additionally, **MM 4.17-2** would require the submittal of payment of a fair share fee towards a long-term solution.

Transit, Bike, and Pedestrian Facilities

As noted previously, there are Class II Bike lanes that terminate at two intersections adjacent to the Project site (Airport Drive at West Day Avenue and Airport Drive at Hanger Way/Skyway Drive), per the Kern County ATP (Northeast Area). Additionally, the Project contains five driveways along

Airport Drive, which is identified as containing a Class II Bike lane along the roadway, per the 2012 Bicycle Master Plan. **Mitigation Measure MM 4.17-2** would require the developer to pay the required Transportation Traffic Impact Fees for Metropolitan Bakersfield that would be utilized to provide continuous bikeways and pedestrian paths, identified in the Kern County ATP, in coordination with the Kern County Public Works Department.

The Project is not located along an existing bus route and few bus stops exist on the roadways likely to be used during construction and operation. The Project would have employees stagger at three shifts, as to spread out travel demand. Although the Project would not house residents or employees, the project proponent would be required to implement **Mitigation Measure MM 4.17-3,** which would incentivize alternative means of transportation to further reduce VMT for employees.

Conclusion

Implementation of the Project would reduce the level of service from LOS C to LOS D at the Airport Drive/Olive Drive/Decatur Street intersection, which would render the intersection from an acceptable to unacceptable LOS with the Project in the opening year. However, with **Mitigation Measure MM 4.17-1**, the LOS would remain at an acceptable level and would be consistent with MBGP policy. In regard to active transportation, the Kern County ATP identifies a Class II bike lane opportunity adjacent to the Project. With implementation of **Mitigation Measure MM 4.17-2,** fees would be utilized to ensure continuous bikeways identified in the Kern County ATP. Furthermore, **Mitigation Measure MM 4.17-3** would work to reduce vehicle trips associated with the project by incentivizing alternative modes of transportation and thereby reducing vehicle trips, incidentally, reducing intersection congestion and improving active transportation circulation. With implementation of **Mitigation Measures MM 4.17-1** through **MM 4.17-3,** the Project would not conflict with plans and policies addressing the circulation system. Therefore, impacts would be less than significant.

Mitigation Measures

MM 4.17-1 To improve traffic during operation of the project, the following traffic improvements shall be constructed at the intersection of Airport Drive/Olive Drive/Decatur Street prior to the buildout year of opening day; costs shall be funded entirely by the project proponent and at no cost to either the County of Kern or the California Department of Transportation (Caltrans):

a. Convert the inside eastbound and westbound through lanes to shared left-through lanes to provide two lanes for the eastbound and westbound left turn movements.

b. Implement split phased signal operation to all the separation of traffic movements in the eastbound and westbound direction.

c. Implement a split phasing scheme that re-optimizes the intersection timing including increasing the cycle length to 140 seconds in both the AM and PM peak hours.

Prior to final occupancy, the project proponent shall complete the following:

a. Record an irrevocable offer of dedication to the County of Kern of all subject frontage along:

    1. Airport Drive, 55 feet in width, and additional right-of-way for right turn channelization, per the Kern County Land Division Ordinance, and Development Standards

    2. Boughton Drive, 55 feet in width, and additional right-of-way for right turn channelization, per the Kern County Land Division Ordinance, and Development Standards

    3. Hangar Way, 45 feet in width, and additional right-of-way for right turn channelization, per the Kern County Land Division Ordinance, and Development Standards

b. Under street improvement plans submitted for review and approval by the Kern County Public Works Department:

    1. Construct Airport Drive project frontage to "Type A" Subdivision Standard, half width Arterial Street, and right turn lane (Plate R-40), per the Kern County Development Standards and the Land Division Ordinance. These improvements shall be, but not limited to: curb, gutter, sidewalk, wheelchair ramps, asphalt concrete, and the necessary tie-ins.

    2. Construct Type B1 curb (Plate R-52), raised median curb along the Airport Drive project frontage, from Boughton Drive to Skyway Drive, per the Kern County Development Standards and Land Division Ordinance.

    3. Construct Boughton Drive project frontage to "Type A" Subdivision Standard, half width Arterial Street, and right turn lane (Plate R-40), per the Kern County Development Standards and the Land Division Ordinance. These improvements shall be, but not limited to: curb, gutter, sidewalk, wheelchair ramps, asphalt concrete, and the necessary tie-ins.

    4. Construct Hangar Way project frontage to "Type A" Subdivision Standard, half width Collector Street, and right turn lane (Plate R-40), per the Kern County Development Standards and the Land Division Ordinance. These improvements shall be, but not limited to: curb, gutter, sidewalk, wheelchair ramps, asphalt concrete, and the necessary tie-ins.

    5. Construct a traffic signal at the intersection of Airport Drive and Park Meadows Avenue in accordance with Kern County Development Standards and Land Division Ordinance.

    6. Include a striping plan and streetlight plan

c. Provide a 20-foot by 20-foot right of way corner cutoff at all intersections.

d. All employee drive approaches shall conform to Plate R-58, widths to be determined in consultation with Kern County Public Works Department and per the Kern County Development Standards and the Land Division Ordinance.

e. All truck drive approaches shall conform to Plat eR-58, widths to be determined in consultation with Kern County Public Works Department and per the Kern County Development Standards and the Land Division Ordinance.

f. All easements shall be kept open, clear, and free from buildings and structures of any kind pursuant to Chapters 18.50 and 18.55 of the Kern County Land Division Ordinance. All obstructions, including utility poles and lines, trees, pole signs, fences, or similar obstructions, shall be removed from the ultimate road right-of-way. Compliance with this requirement is the responsibility of the applicant and may result in significant expenditures.

MM 4.17-2 Prior to the issuance of any building permit within Metropolitan Bakersfield, the project proponent shall pay the required Transportation Traffic Impact fees.

MM 4.17-3 Prior to the issuance of a Certificate of Occupancy for any tenant(s), the project proponent shall coordinate with the tenant(s) to prepare a Transportation Demand Management program to reduce Vehicle Miles Travelled associated with employee trips and submit a copy to the Planning and Natural Resources Department to be kept on file. The program shall include Transportation Demand Management measures that would individually reduce the proposed project's Vehicle Miles Traveled and trips, with the goal of obtaining a Vehicle Miles Traveled reduction to lessen the proposed project's Vehicle Miles Traveled impact. The following Transportation Demand Management measures would be implemented by the proposed project as part of the Transportation Demand Management program:

a. Alternative-Mode Subsidies and Incentives: provide subsidization of transit fares, carpool, or electric vanpool for employees of the project site. Provide monetary incentives for alternate modes of transportation.

b. Travel Behavior Change Program: Provide a web site that allows employees to research other modes of transportation for commuting to the site.

c. Promotions and Marketing: Provide marketing and promotional tools to educate and inform travelers about site-specific transportation options and the effects of their travel choices with passive educational and promotional materials.

d. Commute Assistance Center: Provide a computer kiosk that allows employees to research other modes of transportation for commuting.

e. Preferential Carpool/Vanpool Parking Spaces: Provide reserved carpool/vanpool spaces closer to the building entrance.

f. Passenger Loading Zones: Provide passenger loading zones for easy access to carpools or vanpools.

g. Bike Share: Implement bike share to allow people to have on-demand access to a bicycle, as needed.

h. Bike Parking and Facilities: Include secure bike parking and showers to provide additional end-of-trip bicycle facilities to support safe and comfortable bicycle travel. Provide on-site bicycle repair tools and space to use them supports ongoing use of bicycles for transportation.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.17-1** through **MM 4.17-3** would be required.

Level of Significance

With implementation of **Mitigation Measures MM 4.17-1** through **MM 4.17-3,** impacts would be less than significant.

Impact 4.17-2: The Project would conflict or be inconsistent with CEQA Guidelines § 15064.3 (b).

The Project consists of two warehouse buildings with a total area of 923,130 square feet. The primary function is a distribution and logistics facility that would require modifications to the interior design for the final user. All interior modifications would require a tenant improvement permit that will be subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. Building Code, Fire Code, Plumbing Code, etc.). Outdoor storage is not proposed as part of this project.

Trip generation rates for High Cube Warehouse, as described above, predict a total of 1,430 vehicle trips per day, with 83 vehicle trips in the AM peak hour, and 99 vehicle trips in the PM peak hour. The trip generation for the Project exceeds OPR's threshold of 110 daily trips. As a result, the Project is not screened from conducting a VMT analysis based on this criterion. As of 2024, the Kern County Public Works Department - Traffic Division has not finalized or adopted any policies or thresholds for VMT analysis; therefore, the OPR Technical Advisory is used as the basis for this evaluation per the Traffic Study (Appendix J).

For nonresidential development (except retail) OPR recommends a threshold of significance at 15% below the baseline metric of countywide VMT per employee. While no specific recommendations are provided for industrial land use, the trip-making characteristics of warehousing are very similar to those of office buildings where most of the passenger vehicle trips are generated by employees. Therefore, the focus of per employee evaluation is the home-based work trip per employee.

As discussed above, the Kern COG regional transportation model is used to estimate countywide metrics for home-based work VMT per employee. The current model baseline year is 2020, and the cumulative future year is 2046. Based on Kern COG, the average countywide VMT per employee is 37.58 in 2020, and 35.40 in 2046. This translates to a total of 11,327,204 home to work VMT per employee in 2020 and 12,706,296 home to work VMT per employee in 2046 for office uses.

Based on the Traffic Study, the Kern COG model estimates that a total of 444 employees (conversion from building floor area to employees per the Southern California Association of Governments Employment Density Study Summary Report) would generate about 7,280 home-based work daily VMT in baseline conditions. This results in a metric of 16.40 home-based work VMT per employee, which is approximately half of the significance threshold of 31.94 VMT per employee countywide, as seen below in **Table 4.17-7**. It is important to note that while the home to work VMT is recommended for office use, the source for the number of employees utilized a warehousing conversion of 2,111 square feet per employee. This conversion captures the intensive truck trips associated with warehousing projects, per the Southern California Association of Governments Employment Density Study Summary Report (Appendix J).

As seen in the table below, 2046 future conditions indicate a lower home-based work trip per employee. This is to be expected as the Project-generated VMT would reduce slightly to reflect the maturation of development within the Project area, providing opportunities for employees to reside closer to the workplace. In 2046, the VMT per employee is anticipated to reduce to a total of 14.88 VMT per employee, which is less than 50% of the 31.94 VMT per employee significance threshold.

Table 4.17-7: Comparison of Project Generated Home-Based Work VMT Per Employee

Year	Home to Work Project Generated VMT[1]	Project Employment[2]	Project VMT Per Employee	Significance Threshold (VMT Per Employee)[3]	Exceed Significance Threshold?
2020	7,280	444	16.40	31.94	No
2046	6,605	444	14.88		No

Source: Traffic Study (Appendix J)

1 Daily project VMT for home to work trip purpose (2020 and 2046) is from Kern COG.

2 Source of conversion from building floor area to employees: Southern California Association of Governments (SCAG) Employment Density Study Summary Report, October 31, 2001. Table 7A (Derivation of Square Feet per Employee Based on Median Employees Per Acre and Median Floor Area Ratio (FAR) in San Bernardino County). For warehousing, the conversion is 2,111 square feet per employee.

3 Significance Threshold (85% of countywide baseline VMT/Employee) is based on the recommendations in the California Office of Planning and Research (OPR) Technical Advisory (Dec. 2018). This study used OPR's threshold recommendation for office land uses which is based on employee commute trips and very similar to industrial land uses. The OPR recommended significance threshold requires that project-generated VMT/Employee not exceed 15% less than countywide average baseline home-to-work-based VMT/employee metric.

Key:

VMT = vehicle miles traveled

Conclusion

The VMT analysis determined that the Project generated home-based work VMT per employee is less than the significance threshold for both baseline conditions (2020) and future cumulative conditions (2046). Nonetheless, implementation of **Mitigation Measure MM 4.17-3** will ensure further reduction of VMT associated with employee trips. Therefore, the Project has a less than significant VMT impact.

Mitigation Measures

Implement Mitigation Measure MM 4.17-3Level of Significance

With implementation of **Mitigation Measure MM 4.17-3**, impacts would be less than significant.

Impact 4.17-3: The project would substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

The Project site is described as having a flat topography, with no elevations that would obstruct views if sharp curves were within the Project area. Additionally, there are no incompatible uses within the Project vicinity. However, the introduction of construction-related traffic would have the potential to increase accident rates and could result in significant impacts. The delivery of heavy construction equipment may require transport by oversize vehicles using area roadways. The delivery of heavy equipment would be hauled in and out of the Project site on an as-needed basis. These deliveries and use of oversize vehicles during construction can create a hazard to the public by limiting motorist views on roadways and creating obstructions, which is considered a potentially significant impact. With implementation of **Mitigation Measure MM 4.17-4**, as listed below, it would be required that information be provided regarding any movement of oversized/overweight vehicles that would require transport over publicly maintained State or County roads. Additionally, the project proponent shall provide a Construction Traffic Control Plan for Kern County and Caltrans approval. In addition to mitigation, the Project contains associated roadway improvements along Airport Drive, Boughton Drive, and Hanger Way that include medians along Project frontage, right-turn channelization, and increased with of collector streets along the frontage of the Project. These improvements would create enhanced design features along the Project frontage.

Once operational, the Project will operate as a distribution and logistics facility. The final end user may require modifications to the interior of the building to accommodate specialized storage and handling equipment for the goods and materials that may include but are not limited to finished products, consumer goods, parts, materials, tires, tools, etc. typically found in a modern distribution/logistics facility. Any modification to the interior of the building will require a tenant improvement permit that is subject to plan check review and require issuance of a building permit to ensure compliance with applicable codes (i.e. Building Code, Fire Code, Plumbing Code, etc.). Outdoor storage is not proposed as part of this project. As such, impacts regarding substantially increasing hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment) are not expected based on any specific product stored on-

site and entirely within the proposed warehouse. Regardless, Kern County is requiring **Mitigation Measure MM 4.17-4**.

Mitigation Measures

MM 4.17-4 Prior to the issuance of construction or building permits, the project proponent/operator shall:

a. Prepare and submit a Construction Traffic Control Plan to Kern County Public Works Department – Traffic Division and the California Department of Transportation offices for District 6, as appropriate, for approval. The Construction Traffic Control Plan must be prepared in accordance with both the California Department of Transportation Manual on Uniform Traffic Control Devices and Work Area Traffic Control Handbook and must address, at a minimum, the following issues:

1. Timing of deliveries of heavy equipment and building materials;
2. Directing construction traffic with a flag person;
3. Placing temporary signing, lighting, and traffic control devices if required, including, but not limited to, appropriate signage along access routes to indicate the presence of heavy vehicles and construction traffic;
4. Ensuring access for emergency vehicles to the project sites;
5. Temporarily closing travel lanes or delaying traffic during materials delivery, transmission line stringing activities, or any other utility connections;
6. Maintaining access to adjacent property; and,
7. Specifying both construction-related vehicle travel and oversize load haul routes, minimizing construction traffic during the AM and PM peak hours.
8. Consult with the County to develop coordinated plans that would address construction-related vehicle routing and detours adjacent to the construction area for the duration of construction overlapping with neighboring projects. Key coordination meetings would be held jointly between applicants and contractors of other projects for which the County determines impacts may overlap.

b. Obtain all necessary encroachment permits for the work within the road right-of-way or use of oversized/overweight vehicles that will utilize county maintained roads, which may require California Highway Patrol or a pilot car escort. Copies of the approved traffic plan and issued permits shall be submitted to the Kern County Planning and Natural Resources Department, the Kern County Public Works Department-Traffic Division, and Caltrans.

c. Enter into a secured agreement with Kern County to ensure that any County roads that are demonstrably damaged by project-related activities are promptly repaired and, if necessary, paved, slurry-sealed, or reconstructed as per requirements of the State and/or Kern County.

d. Submit documentation that identifies the roads to be used during construction. The project proponent/operator shall be responsible for repairing any damage to county and non-county maintained roads that demonstrably result from construction activities. The project proponent/operator shall submit a pre-construction video log and inspection report regarding roadway conditions for roads used during construction to the Kern County Public Work Department-Traffic Division and the Kern County Planning and Natural Resources Department.

e. Within 30 days of completion of construction, the project proponent/operator shall submit a post-construction video log and inspection report to the County. This information shall be submitted in electronic format on USB. The County, in consultation with the project proponent/operator's engineer, shall determine project responsibility for the damage and the extent of remediation required, if any.

Mitigation Measure

Implementation of Mitigation Measure MM 4.17-4 would be required.

Level of Significance after Mitigation

With implementation of **Mitigation Measure MM 4.17-4**, impacts would be less than significant.

Impact 4.17-4: The project would result in inadequate emergency access.

The Project would generate construction trips, including the movement of oversize equipment, and the potential for roadway lane closures during construction. These factors could temporarily increase the daily traffic volumes on surrounding local roadways and at intersections. It is anticipated that emergency access would be maintained at all times, and appropriate detours would be provided, as necessary.

While the project would not require closures of public roads beyond the construction phase, which could inhibit access by emergency vehicles, heavy construction-related traffic could have the potential to interfere with emergency response or emergency evacuation procedures in the event of an emergency, such as a wildfire or a chemical spill. Heavy construction-related traffic could also interfere with emergency response to other uses in the vicinity and, therefore, could represent a significant impact.

To ensure emergency access during construction, **Mitigation Measure MM 4.17-4** requires the preparation of a Construction Traffic Control Plan and includes assurance of access for emergency vehicles and would therefore reduce potential impacts to less than significant.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.17-4** would be required.

Level of Significance after Mitigation

With implementation of **Mitigation Measure MM 4.17-4,** impacts would be less than significant.

4.17.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

Impacts of the Project would be considered cumulatively considerable if they would have the potential to combine with other past, present, or reasonably foreseeable projects to become significant. The potential for cumulative construction impacts exists where there are multiple projects proposed in an area with overlapping construction schedules that could affect similar resources. Cumulative operational impacts exist where multiple projects result in significant and unavoidable impacts to the same surrounding intersections and roadways.

Cumulative conditions represent regional growth in traffic up to the year 2046. Growth in traffic is from forecasts from the Kern COG model projections. The Kern COG 2046 model includes planned and approved regional improvements which result in traffic diverting to new routes with more capacity. These improvements are consistent with the RTP, representing, at a minimum, the fiscally constrained capital improvement projects identified in the RTP.

Consistency with Programs, Plans, and Policies

As a result of regional and local improvements to the road and highway network, some intersections under cumulative conditions experience better levels of service when compared to opening year conditions, as traffic diffuses throughout a more connected network and diverts to areas with increased capacity. However, as illustrated in **Table 4.17-8**, some intersections are anticipated to operate at below acceptable levels of operation, even with cumulative roadway improvements. Airport Drive at Norris Road, Airport Drive at Roberts Lane, Olive Drive at Roberts Lane, Olive Drive at SR 99 SB ramps and Golden State Highway SB ramps at 7th Standard Road, are all anticipated to operate at a LOS below acceptable levels, per the MBGP, and are identified as cumulative deficiencies occurring prior to the addition of the project.

Table 4.17-8: Intersection Level of Service for Cumulative Conditions

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
Airport Drive and Boughton Drive/West Day Avenue	TS	15.0	B	18.9	B
Airport Drive/Norris Road	**TS**	**25.6**	**C**	**40.4**	**D**
Airport Drive/Olive Drive/Decatur Street	TS	25.2	C	29.9	C
Airport Drive/Roberts Lane	**TS**	**38.7**	**D**	**43.9**	**D**

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
Airport Drive/State Road/SR 99 NB off-ramp	TS	14.4	B	20.5	C
Olive Drive/Roberts Lane	**TS**	**18.6**	**B**	**43.8**	**D**
Olive Drive/State Road	TS	12.3	B	19.0	B
State Road/SR 99 NB ramps	SSSC	14.1	B	17.0	C
Olive Drive/SR 99 SB ramps	**SSSC**	**23.9**	**C**	**40.2**	**E**
Golden State Highway SB ramps/7th Standard Road	**TS**	**55.0**	**E**	**59.5**	**E**
SR 99 Connector to Highway 65/Merle Haggard Drive	TS	25.1	C	33.0	C
Merle Haggard Drive/Wings Way	TS	12.8	B	17.5	B
Airport Drive/Merle Haggard Drive	TS	18.9	B	24.2	C
Boughton Drive/Hanger Way	SSSC	9.0	A	9.0	A

Source: Traffic Study (Appendix J)

Key:
Delay = seconds per vehicle
NB = northbound
SSSC = side-street stop-controlled
TS = traffic-signal controlled

As illustrated in **Table 4.17-9**, the addition of the Project to cumulative projects does not create a reduction in LOS at any intersections. With and without the project, it is anticipated that there would be five deficient intersections. The deficient intersection of Olive Drive and the SR 99 SB ramps does not meet signal installation Warrant #3 (Peak Hour) from the California Manual on Uniform Traffic Control Devices (CA MUTCD) in Cumulative Plus Project conditions. Other design and safety related factors were considered in determining feasible measures for improving the level of service deficiency at this intersection. **Mitigation Measure 4.17-2** would ensure LOS remain at an acceptable level at the intersection of Airport Drive/Olive Drive/Decatur Street.

Table 4.17-9: Comparison of Cumulative and Cumulative Plus Project Level of Service

Intersection	Control Type	Cumulative Conditions				Cumulative plus Project Conditions			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Airport Drive and Boughton Drive/West Day Ave	TS	15.0	B	18.9	B	13.0	B	16.1	B
Airport Drive/Norris Road	**TS**	**25.6**	**C**	**40.4**	**D**	**25.5**	**C**	**40.5**	**D**
Airport Drive/Olive Drive/Decatur Street	TS	25.2	C	29.9	C	26.6	C	32.0	C

Intersection	Control Type	Cumulative Conditions				Cumulative plus Project Conditions			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Mitigation: convert eastbound and westbound through lane to shared left-through lane and split phase east-west approaches left-through lane						27.8	C	34.3	C
Airport Drive/Roberts Lane	**TS**	**38.7**	**D**	**43.9**	**D**	**38.7**	**D**	**44.5**	**D**
Airport Drive/State Road/ SR 99 NB Off-ramp	TS	14.4	B	20.5	C	14.7	B	20.7	C
Olive Drive/Roberts Lane	**TS**	**18.6**	**B**	**43.8**	**D**	**18.7**	**B**	**45.4**	**D**
Olive Drive/State Road	TS	12.3	B	19.0	B	12.7	B	19.2	B
State Road/SR 99 NB ramps	SSSC	14.1	B	17.0	C	14.2	B	17.4	C
Olive Drive/SR 99 SB ramps	**SSSC**	**23.9**	**C**	**40.2**	**E**	**24.8**	**C**	**41.6**	**E**
Golden State Highway SB ramps/7th Standard Road	**TS**	**55.0**	**E**	**59.5**	**E**	**55.8**	**E**	**61.2**	**E**
SR 99 Connector to Highway 65/Merle Haggard Drive	TS	25.1	C	33.0	C	25.6	C	33.8	C
Merle Haggard Drive/Wings Way	TS	12.8	B	17.5	B	12.9	B	17.9	B
Airport Drive/Merle Haggard Drive	TS	18.9	B	24.2	C	19.4	B	27.3	C
Boughton Drive/Hanger Way	SSSC	9.0	A	9.0	A	9.0	A	8.9	A

Source: Traffic Study (Appendix J)

Key:
Delay = seconds per vehicle
LOS = level of service
SSSC = side-street stop-controlled
TS = traffic-signal controlled

Guidelines Section 15064.3(b) Consistency

Implementation of the Project would generate 7,280 home-based-work VMT in baseline conditions, and 6,605 home-based-work VMT by 2046. This project-generated VMT reduces slightly in the future reflecting the maturation of development in the vicinity of the Project. By 2046, VMT drops to 14.88 VMT per employee, nearly half of the significance threshold of 31.94. The Project would have a less than cumulatively considerable impact.

Geometric Design Features/Emergency Access

Cumulative projects surrounding the Project that would occur at the same time as the Project's construction would also be required to evaluate geometric hazards; therefore, cumulative impacts related to geometric hazards would be less than significant. The analysis above also evaluated geometric hazards generated by project improvements and found that, with implementation of the existing regulatory requirements and **Mitigation Measure MM 4.17-4**, which implements a Construction Traffic Control Plan. This would ensure that the Project does not significantly impact traffic during construction. Emergency access to the site is generally an impact contained at the site; therefore, the Project would not have a cumulative impact to the cumulative projects in the area. Regardless, the cumulative projects would also be required to evaluate cumulative impacts regarding site access for emergency vehicles.

Summary

Intersection and roadway improvements to maintain or improve the operational LOS of the street system in the vicinity of the Project would be implemented by the Project associated improvements, as outlined in **Mitigation Measure MM 4.17-1**, and through regional improvement funded through mitigation measures. **MM 4.17-2** would ensure appropriate funds for capital improvement projects to be constructed and maintained by Kern County Public Works Department – Traffic Division. Implementation of **Mitigation Measure MM 4.17-3** would require the incentivization of operational employees to utilize alternative methods of transportation to the site, thereby reducing VMT and incidentally, vehicle trips to and surrounding the site. Additionally, **Mitigation Measure MM 4.17-4** would reduce the potential for Project-related accidents during construction by requiring a Construction Traffic Control Plan be approved prior to construction. These mitigation measures and associated roadway improvements would reduce impacts to less than significant for conflicts with the MBGP, public transit and active transportation planning, and roadway hazards through the year 2046. Cumulative impacts to traffic and transportation would be reduced to less than significant with mitigation.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.17-**1 through **MM 4.17-4** would be required**.**

Level of Significance after Mitigation

With implementation of **MM 4.17-1** through **MM 4.17-4**, cumulative impacts would be less than significant.

Section 4.18

Tribal Cultural Resources

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Section 4.18

Tribal Cultural Resources

4.18.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding tribal cultural resources. It also evaluates impacts on tribal cultural resources that could result from implementation of the proposed IPG Industrial Project (Project), and identifies mitigation measures that would reduce these impacts, if necessary. This section is informed by the August 2023 Native American consultation conducted by the 2024 Phase I Historical/Archaeological Resources Survey and the 2023 Paleontological Resources Assessment Report, both prepared by CRM Tech (Appendix D) and Kern County (County) to comply with Assembly Bill 52 (AB 52) (Appendix K.1 through K.5).

Tribal Cultural Resource Terminology

As explained in Section 4.5, *Cultural Resources*, historical resources can include areas determined to be important to Native Americans, such as sacred sites. Sacred sites are most often important to Native American groups because of the role of the location in traditional ceremonies or activities. "Cultural resources" generally refer to pre-Contact and post-Contact (historic) archaeological sites and the built environment. Cultural resources can also include areas determined to be important to Native Americans.

As provided in Section 4.5, *Cultural Resources*, the following definitions of key tribal cultural resources terms used in this section are below:

- **Archaeological Site:** A site is defined by the National Register of Historic Places as the place or places where the remnants of a past culture survive in a physical context that allows for the interpretation of these remains. Archaeological remains usually take the form of artifacts (e.g., fragments of tools, vestiges of utilitarian, or non-utilitarian objects), features (e.g., remnants of walls, cooking hearths, or midden deposits), and ecological evidence (e.g., pollen remaining from plants that were in the area when the activities occurred). **Pre-Contact archaeological sites** generally represent the material remains of Native American groups and their activities dating to the period before European contact (the Contact period). In some cases, pre-Contact sites may contain evidence of trade contact with Europeans. **Ethnohistoric archaeological sites** are defined as Native American settlements occupied after the arrival of European settlers in California. **Historic archaeological sites** reflect the activities of nonnative populations in the period after initial European contact (the post-Contact period, also known as the historic period).
- **Artifact:** An object that has been made, modified, or used by a human being
- **Cultural Resource:** A cultural resource is a location of human activity, occupation, or use identifiable through field inventory, historical documentation, or oral evidence. Cultural

resources include archaeological resources and built environment resources (sometimes known as historic architectural resources), and may include sites, structures, buildings, objects, artifacts, works of art, architecture, and natural features that were important in past human events. They may consist of physical remains or areas where significant human events occurred, even though evidence of the events no longer remains. Cultural resources also include places that are considered to be of traditional cultural or religious importance to social or cultural groups.

- **Cultural Resources Study Area:** All areas within the project site boundary plus a 1-mile buffer
- **Cultural Resources Survey Area:** All areas of potential permanent and temporary impacts for a reasonable worst-case development within the project site, plus a 60-foot buffer to account for secondary or unanticipated impacts
- **Ethnographic:** Relating to the study of human cultures. "Ethnographic resources" represent the heritage resource of a particular ethnic or cultural group, such as Native Americans or African, European, Latino, or Asian immigrants. They may include traditional resource-collecting areas, ceremonial sites, value-imbued landscape features, cemeteries, shrines, or ethnic neighborhoods and structures.
- **Historic period:** The period that begins with the arrival of the first nonnative population and thus varies by area. In 1772, Commander Don Pedro Fages was the first European man to enter Kern County, initiating the historic period in the Project study area.
- **Historical resource:** This term is used for the purposes of the California Environmental Quality Act (CEQA) and is defined in the CEQA Guidelines (§15064.5) as: (1) a resource listed in or determined to be eligible for listing in the California Register of Historical Resources (CRHR); (2) a resource included in a local register of historical resources, as defined in Public Resources Code (PRC) §5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC §5024.1(g); and (3) any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record.
- **Isolate:** An isolated artifact or small group of artifacts that appear to reflect a single event, loci, or activity. It may lack identifiable context but has the potential to add important information about a region, culture, or person. Isolates are not considered under CEQA to be significant and, thus, do not require avoidance mitigation (CEQA Statute §21083.2 and CEQA Guidelines §15064.5). However, all isolates located during the field effort are recorded and the data are transmitted to the appropriate California Historical Resources Information System Information Center.
- **Lithic:** Of or pertaining to stone. In archaeology, lithic artifacts are chipped or flaked stone tools and the stone debris resulting from their manufacture.

- **Native American sacred site:** An area that has been, and often continues to be, of religious significance to Native American peoples, such as an area where religious ceremonies are practiced or an area that is central to their origins as a people. They also include areas where Native Americans gather plants for food, medicinal, or economic purposes.
- **Pre-Contact period:** The era prior to 1772. The latter part of the pre-Contact period (post-1542) is also referred to as the protohistoric period in some areas, which marks a transitional period during which native populations began to be influenced by European presence, resulting in gradual changes to their lifeways.
- **Tribal Cultural Resource (TCR):** These are defined in AB 52 as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe" that are either included or determined to be eligible for inclusion in the CRHR or included in a local register of historical resources (PRC § 21074 (a)(1)).
- **Unique Archaeological Resource:** This term is used for the purposes of CEQA and is defined in PRC Section (§) 21083.2(g) as an archaeological artifact, object, or site that does not merely add to the current body of knowledge. A Unique Archaeological Resource has a clearly demonstrated and high probability that it either contains information needed to answer important scientific research questions and that there is demonstrable public interest in that information, has a special and particular quality (such as being the oldest of its type or the best available example of its type) or is directly associated with a scientifically recognized important event or person of the past.

4.18.2 Environmental Setting

Refer to Section 4.5, *Cultural Resources*, of this Draft EIR for a greater discussion of the tribal cultural resources environmental setting.

Existing Tribal Cultural Resources

Native American Assembly Bill 52 Consultation

Per California PRC § 21080.3.1, AB 52 requires that within 14 days of a lead agency's determination that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency must provide formal notification to the designated contact, or a tribal representative, of California Native American Tribes that are traditionally and culturally affiliated with the geographic area of the project (as defined in PRC § 21073) and who have requested in writing to be informed by the lead agency (PRC § 21080.3.1(b)). Tribes interested in consultation must respond in writing within 30 days from receipt of the lead agency's formal notification, and the lead agency must begin consultation within 30 days of receiving the tribe's request for consultation (PRC § 21080.3.1(d) and 21080.3.1(e)).

On August 8, 2023, pursuant to AB 52, Kern County sent consultation notification letters via certified mail to four California Native American tribal contacts on the County's Master List for AB 52 consultation. Consultation letters were sent to contacts for the Tejon Indian Tribe, the Torres

Martinez Desert Cahuilla Indians, the Twenty-Nine Palms Band of Mission Indians, and the Yuhaaviatam of San Manuel Nation. No responses were received by the above listed Native American tribes during the 30-day consultation inquiry period, which ended September 8, 2023 (**Table 4.18-1**). No requests for consultation were received from any of the Tribes contacted.

Table 4.18-1: AB 52 Native American Consultation

Contact	Tribe	Date of Letter	Response
Candice Garza	Tejon Indian Tribe	August 8, 2023	No Response
Michael Mirelez	Torres Martinez Desert Chuilla Indians	August 8, 2023	No Response
Anthony Madrigal Jr.	Twenty-Nine Palms Band of Mission Indians	August 8, 2023	No Response
Darrell Mike	Twenty-Nine Palms Band of Mission Indians	August 8, 2023	No Response
Alexandra McCleary, Ph.D.	Yuhaaviatam of San Manuel Nation	August 8, 2023	No Response

Sacred Lands File Search

The California Native American Heritage Commission (NAHC) maintains a confidential Sacred Lands File (SLF) which contains sites of traditional, cultural, or religious value to the Native American communities. In an effort to determine whether any sacred sites are listed on its SLF, CRM Tech contacted the NAHC for a SLF search for the Project on May 25, 2023 (Appendix D). In response to CRM Tech's inquiry, the NAHC stated in a letter dated June 21, 2023, that the SLF search identified no record of places that are of special religious or social significance to Native American in the Project study area. Noting that the absence of specific information does not preclude the presence of cultural resources in the vicinity, the commission recommended contacting local Native American groups for pertinent information and proceeded to provide a referral list of nine individuals associated with five local Native American groups.

The records searches, supplemental research, and consultation did not reveal any known cemeteries or burial sites within the Project study area. No Native American sacred sites or human burials are known to be located within the site boundaries of the Project, and no responses were received by the consultation notification letters.

4.18.3 Regulatory Setting

Federal

There are no applicable federal regulations for this issue area.

State

Native American Heritage Commission

Section 5097.91 of the California PRC established the NAHC, whose duties include the inventory of places of religious or social significance to Native Americans and the identification of known graves and cemeteries of Native Americans on private lands. Section 5097.98 of the PRC specifies

a protocol to be followed when the NAHC receives notification of a discovery of Native American human remains from a county coroner.

Assembly Bill 52 and Related Public Resource Code Sections

AB 52 was approved by California State Governor Edmund Gerry "Jerry" Brown, Jr., on September 25, 2014. The act amended California PRC § 5097.94 and added PRC § 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2, and 21084.3. AB 52 applies specifically to projects for which a Notice of Preparation or a Notice of Intent to Adopt a Negative Declaration or Mitigated Negative Declaration will be filed on or after July 1, 2015. The primary intent of AB 52 was to include California Native American Tribes early in the environmental review process and to establish a new category of resources related to Native Americans that require consideration under CEQA, known as tribal cultural resources. PRC § 21074(a)(1) and (2) defines tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe" that are either included or determined to be eligible for inclusion in the CRHR or included in a local register of historical resources, or a resource that is determined to be a TCR by a lead agency in its discretion and supported by substantial evidence. On July 30, 2016, the California Natural Resources Agency adopted the final text for TCRs update to Appendix G of the CEQA Guidelines, which was approved by the Office of Administrative Law on September 27, 2016.

PRC § 21080.3.1 requires that within 14 days of a lead agency determining that an application for a project is complete, or a decision by a public agency to undertake a project, the lead must agency provide formal notification to the designated contact, or a tribal representative, of California Native American Tribes that are traditionally and culturally affiliated with the geographic area of the Project (as defined in PRC § 21073) and who have requested in writing to be informed by the lead agency (PRC § 21080.3.1(b)). Tribes interested in consultation must respond in writing within 30 days from receipt of the lead agency's formal notification and the lead agency must begin consultation within 30 days of receiving the tribe's request for consultation (PRC §s 21080.3.1(d) and 21080.3.1(e)).

PRC § 21080.3.2(a) identifies the following as potential consultation discussion topics: the type of environmental review necessary, the significance of tribal cultural resources, the significance of the project's impacts on the tribal cultural resources, project alternatives or appropriate measures for preservation, and mitigation measures. Consultation is considered concluded when either: (1) the parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or (2) a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached (PRC § 21080.3.2(b)).

If a California Native American tribe has requested consultation pursuant to Section 21080.3.1 and has failed to provide comments to the lead agency, or otherwise failed to engage in the consultation process, or if the lead agency has complied with Section 21080.3.1(d) and the California Native American tribe has failed to request consultation within 30 days, the lead agency may certify an EIR or adopt a Mitigated Negative Declaration (PRC § 21082.3(d)(2) and (3)).

PRC § 21082.3(c)(1) states that any information (including the location, description, and use of the tribal cultural resources) that is submitted by a California Native American tribe during the environmental review process would not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public without the prior consent of the tribe that provided the information. If the lead agency publishes any information submitted by a California Native American tribe during the consultation or environmental review process, that information would be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public.

California Public Records Act

Sections 6254(r) and 6254.10 of the California Public Records Act were enacted to protect archaeological sites from unauthorized excavation, looting, or vandalism. Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Section 6254.10 specifically exempts from disclosure requests for "records that relate to archaeological site information and reports, maintained by, or in the possession of the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the NAHC, another State agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a State or local agency."

California Native American Graves Protection and Repatriation Act of 2001

Codified in the California Health and Safety Code §s 8010-8030, the California Native American Graves Protection and Repatriation Act (Cal NAGPRA) is consistent with the federal NAGPRA. Intended to "provide a seamless and consistent state policy to ensure that all California Indian human remains and cultural items be treated with dignity and respect," Cal NAGPRA also encourages and provides a mechanism for the return of remains and cultural items to lineal descendants. Section 8025 established a Repatriation Oversight Commission to oversee this process. Cal NAGPRA also provides a process for non-federally recognized tribes to file claims with agencies and museums for repatriation of human remains and cultural items.

California Health and Safety Code, Sections 7050, 7052

California Health and Safety Code § 7050.5 declares that, in the event of the discovery of human remains outside of a dedicated cemetery, all ground disturbance must cease, and the county coroner must be notified. Section 7052 establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives.

Local

Metropolitan Bakersfield General Plan

The Project is located within the administrative boundaries of the Metropolitan Bakersfield General Plan (MBGP**)** and would therefore be subject to applicable policies and measures of the MBGP. Chapter 2, *Land Use Element*, of the MBGP contains the following policy:

Policy 104: As part of the environmental review procedure, an evaluation of the significance of paleontological, archaeological, and historical resources and the impact of proposed development on those resources shall be conducted and appropriate mitigation and monitoring included for development projects.

4.18.4 Impacts and Mitigation Measures

Methodology

The Project's potential impacts on TCRs have been evaluated using a variety of resources, including an SLF search conducted by the NAHC. AB 52 notification letters were sent to Native American groups and individuals indicated by the NAHC to solicit information regarding the presence of tribal cultural resources. The County has synthesized the aforementioned resources and professional judgment, to analyze impacts according to CEQA significance criteria described below.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine if a project could potentially have a significant adverse effect on tribal cultural resources.

A project would normally be considered to have a significant impact if it would cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is either of the following:

- Listed or eligible for listing in the CRHR, or in a local register of historical resources as defined in PRC § 5020.1(k)
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC § 5024.1

In applying the criteria set forth in subdivision (c) of PRC § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Project Impacts

Impact 4.18-1a: The project would cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k).

Neither the SLF searches conducted by the NAHC nor the AB 52 consultation indicated the presence of known tribal cultural resources that is listed or eligible for listing in the CRHR or in a local register of historical resources within or immediately adjacent to the project site.

Construction, grading, and excavation activities have the potential to unearth previously undiscovered, historic tribal cultural materials. If such materials, including human remains, are found, a potentially significant impact may occur.

The project would implement **Mitigation Measures** (**MM**) **4.5-1** through **MM 4.5-3** (see Section 4.5, *Cultural Resources,* for full mitigation measures).

Pursuant to Section 21080.3.2(b)(1) of AB 52, the lead agency considers the consultation concluded, as no responses have been received by the County during the designated consultation inquiry period from August 8, 2023, to September 8, 2023, or at the time of this writing.

However, the lead agency notes that that Section 21080.3.2 (c) of AB 52 states as follows:

(1) This section does not limit the ability of a California Native American tribe or the public to submit information to the lead agency regarding the significance of the tribal cultural resources, the significance of the project's impact on tribal cultural resources, or any appropriate measures to mitigate the impact.

(2) This section does not limit the ability of the lead agency or project proponent to incorporate changes and additions to the project as a result of the consultation, even if not legally required.

Mitigation Measures

Implementation of **MM 4.5-1** through **MM 4.5-3** (see Section 4.5, *Cultural Resources*, for full mitigation measures) would be required.

Level of Significance After Mitigation

With implementation of **MM 4.5-1** through **MM 4.5-3**, impacts would be less than significant after mitigation.

Impact 4.18-1b: The project would cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

As noted in Impact 4.18-1a, construction, grading, and excavation activities have the potential to unearth previously undiscovered, historic tribal cultural materials, which could cause a significant impact on found materials, including human remains.

The Project would implement **MM 4.5-1** through **MM 4.5-3** to reduce significant impacts on tribal cultural resources should inadvertent discovery during implementation of the Project occur. Adherence to **MM 4.5-1** requires employee training prior to commencement of ground disturbing activities. **MM 4.5-3** (see Section 4.5, *Cultural Resources*) further requires a Native American Monitor would monitor all project-related ground disturbing activities within 150 feet of the environmentally sensitive areas. Furthermore, **MM 4.5-3** requires the Native American Monitor be selected from contacts with traditional ties to the Project area.

Mitigation Measures

Implementation of **MM 4.5-1** through **MM 4.5-3** (see Section 4.5, *Cultural Resources,* for full mitigation measures) would be required.

Level of Significance After Mitigation

With implementation of **MM 4.5-1** through **MM 4.5-3**, impacts would be less than significant after mitigation.

4.18.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects located in the vicinity of the Project.

The geographic context for this analysis includes the southern San Joaquin Valley, in unincorporated Kern County. Past, present, and future development projects contribute to impacts related to cultural or tribal cultural resources. As analyzed in the MBGP, there could be a cumulative impact in the County, with respect to historical, archaeological, and cultural resources, as a result of future development and related construction activities in the region. However, potential cumulative impacts would be mitigated to below a level of significance at an individual Project level by adherence to applicable current State and federal laws and regulations, as well as other applicable laws, regulations and mitigations, such as adherence to standard conditions of approval that require monitoring of construction sites near known resources, immediate cessation of construction activity upon discovery of unidentified human remains, and the protection of cultural resources that are discovered. Moreover, the Project's incremental contribution to less than significant cumulative impacts would not be cumulatively considerable or significant.

The combination of the above-mentioned and described efforts, standard construction conditions, and implementation of Mitigation Measures **MM 4.5-1** through **MM 4.5-4** would reduce potential cumulative impacts related to historical, archaeological, and cultural resources to a less than significant level.

Mitigation Measures

Implementation of **MM 4.5-1** through **MM 4.5-4** would be required.

Level of Significance After Mitigation

With implementation of **MM 4.5-1** through **MM 4.5-4**, cumulative impacts would be less than significant.

Section 4.19

Utilities and Service Systems

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Section 4.19

Utilities and Service Systems

4.19.1 Introduction

This section of the Draft Environmental Impact Report (EIR) describes the affected environment and regulatory setting regarding utilities and service systems. It also evaluates the impacts on utilities and service systems that would result from implementation of the proposed IPG Industrial Project (Project), and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the 2024 Project-specific Water Supply Assessment (WSA) that was prepared by Kier and Wright (Appendix H.2), and will-serve letters from the Oildale Mutual Water Company and North of River Sanitary District (Appendix H.3).

4.19.2 Environmental Setting

Water Supply

The three sources of supply water typically used for development are natural sources, man-made sources, and reclaimed water. Natural sources include rivers, lakes, streams, and groundwater stored in aquifers. Human-created sources include runoff water treated and stored in reservoirs and other catchment structures. Reclaimed water is wastewater that has been conveyed to a treatment plant and then treated to a sufficient degree that it may again be used for certain uses, such as irrigation. However, reclaimed water is not potable (drinkable) and must be conveyed in a separate system to ensure that there is no possibility of direct human consumption.

A WSA report was prepared for the Project by Kier and Wright (Appendix H.2). The WSA used criteria in the California Water Code, as amended in 2002 by the passage of Senate Bill (SB) 610. The WSA analyzed the sufficiency of the proposed water supplies to meet the Project's projected future water demands, under all hydrologic conditions (normal years, single dry years, and multiple dry years), in addition to the existing and future water uses of the area within a 20-year planning horizon. The following sections describe the water supply for the Project.

The Oildale Mutal Water Company (OMWC) is the public water supplier for the Project. The OMWC's service area encompasses approximately 26.3 square miles in the southern portion of San Joaquin Valley, just north of Bakersfield, approximately 110 miles north of Los Angeles, and 290 miles southwest of San Francisco. The OMWC's service area includes the southeast Shafter area and the easterly half of Kern County, including Bakersfield and portions of Oildale. The OMWC merged the retail portion of the North of the River Municipal Water District's (NORMDWD) service area in 2014. The OMWC serves a total of approximately 37,726 customers with a total of 11,693 municipal connections. Services are mostly residential connections with some commercial and industrial customer connections.

OMWC's water supply source comes from purchased or imported water from the NORMWD/Kern County Water Agency (KCWA) and groundwater from the Kern County Subbasin.

As part of the monthly reporting, the OMWC records and submits production volumes to the State Water Resources Control Board (SWRCB). In 2020, approximately 79% of water delivered to customers was to residential customers, such as single-family and multifamily residences. The OMWC does not currently provide non-potable water to any of its customers. Water use within the OMWC service area has primarily been single-family residential, multifamily residential, and commercial/institutional. The least amount of water delivered to customers was used for industrial and landscaping. Water losses are accounted for and are considered very minuscule. **Table 4.19-1** presents the 2020 water demands per use category. **Table 4.19-2** presents the historical water demands from the previous five years.

Table 4.19-1: 2020 Water Demands by Category

Category	Annual Demands (acre-feet)
	2020
Single Family	6,309.68
Multifamily	1,037.25
Commercial/Institutional	1,474.05
Industrial	191.04
Landscape	234.11
Water Loss	3.19
Total Demand =	**9,249**

Table 4.19-2: Historic Water Use 2016-2020

Category	Annual Demands (acre-feet)				
	2016	2017	2018	2019	2020
NORMWD/KCWA Surface Water	7,762	8,150	8,630	8,116	8,475
OMWC Groundwater Pumped	345	501	595	714	774
Total Demand =	**7,886**	**8,772**	**9,225**	**8,830**	**9,249**

Key: KCWA = Kern County Water Agency; NORMWD = North of the River Municipal Water District; OMWC = Oildale Mutal Water Company

Existing Supply

The OMWC's surface water supply comes from the KCWA Improvement District Number 4's (ID No. 4) Henry C. Garnett Water Purification Plant. The KCWA ID No. 4 receives a municipal and industrial supply of 77,000 acre-feet and 5,846 acre-feet of agricultural Table A water from the State Water Project (SWP). ID No. 4 historically treats a minimum of 25,000 acre-feet for delivery to its treated water contractors. The NORMWD is contracted with the KCWA to receive 15,000 acre-feet per year (AFY) of the treated water supply. The OMWC is contracted with the NORMWD to receive 100% of the 15,000 acre-feet supply. The total amount of surface water available to

OMWC is 15,000 AFY. ID No. 4 has operated banking programs for many years; therefore, the surface water supply is projected to be available 100% of the time regardless of drought conditions.

The OMWC operates eight groundwater production wells that are all equipped with flow meters to measure water production. However, a public map with the locations of the existing eight wells was unavailable. Only five of the eight wells are active. Under the assumption that the five active groundwater wells operate for 8 hours a day, the total pumping capacity of the five wells is approximately 7,500 gallons per minute. The groundwater supply available to the OMWC is approximately 8,500 AFY. The OMWC owns the land where the groundwater well sites are and maintains a prescriptive water right to the groundwater pumped. This prescriptive water right is dedicated to public use.

The total available water supply to the OMWC is 23,500 AFY. **Table 4.19-3** presents a summary of OMWC's total water supplies.

Table 4.19-3: OMWC Existing Water Supply

Supply	Source	Authorization	Ever Used	Volume (acre-feet per year)
Purchased Surface Water	NORWM (Wholesaler)	Contract	Yes	15,000
OMWC Groundwater	OMWC Wells	Prescriptive Right	Yes	8,500
			Total Water Supply	**23,500**

Key: NORMWD = North of the River Municipal Water District; OMWC = Oildale Mutal Water Company

Kern County Subbasin

Groundwater is an existing water supply source for the OMWC. However, since the California SWP delivery system was initiated in 1977, local groundwater has only been used as a supplemental source that has historically been approximately 10% of the OMWC's supply. Groundwater supplied by the OMWC is drawn from the Kern County Subbasin within the Tulare Lake Hydrologic Region of the San Joaquin Valley Basin. The Kern Groundwater Authority's basin manager oversees the Kern County Subbasin. The Kern County Subbasin is not adjudicated.

The Kern County Subbasin is bounded to the north by the Tulare Lake and Tule Subbasin, to the east and south by the crystalline bedrock of the Sierra Nevada and San Emigdio Mountains, and to the west by the marine sediments of the San Emigdio Mountains and Coast Ranges. Continental deposits shed from the surrounding mountains form an alluvial wedge that thickens from the valley margins toward the axis of the structural trough. Sediments that comprise the shallow intermediate-depth water-bearing deposits in the groundwater subbasin are primarily continental deposits of Tertiary and Quaternary age. From oldest to youngest the deposits include Olcese and Santa Margarita Formations; the Tulare Formation (western subbasin) and its eastern subbasin equivalent, the Kern River Formation; older alluvium/stream deposits; and younger alluvium and coeval flood basin deposits.

Estimates by the California Department of Water Resources (DWR) San Joaquin District office for the unconfined aquifer (Tulare and Kern River Formations and overlying alluvium) range from 5.3 to 19.6% and average 11.8% for the interval from surface to 300 feet below grade. The DWR groundwater model of Kern County lists the range as 8.0 to 19.5% with an average value of 12.4% representing an interval thickness of 175 to 2,900 feet and averaging approximately 600 feet. The greatest thickness of unconfined aquifer occurs along the eastern subbasin margin. The highest specific yield values are associated with sediments of the Kern River Fan west of Bakersfield. The KCWA estimates the total water in storage to be 40,000,000 acre-feet and dewatered aquifer storage to be 10,000,000 acre-feet.

Groundwater Management

The Sustainable Groundwater Management Act (SGMA) was implemented in 2014 to ensure the protection of groundwater in California. The SGMA set forth a statewide directive to bring groundwater basins to a sustainable level through groundwater management and planning. The act requires that groundwater basins and subbasins designated as medium or high priority (critical overdraft) by the DWR, develop Groundwater Sustainable Agencies (GSAs) to implement Groundwater Sustainability Plans (GSPs) that manage groundwater sustainability over 20 years.

The DWR has determined that the Kern County Subbasin is critically overdrafted and, therefore, a high-priority subbasin. The Kern County Subbasin is managed by 14 different GSAs. The OMWC's service area lies primarily within the boundary of the Kern River GSA, with the rest of the service area in the boundaries of the Kern Groundwater Authority GSA, and the Cawelo Water District GSA. The following six GSAs have submitted GSPs: Kern River GSA, Buena Vista GSA, South of the Kern River GSA, Olcese Water District GSA, and Henry Miller GSA. Each GSP covers a certain area of the Kern County Subbasin.

The six GSPs were determined to be inadequate by the DWR due to inconsistencies. The six GSAs are addressing these inconsistencies to satisfy the requirements of SGMA. The GSP will aim to alleviate overdraft conditions in the Kern County Subbasin by implementing actions that help negate a negative change in groundwater storage. These implementation actions will aim to maintain groundwater levels as well as prevent water quality degradation and land subsidence. The GSPs will implement actions that achieve sustainability in the subbasin by the year 2042.

The KCWA has implemented a groundwater recharge program that has subsequently reduced the pumping of the OMWC. This has stabilized the water table beneath the OMWC service area. Additionally, the Kern Groundwater Authority GSA, Kern River GSA, and the Cawelo Water District GSA are managing groundwater levels within a safe basin operating range. The OMWC continues to aid these efforts by recommending water use reductions to its customers.

Wastewater

The Project site is within the service area boundaries of the North of the River Sanitary District (NORSD or District). NORSD serves the unincorporated community of Oildale, the northern portion of County Service Area 71 that includes portions of the city of Bakersfield, and the city of Shafter, with the nearest planned sewer areas located west across State Route 99. The District provides wastewater collection and wastewater treatment for a population of more than 55,000 people and a service area of approximately 54 square miles.

The collection system consists of approximately 174 miles of sewers ranging from 6 inches to 54 inches and five lift stations. Additionally, the system includes approximately 3,236 manholes and cleanouts by line size and serves approximately 23,400 active sewer connections plus the outfall from the city of Shafter. The nearest sewer main is a 10-inch trunk sewer line that runs along Airport Drive, east of the Project site, however, no sewer lines or infrastructures are currently located within the Project site.

Wastewater Treatment

Based on the NORSD Sewer Master Plan, the Project area is within the NORSD service area, and wastewater from the Project site would be collected and transported to the NORSD Wastewater Treatment Plant (WWTP). Wastewater is collected from residences and businesses into the District collection system and conveyed to the 7.5-million-gallon-per-day (MGD) WWTP, approximately 17.3 miles west of the Project site. The sewage collection system consists of approximately 180 miles of sewer pipeline ranging from 6-inch to 54-inch in diameter. The District has five lift stations that pump wastewater from lower to higher elevations within the system such that the wastewater can gravity flow to the WWTP. The treatment capacity of the District's WWTP is 7.5 MGD and the permitted capacity is 7.5 MGD. Effluent from the WWTP is undisinfected secondary water (NORSD 2018).

The WWTP utilizes primary treatment and secondary treatment technologies to treat the wastewater. All the treated WWTP effluent is recycled on adjacent irrigated farmland where it is used for the irrigation of fodder, fiber, and seed crops for non-human consumption. Biosolids are treated in digesters, dewatered, stored, and then applied to adjacent farmland for soil conditioning and as a fertilizer.

Stormwater Drainage

The Project site is flat with a gentle north-easterly slope; however, outside of leveled fields and orchards, the area is better described as an uneven plain consisting of extensive alluvial fans, debris flow, and over-bank deposits. Project site runoff follows topography and drains to the northeast across the site toward Airport Drive. There are no existing stormwater drainage systems on the Project site.

The City of Bakersfield is responsible for the operation and maintenance of a majority of residential and commercial and industrial stormwater conveyance systems (including catch basins, stormwater pipes, manholes, junction boxes, and inlet structures) and disposal systems (typically an infiltration

basin) surrounding the Project site. The city's urbanized areas reflect limited annual rainfall and relatively flat topography. Both the City and the County adopted several "planned drainage areas" for which master storm drain system plans have been developed and area-specific, benefit-related development fees are charged to fund the construction of major drainage facilities (City of Bakersfield and Kern County 2007). The Project site is located within the Oildale Planned Drainage Area (Kern County 2024).

Solid Waste

Solid waste generally refers to garbage, refuse, sludge, and other discarded solid materials that come from residential, industrial, and commercial activities. Construction, demolition, and inert wastes are also classified as solid waste. Such wastes include nonhazardous building materials such as asphalt, concrete, brick, drywall, fencing, metal, packing materials, pallets, pipe, and wood. The general waste classifications used for California waste management units, facilities, and disposal sites are outlined in this section. Nonhazardous solid waste consists of organic and nonorganic solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, and vegetable or animal solid and semisolid wastes; and other discarded waste, provided that such wastes do not contain hazardous materials or soluble pollutants in concentrations that would exceed applicable water quality objectives or cause a degradation of waters of the State.

California State law regulates the types of waste that may be disposed of at the different classes of landfills. Class I landfills may accept hazardous and nonhazardous wastes. Class II landfills may accept designated and nonhazardous wastes, and Class III landfills may accept nonhazardous wastes.

Landfills

The Kern County Public Works Department operates seven recycling and sanitary landfills throughout the County. Landfills are located in Bakersfield, Boron, Mojave-Rosamond, Ridgecrest, Shafter-Wasco, Taft, and Tehachapi (Kern County Public Works Department 2024a). No solid waste is currently generated at the Project site. The Project would likely be served primarily by the Bena Landfill, at 2951 Neumarkel Road approximately 17 miles southeast of the Project site. This landfill accepts batteries, clean dirt, clean inerts (for example, source-separated asphalt, brick, and concrete); construction and demolition (C&D) waste (for example, asphalt, brick, concrete, dirt, and metal), dead animals, electronic waste, green waste, ordinary household trash, tires, treated wood waste, and used motor oil (Kern County Public Works Department 2024a).

Kern County is responsible for meeting the California Integrated Waste Management Act of 1989 (Assembly Bill [AB] 939). AB 939 required cities and counties to reduce the amount of solid waste being sent to landfills by 50% by January 1, 2000. It also required cities and counties to prepare solid waste planning documents. These documents included the Source Reduction and Recycling Element (SRRE), Hazardous Waste Element, and Non-disposal Facility Element. All three of these documents, as well as the Integrated Waste Management Plan (approved in February 1998 and

amended in 2015 by the California Integrated Waste Management Board) have been approved for Kern County. The Kern County Integrated Waste Management Plan is the long-range planning document for landfill facilities (Kern County Public Works Department 2024a).

C&D waste is generally heavy, inert material. This material creates significant problems when disposed of in landfills. Because C&D waste is heavier than paper and plastic, it is more difficult for counties and cities to reduce the tonnage of disposed waste. For this reason, C&D waste has been specifically targeted by the State of California for diversion from the waste stream. Projects that generate C&D waste should emphasize deconstruction and diversion planning rather than demolition. Deconstruction is the planned, organized dismantling of a prior construction project, allows maximum use of the deconstructed materials for recycling in other construction projects, and sends a minimum amount of the deconstruction material to landfills.

The Waste Operations Division of the Kern County Public Works Department administers or sponsors the following recycling programs that contribute toward meeting State-mandated solid waste diversion goals:

- Recycling programs at landfills to recycle or divert a wide variety of products, such as wood waste, cathode ray tubes, tires, inert materials, and appliances.
- Drop-off recycling centers for household recyclables. County- and City-operated drop-off recycling centers are located in the unincorporated metropolitan area and the city, and may be used by both county and city residents.
- Financial assistance for operation of the City of Bakersfield Green Waste Facility.
- The Kern County Special Waste Facility for the disposal of household hazardous waste. The facility serves all Kern County residents.
- Semiannual “bulky waste” collection events that are held in the Bakersfield area and available to both County and city residents (co-sponsor).
- Christmas tree recycling campaign (participates jointly with the City of Bakersfield).
- Telephone book recycling program (co-sponsors with Community Clean Sweep).
- Community Clean Sweep summer workshops called “Trash to Treasure” that educate children about recycling and other Kern County Waste Management Department programs (sponsor).
- An innovative elementary school program called the “Clean Kids Hit the Road Puppet Show” (operates in collaboration with Community Clean Sweep).
- Recycling trailers for churches, schools, and nonprofit organizations.

Electric Power, Natural Gas, and Telecommunications

The Project site is in the area served by Pacific Gas and Electric (PG&E) for electric power. The nearest existing PG&E substation to the Project site is approximately 1 mile northeast in Bakersfield. Natural gas service is to be provided by PG&E. No known natural gas pipelines or telecommunication lines exist at the Project site.

4.19.3 Regulatory Setting

Federal

There are no applicable federal regulations for this issue area.

State

State Water Resources Control Board and Regional Water Quality Control Board

The SWRCB and the nine Regional Water Quality Control Boards (RWQCBs), collectively known as the California Water Boards (Water Boards), are dedicated to a single vision: abundant clean water for human uses and environmental protection to sustain California's future. Under the federal Clean Water Act and the State's pioneering Porter-Cologne Water Quality Control Act, the SWRCB and RWQCBs have regulatory responsibility for protecting the water quality of nearly 1.6 million acres of lakes, 1.3 million acres of bays and estuaries, 211,000 miles of rivers and streams, and approximately 1,100 miles of exquisite California coastline.

The California SWRCB and RWQCBs enforce State of California statutes that are equivalent to or more stringent than the federal statutes. RWQCBs are responsible for establishing water quality standards and objectives that protect the beneficial uses of various waters. The Project site is within the jurisdiction of the Lahontan RWQCB.

The RWQCB's regulatory role often involves the formation and implementation of basic water protection policies. These are reflected in the individual RWQCB's Basin Plan in the form of guidelines, criteria, and/or prohibitions related to the siting, design, construction, and maintenance of on-site sewage disposal systems. The SWRCB's role has historically been to provide overall policy direction, organizational and technical assistance, and a communications link to the State legislature.

California Department of Water Resources

The California DWR is responsible for protecting, conserving, developing, and managing much of California's water supply. These duties include preventing and responding to floods, droughts, and catastrophic events; informing and educating the public on water issues; developing scientific solutions; restoring habitats; planning for future water needs, climate change impacts, and flood protection; constructing and maintaining facilities; generating power; ensuring public safety; and providing recreational opportunities.

California Water Code Section 13260

California Water Code Section 13260 requires any person who discharges waste, other than into a community sewer system, or proposes to discharge waste that could affect the quality of waters of the State to submit a report of waste discharge to the applicable RWQCB. Any actions of the projects that would be applicable under California Water Code Section 13260 would be reported to the Central Valley RWQCB. However, the Project is not expected to discharge waste into the local sewer system and, therefore, is not required to prepare and submit the described report.

Senate Bills 610 and 221

Senate Bill (SB) 610 and SB 221, passed in 2001, are companion measures that seek to promote more collaborative planning among local water suppliers, cities, and counties. SB 610 requires a city or county that determines that a project, as defined, is subject to CEQA to identify any public water system that may supply water for the project and to request those public water systems to prepare a specified water assessment. The Project is subject to CEQA and is considered to be a project that requires the preparation of a WSA because it is a proposed industrial facility occupying more than 40 acres of land.

If groundwater is the proposed supply source, the required assessments must include detailed analyses of historic, current, and projected groundwater pumping and an evaluation of the sufficiency of the groundwater basin to sustain a new project's demands. The assessments also require identifying existing water entitlements, rights, and contracts; and quantifying the prior year's water deliveries. In addition, the supply and demand analysis must address water supplies during normal, single, and multiple dry years, presented in five-year increments for a 20-year projection.

Section 10912(a) of the California Water Code identifies a "project" as meeting any of the following criteria:

- A proposed residential development of more than 500 dwelling units.
- A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
- A commercial building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
- A hotel or motel with more than 500 rooms
- A proposed industrial, manufacturing, or processing plant, or industrial park, planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
- A mixed-use project that includes one or more of these elements.
- A project creating the equivalent demand of 500 residential units.

Sustainable Groundwater Management Act

In 2014, California enacted the SGMA (Water Code Section 10720 et seq.). This act, and related amendments to California law, require that all groundwater basins designated as high- or medium-priority in the DWR California Statewide Groundwater Elevation Monitoring program, and that are subject to critical overdraft conditions, must be managed under a new GSP or a coordinated set of GSPs by January 31, 2020. High- and medium-priority basins that are not subject to critical overdraft conditions must be managed under a GSP by January 31, 2022. Where GSPs are required, one or more local GSAs must be formed to cover the basin and prepare and implement applicable GSPs. The SGMA does not apply to basins that are managed under a court-approved adjudication, or to low- or very low-priority basins.

California Department of Water Resources California's Groundwater (Bulletin 118)

California's Groundwater (Bulletin 118) is the State's official publication on the occurrence and nature of groundwater in California. The publication defines the groundwater basin boundaries and summarizes groundwater information for each of the State's 10 hydrologic regions. California's Groundwater features current knowledge of groundwater resources, including information on the location, characteristics, use, management status, and conditions of the State's groundwater. The publication also presents findings and recommendations that support the future management and protection of groundwater.

California Department of Resources and Recycling and Recovery

California Department of Resources Recycling and Recovery (CalRecycle) is the State agency designated to oversee, manage, and track California's 76 million tons of waste generated each year. It is one of the six agencies under the umbrella of the California Environmental Protection Agency. CalRecycle administers and provides oversight for all of California's State-managed nonhazardous waste handling and recycling programs. CalRecycle provides training and ongoing support for local enforcement agencies that regulate and inspect California's active and closed solid waste landfills (CalRecycle 2024).

The Integrated Waste Management Act of 1989 (Public Resources Code [PRC] 40050 et seq. or AB 939, codified in PRC 40000), administered by CalRecycle, requires all local and county governments to adopt an SRRE to identify means of reducing the amount of solid waste sent to landfills. This law set reduction targets at 25% by the year 1995 and 50% by the year 2000. To assist local jurisdictions in achieving these targets, the California Solid Waste Reuse and Recycling Access Act of 1991 requires all new developments to include adequate, accessible, and convenient areas for collecting and loading recyclable and green waste materials.

California Integrated Waste Management Act (AB 939)

California adopted its first statewide, general recycling program in 1989. The Integrated Waste Management Act of 1989 (PRC 40050 et seq. or AB 939, codified in PRC 40000), administered by CalRecycle, requires all local and county governments to adopt an SRRE to identify means of

reducing the amount of solid waste sent to landfills. This law set reduction targets at 25% by the year 1995 and 50% by the year 2000.

SB 1374 (Construction and Demolition Waste Materials Diversion)

Senate Bill 1374 (SB 1374), C&D Waste Materials Diversion Requirements, was adopted in 2002 and requires that jurisdictions summarize their progress realized in diverting C&D waste from the waste stream in their annual AB 939 reports. SB 1374 required the California Integrated Waste Management Board (CIWMB) to adopt a model C&D ordinance for voluntary implementation by local jurisdictions.

California Integrated Waste Management Board Model Ordinance

Subsequent to the Integrated Waste Management Act, additional legislation was passed to assist local jurisdictions in accomplishing the goals of AB 939. The California Solid Waste Reuse and Recycling Access Act of 1991 (PRC § 42900-42911) directs the CIWMB to draft a "model ordinance" relating to adequate areas for collecting and loading recyclable materials in development projects. The model ordinance requires that any new development project, for which an application is submitted on or after September 1, 1994, include "adequate, accessible, and convenient areas for collecting and loading recyclable materials." For subdivisions of single-family detached homes, recycling areas are required to serve only the needs of the homes within that subdivision.

California Solid Waste Reuse and Recycling Access Act of 1991 or Senate Bill 1327

The California Solid Waste Reuse and Recycling Access Act of 1991 (PRC Chapter 18) identified a lack of adequate areas for collecting and loading recyclable materials, resulting in a significant impediment to diverting solid waste. This act requires state and local agencies to address access to solid waste for source reduction, recycling, and composting activities. Each local agency must adopt an ordinance related to adequate areas for collecting and loading recyclable materials for development projects.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act authorizes regulation of California water rights and water quality by the SWRCB. This act also established nine RWQCBs to ensure that water quality on local and regional levels is maintained. The Project area is under the jurisdiction of the Central Valley RWQCB.

California Mandatory Commercial Recycling Law (AB 341)

AB 341 directed CalRecycle to develop and adopt regulations for mandatory commercial recycling. CalRecycle initiated formal rulemaking with a 45-day comment period beginning October 28, 2011. The final regulation was approved by the Office of Administrative Law on May 7, 2012. The purpose of AB 341 is to reduce greenhouse gas emissions by diverting commercial solid waste to recycling efforts and to expand the opportunity for additional recycling services and recycling manufacturing facilities in California.

Beginning on July 1, 2012, businesses have been required to recycle, and each jurisdiction has implemented programs that include education, outreach, and monitoring. Jurisdictions were required to start reporting on their 2012 Electronic Annual Report (due August 1, 2013) on their initial education, outreach, and monitoring efforts, and, if applicable, on any enforcement activities or exemptions implemented by the jurisdiction.

In addition to mandatory commercial recycling, AB 341 sets a statewide goal of a 75% disposal reduction by the year 2020. This is not written as a 75% diversion mandate for each jurisdiction. The 50% disposal reduction mandate still stands for cities, counties, and State agencies (including community colleges) under AB 939. CalRecycle continues to evaluate program implementation as it has in the past through the Annual Report review process for entities subject to AB 939.

California Department of Resources Recycling and Recovery (formerly California Integrated Waste Management Board)

CalRecycle is the State agency designated to oversee, manage, and track California's 76 million tons of waste generated each year. It is one of the six agencies under the umbrella of the California Environmental Protection Agency. CalRecycle develops regulations to control and manage waste, for which enforcement authority is delegated to the local government. CalRecycle works jointly with local governments to implement regulations and fund programs.

California Short-lived Climate Pollutant Reduction Strategy (SB 1383)

Senate Bill 1383 (SB 1383), Short-lived Climate Pollutants: Organic Waste Reductions, was signed into law in September 2016 to reduce short-lived, harmful super pollutants with significant warming impacts and is essential to achieving California's climate goals. SB 1383 makes it mandatory for all business to recycle their organics weekly as well as requires businesses to divert their organics material from going to the landfill, which can include donating surplus food. Its statewide goal is to reduce the amount of organic waste disposed of in landfills (50% reduction by 2020 and 75% reduction by 2025). It also aims to rescue food for people to eat—at least 20% of currently disposed surplus food by 2025.

SB 1383 requires counties to take the lead in collaborating with jurisdictions within the county in planning for the necessary organic waste recycling and food recovery capacity needed to divert organic waste from landfills into recycling activities and food recovery organizations. It requires organic waste facilities and operations to measure and report organic waste material activity, including composting and anaerobic digestion.

Energy California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24 Building Standards)

The California Energy Commission administers Title 24 Building Standards that were adopted in 1976 in response to a legislative mandate to reduce California's energy consumption. Standards are periodically updated to allow consideration and possible incorporation of new energy efficiency technologies and methods. California's building efficiency standards are updated on an approximately three-year cycle. On August 11, 2021, the California Energy Commission adopted

the 2022 Energy Code. In December, it was approved by the California Building Standards Commission for inclusion into the California Building Standards Code. The 2022 Energy Code encourages efficient electric heat pumps, establishes electric-ready requirements for new homes, expands solar photovoltaic and battery storage standards, strengthens ventilation standards, and more. Buildings whose permit applications are applied for on or after January 1, 2023, must comply with the 2022 Energy Code.

California Green Building Code

As part of compliance with the State of California Green Building Code Requirements (known as CALGreen) that took effect beginning January 2011, Kern County implemented the following construction waste diversion requirements:

- Submittal of a construction waste management plan prior to project construction for approval by the Kern County Building Department.
- Recycling or reuse, or both, of a minimum 50% of C&D waste.
- Recycling or reuse of 100% of tree stumps, rocks, and associated vegetation and soils resulting from land clearing (AB 341).

Since the passage of AB 939, diversion rates in California have been reduced to approximately 65%, the statewide recycling rate is approximately 50%, and the beverage container recycling rate is approximately 80%. In 2011, the State passed AB 341, which established a policy goal that a minimum of 75% of solid waste must be reduced, recycled, or composted by the year 2020. The State provided the following strategies to achieve that 75% goal:

1. Moving organics out of the landfill.
2. Expanding the recycling and manufacturing infrastructure.
3. Exploring new approaches for state and local funding of sustainable waste management programs.
4. Promoting state procurement of post-consumer recycled content products.
5. Promoting extended producer responsibility.

To achieve these strategies, the State recommended legislative and regulatory changes including mandatory organics recycling, solid waste facility inspections, and updates to packaging. With regard to C&D, the State recommended an expansion of California Green Building Code standards that incentivize green building practices and increase the diversion of recoverable C&D materials. Current standards require 65% waste diversion on construction and some renovation projects. The State also recommends promoting the recovery of C&D materials suitable for reuse, compost, or anaerobic digestion before residual wastes are considered for energy recovery.

Local

Kern Integrated Regional Water Management Plan

The Kern Region published an Integrated Regional Water Management Plan update in 2020. The 2020 Tulare Lake Basin Portion of Kern County Integrated Regional Water Management (IRWM) Plan Update (2020 Plan Update) includes new information as required by the DWR 2016 Integrated Regional Water Management Proposition 1 Guidelines. IRWM is a collaborative effort to manage all aspects of water resources in a region. The State recognizes that there is a need to consider a broader range of resource management issues, competing water demands, new approaches to ensuring water supply reliability, and new ways of financing. The State's IRWM program was developed beginning with SB 1672, which created the IRWM Act to encourage local agencies to work cooperatively to manage local and imported water supplies to improve water quality, quantity, and reliability.

Tulare Lake Basin Portion of Kern County Integrated Regional Water Management Plan

The Tulare Lake Basin Portion of Kern County Region, as defined for this IRWMP, consists of that portion of the Tulare Lake Basin hydrologic region that is within Kern County, with small additional areas that are included for hydrologic reasons. The IRWMP develops a cooperative regional framework, implementation plan, and context for managing water resources in the Kern region. Objectives detailed by the plan for the Kern region include increasing water supply; improving operational efficiency, water quality, regional flood management; and promoting land use planning and resource stewardship.

OMWC Urban Water Management Plan

OMWC prepared a 2020 Urban Water Management Plan (UWMP) as an update to the 2015 Plan. The UMWP was prepared in accordance with the Urban Water Management Planning Act enacted in 1983 and provides an assessment of the present and future water supply sources and demands within OMWC's service area. The UWMP serves as a planning document that includes descriptions of historical and projected water demands and supplies, and evaluates the water system's reliability during various climatic conditions over 20 years.

The OMWC supplies potable water to a population of approximately 37,726 residents. The sources of potable water for the system are pumped groundwater wells that are owned and operated by OMWC and also from the wholesale water supplier, NORMWD. The Company's sources of water supply include both groundwater wells and treated surface water supplied to its service area from the ID No. 4 Henry C. Garnett Water Purification Plant. The Company's main water supply is from the purification plant and the total amount of treated surface water available to OMWC is 15,000 AFY (OMWC 2022).

The OMWC's service area lies within areas managed by the Kern Groundwater Authority GSA, Kern River GSA, and the Cawelo Water District GSA, which also manage the Kern County Subbasin. According to DWR, California Bulletin 118, the subbasin is in a water-short condition.

The Kern Groundwater Subbasin was identified as "critically overdrafted" by the DWR. The DWR also identified the subbasin as "High Priority" due to overdraft, land subsidence, and groundwater quality degradation. Similarly, the SGMA has designated the Kern Groundwater Subbasin as a high priority.

Kern County Integrated Waste Management Plan

The State requires the Kern County Public Works Department to plan and implement waste management activities and programs in the County's unincorporated area to ensure compliance with AB 939 and subsequent State mandates. The Kern County Integrated Waste Management Plan includes a Reduction and Recycling Element, Household Hazardous Waste Element, and Non-disposal Facility Element. The Plan was approved in February 1998 by the CIWMB (now California Department of Resources Recycling and Recovery, or CalRecycle). The Kern County Integrated Waste Management Plan is a long-range planning document for landfill facilities.

Kern County Public Works Department Recycling Programs

The Waste Operations Division of the Kern County Public Works Department administers or sponsors the following recycling programs, which contribute toward meeting State-mandated solid waste diversion goals to achieve 75% recycling, composting, or source reduction of solid waste by 2020:

- Recycling programs at landfills to recycle or divert a wide variety of products, such as wood waste, cathode ray tubes, tires, inert materials, and appliances.
- Drop-off recycling centers for household recyclables. The County- and the city-operated drop-off recycling centers, which are in the unincorporated metropolitan area and the city, may be used by both County and city residents.
- Financial assistance for operation of the City of Bakersfield Green Waste Facility.
- The Kern County Special Waste Facility for the disposal of household hazardous waste provides services to all Kern County residents.
- Semi-annual "bulky waste" collection events are held in the Bakersfield area and available to both County and city residents (co-sponsor).
- Christmas tree recycling campaign (participates jointly with the City of Bakersfield).
- Telephone book recycling program (co-sponsors with Community Clean Sweep).
- Community Clean Sweep summer workshops called "Trash to Treasure," which educate children about recycling and other Kern County Waste Management Department programs (sponsor).
- An innovative elementary school program called the "Clean Kids Hit the Road Puppet Show" (operates in collaboration with Community Clean Sweep).
- Recycling trailers for churches, schools, and nonprofit organizations.

Metropolitan Bakersfield General Plan

The Project is located within the Metropolitan Bakersfield General Plan (MBGP) area; therefore, would be subject to applicable policies and measures of the MBGP. The Conservation Element and Public Services and Facilities Element of the MBGP include goals, policies, and implementation measures related to utilities that apply to the Project, as described below.

Chapter V. Conservation Element

Water Resources

Goals

Goal 1. Conserve and augment the available water resources of the planning area.

Goal 2. Assure that adequate groundwater resources remain available to the planning area.

Goal 3. Assure that adequate surface water supplies remain available to the planning area.

Chapter X. Public Services and Facilities Element

General Utility Services

Goals

Goal 1. Maintain a coordinated planning and implementation program for the provision of public utilities to the planning area.

Goal 2. Coordinate the planning and implementation of planning area municipal-type utility facilities and services.

Policies

Policy 5. Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent.

Water Distribution

Goals

Goal 1. Ensure the provision of adequate water service to all developed and developing portions of the planning area.

Policies

Policy 3. Require that all new development proposals have an adequate water supply available.

Sewer Service

Goals

Goal 1. Ensure the provision of adequate sewer service to serve the needs of existing and planned development in the planning area.

Goal 3. Provide trunk sewer availability to and treatment/disposal capacity for all metropolitan urban areas, to enable cessation or prevention of the use of septic tanks where such usage creates potential public health hazards or may impair groundwater quality, and to assist in the consolidation of sewerage systems. Provide sewer service for urban development regardless of jurisdiction.

Policies

Policy 1. Effect the consolidated collection, treatment, and disposal of wastewater from all urban development within the metropolitan area, discouraging the creation or expansion of separate systems and encouraging the consolidation and interconnection of existing separate systems.

Implementation Measures

Implementation Measure 1. Require all new urban development to be serviced by centralized wastewater collection, treatment and disposal facilities.

Storm Drainage

Goals

Goal 1. Ensure the provision of adequate storm drainage facilities to protect planning area residents from flooding resulting from storm water excess.

Goal 2. Maintain a comprehensive storm drainage system which serves all urban development within the planning areas.

Implementation Measures

Implementation Measure 4. Use drainage area retention basins for drainages disposal when direct discharge to a waterway is not available. Combine storm drainage usage with recreational usage when feasible. Incorporate in such basins recessed areas for off-season retention of nuisance flows. Maintain all basins with primary purpose of drainage disposal, with recreational usage as a secondary objective.

Solid Waste

Goals

Goal 1. Ensure the provision of adequate solid waste disposal services to meet the demand for these services in the planning area.

Policies

Policy 1. Comply with, and update as required, the adopted county solid waste management plan.

Implementation Measures

Implementation Measure 1. Implement the "Kern County Solid Waste Management Plan-1988", and subsequent updates which will make the Metropolitan Bakersfield Municipal landfill at Bena available to the General Plan area.

Kern County Floodplain Management Ordinance (17.48)

Any construction that takes place within areas of special flood hazards, areas of flood-related erosion hazards, and areas of mudslide (that is, mudflow) hazards within the jurisdiction of unincorporated Kern County will comply with the requirements and construction design specifications of this ordinance. Any required development permits will be obtained before the commencement of construction activities. Sections 17.48.250 through 17.48.350 of the ordinance elaborate on the standards of construction in the special flood hazards area.

Kern County Development Standards

The Kern County Development Standards apply to all developments within Kern County that are outside of incorporated cities. These standards establish minimum design and construction requirements that will result in improvements that are economical to maintain and will adequately serve the public. The requirements outlined in these standards are considered minimum design standards and will require the approval of the entity that will maintain the facilities to be constructed before approval by Kern County.

Kern County Construction Diversion Requirements per the California Green Building Code

As part of compliance with the State of California Green Building Code Requirements (known as CALGreen) that took effect beginning January 2011, Kern County implemented the following construction waste diversion requirements:

- Submittal of a Construction Waste Management Plan before project construction for approval by the Kern County Building Department.
- Recycling and/or reuse of a minimum 50% of C&D waste.
- Recycling or reuse of 100% of tree stumps, rocks, and associated vegetation and soils resulting from land clearing.

4.19.4 Impacts and Mitigation Measures

Methodology

Potential impacts on utilities and service systems associated with the construction and operation of the Project have been evaluated using a variety of resources, including multiple online sources and published documents, as well as the Project-specific WSA provided in Appendix H.2 and will-serve letters. Using these resources and professional judgment, impacts were analyzed according to significance criteria established in Appendix G of the CEQA Guidelines, described below.

Thresholds of Significance

The Kern County California Environmental Quality Act (CEQA) Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine whether a project could potentially have a significant adverse effect on utilities and service systems.

A project could have a significant adverse effect on utilities and service systems if it would:

- Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.
- Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.
- Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.
- Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste-reduction goals.
- Comply with federal, state, and local management and reduction statutes and regulations related to solid waste.

Project Impacts

Impact 4.19-1: The Project would require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.

Water and Wastewater Facilities

The Project would require water during construction for common construction-related activities, such as dust suppression, soil compaction, excavation, grading activities, equipment cleaning, vehicle wash downs, washout basins, re-compaction of backfill materials, concrete pouring, and related activities. Construction water will be trucked from the OMWC. During construction activity, wastewater contained within portable toilet facilities and hand-washing facilities would be disposed of at an approved off-site disposal site. The Kern County Public Health Services Department Environmental Health Services Division is responsible for monitoring the use of portable toilet facilities, and the Project proponent would be required to provide documentation of a portable toilet pumping contract. No off-site sewage or disposal connections to a municipal sewer system exist or are proposed during the construction phase. For these reasons, Project construction would not require or result in the construction of any new water or wastewater facilities that could cause significant environmental effects and, thus, impacts during construction would be less than significant.

During the operation of the Project, the OMWC would supply water to the Project, where service laterals would be extended from an existing water line within Airport Road. The nearest sewer main is a 10-inch trunk sewer line that runs along Airport Drive, east of the Project site. The existing outfall sewer runs approximately 1.5 miles southwest of the Project site and discharges to the WWTP. The extension and construction of wastewater facilities is not proposed as part of the Project. The Project would not require or result in the relocation or construction of new or expanded water and wastewater conveyance facilities, the construction or relocation of which could cause significant environmental effects. Impacts would be less than significant.

Stormwater and Drainage Facilities

The Project would result in increased areas of impervious surfaces, resulting in the need for additional or expanded stormwater drainage, conveyance, and retention infrastructure. During Project construction, stormwater would be managed through compliance with National Pollutant Discharge Elimination System (NPDES) General Construction Permit requirements, where the proposed Project would design and submit a site-specific Storm Water Pollution Prevention Plan (SWPPP) to minimize the discharge of stormwater during construction. Additionally, a Water Quality Management Plan would be prepared, which includes best management practices for runoff control, as described in Section 4.10, *Hydrology and Water Quality*. All construction-related stormwater management features would be replaced with permanent stormwater infrastructure as described below.

The Project would install an on-site storm drainage system consisting of inlets, underground piping, and surface and underground basins. Runoff would drain to retention basins located on the south side of each building within the boundaries of the Project site. The basins would be designed to accommodate a 100-year storm event and would detain runoff and release it at a rate no greater than the pre-development condition of the Project site. The Project would be required to retain the stormwater per Kern County's drainage requirements and all other applicable standards, which include measures to address stormwater controls on both management of runoff volume and water quality, including controlling erosion and protection of water quality of stormwater runoff. The Project would not exceed the capacity of existing stormwater drainage systems in the area. Therefore, the operation of the Project would not result in the relocation or construction of new or expanded stormwater drainage facilities, the construction or relocation of which could cause significant environmental effects. Impacts would be less than significant.

Electricity and Natural Gas

The proposed Project would increase the demand for electricity within the Project site. Currently, there are no existing electrical connections at the Project site. During the construction of the Project, electricity would be consumed, on a limited basis, for power lighting, electric equipment, and water supply and conveyance for dust control. Temporary electric power would likely be provided to the Project site through the use of generators.

During the operation of the Project, electricity would be supplied to the Project site by PG&E. The Project proposes to use the existing electricity grid, and service laterals would be extended to the Project site from existing utility facilities along Boughton Drive and Airport Drive. It is anticipated that there are sufficient planned electricity supplies in the PG&E service area for the increase in energy demands resulting from the Project. Additionally, the Project would implement **Mitigation Measure MM 4.19-1**, requiring coordination with PG&E staff to determine specific requirements regarding any potential electric service or facility issues needed. The Project proponent would comply with and adhere to all requirements identified by PG&E to mitigate impacts to electric services and facilities. Thus, with mitigation, the Project would not require or result in the relocation or construction of new or expanded electric power facilities, the construction or relocation of which could cause significant environmental effects.

Minimal amounts of gasoline may be used for construction however, natural gas service is to be provided by PG&E once operational. Service laterals would be extended to the Project site from existing utility facilities along Boughton Drive and Airport Drive. The Project would implement **Mitigation Measure MM 4.19-2**, which requires coordination with PG&E to determine the specific requirements regarding any potential natural gas service or facility issues needed. The Project proponent would comply with and adhere to all requirements identified by PG&E to mitigate impacts to natural gas services and facilities. Therefore, the Project would not require or result in the relocation or construction of new or expanded natural gas facilities, the construction or relocation of which could cause significant environmental effects. Impacts would be less than significant.

Telecommunications

Cellular or satellite communication technology may be used for telephone systems during construction and operation. The Project would extend fiber lines to existing service laterals for internet access onto the Project site. No off-site telecommunications systems would be constructed; therefore, construction and operation of the Project would not cause significant environmental effects. Impacts would be less than significant.

Mitigation Measures

MM 4.19-1 Prior to issuance of grading and building permits the Project proponent shall coordinate with PG&E staff to determine the specific requirements regarding any potential electric service or facility issues needed to adequately accommodate the proposed Project. The Project proponent shall comply with and adhere to all requirements identified by PG&E to fully mitigate impacts to electric services and facilities, as needed as Project construction progresses.

MM 4.19-2 Prior to issuance of grading and building permits the Project proponent shall coordinate with Pacific Gas and Electric Company (PG&E) staff to determine the specific requirements regarding any potential natural gas service or facility issues needed to adequately accommodate the proposed Project. The Project proponent shall comply with and adhere to all requirements identified by Pacific Gas and Electric Company (PG&E) to fully mitigate impacts to natural gas services and facilities, as needed as Project construction progresses.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.19-1** and **MM 4.19-2**, impacts would be less than significant after mitigation.

Impact 4.19-2: The Project would have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years.

Project Water Demand

Water is assumed to be used during construction for pre-watering and grading. Construction water is considered a temporary use and will not occur at the same time as the other project water demands as its use will occur before the water systems are installed. For a standard 52-acre site, water use for pre-watering is approximately 1,000,000 gallons per day for 21 days and 350,000 gallons per day for 35 days for grading. Therefore, the construction water demand is approximately 102 AFY.

The Project's indoor water demand was determined using an employee-based water demand estimate. The number of warehousing employees was determined using the average of 1,500 square feet per warehouse employee from the 2016 Commercial Building Energy Consumption Survey published by the Energy Information Administration. The number of office employees was

determined using an industry standard of 200 square feet per office employee. The employee factors and the estimated warehouse and office areas were used to determine the total number of employees. This number of employees is expected to double under the assumption of three shifts a day, which yields 1,631 employees. Fixture rates from the Nonresidential Baseline Water Use Worksheet published by the California Green Building Standards Code were used to determine the average water use per employee. This value was determined to be approximately 10 gallons per day per employee, for 1,631 employees, with a total water use of 16,310 gallons per day, or 18 AFY.

The Project's landscaping irrigation water demand was determined using an area-based water demand estimate. Approximately 17% of the developed area (approximately 8.25 acres) was assumed to be landscaped. The nonresidential irrigation water use factor of 1.9 acre-feet per acre per year was taken from Chapter 2.7 of the 2015 California Code of Regulations Model Water Efficient Landscape Ordinance. The nonresidential water use factor and estimated landscaping area were used to determine the yearly landscaping irrigation demand. Therefore, the landscaping irrigation demand determined for the site is 12.6 AFY.

The total water demand for the Project is estimated to be 31 AFY. The Project water demands are not expected to change and shall remain the same at buildout and through the year 2040.

OMWC Projected Water Demand 2040

The land use method of projection was used by the OMWC in accordance with the 2020 UWMP Guidebook. The land use water use projection was prepared based on the Gossamer Grove, Heritage Ranch, and Mission Lakes Specific Plans for the City of Shafter as well as the anticipated growth in industrial development. **Table 4.19-4**, summarizes the projected water demands for the next 20 years in 5-year increments.

Table 4.19-4: Projected Water Use

Use Type	Annual Demands (acre-feet)			
	2025	**2030**	**2035**	**2040**
Single-Family Residential	6,950.5	8,877.6	11,707.1	14,280.6
Multifamily Residential	939.4	916.1	839.4	871.3
Commercial/Institutional	1,384.9	1,350.6	1,723.1	1,744.5
Industrial	239.7	241.1	242.5	244.6
Landscape Irrigation	212.1	206.8	212.1	238.5
Water Loss (Nonrevenue Water)	315.9	376.2	479.8	564.4
Surface Water Total	8,053.4	7,903	8,229	8,210
Groundwater Total	1,989	4,058	7,026	9,734
Total	**10,042.4**	**11,961.1**	**15,254.9**	**17,943.9**

Key: NORMWD = North of the River Municipal Water District; OMWC = Oildale Mutal Water Company

OMWC Projected Water Supply 2040

Per the contracted agreement with the NORMWD, the purchased surface water of 15,000 AFY is projected to remain the same. The OMWC is developing five additional irrigation wells to increase the supply volume to 15,000 gallons per minute. This will increase the groundwater supply to an estimated 12,802 AFY. The OMWC's groundwater supply is not anticipated to be impaired because of the SGMA compliance actions in the six aforementioned GSPs. Additionally, California law states municipal water rights and uses have a higher priority and are entitled to more protection than other uses of groundwater. **Table 4.19-5** summarizes the projected water supplies for the next 20 years in 5-year increments.

Table 4.19-5: Projected Water Supply

Water Supply	Source	Projected Water Supply, acre-feet			
		2025	2030	2035	2040
Purchased or Imported Water	NORMWD/KCWA	15,000	15,000	15,000	15,000
Groundwater (Reasonably Available Volume)	OMWC Wells	10,651	11,726	12,802	12,802
Total		**25,651**	**26,726**	**27,802**	**27,802**

Key: NORMWD = North of the River Municipal Water District; OMWC = Oildale Mutal Water Company

Table 4.19-6 presents the comparison of OMWC's supply and demand in normal years. Under normal hydrologic conditions, there is a surplus of water supply from the year 2025 to 2040. The surplus water supply volume is greater than 9,000 AF through the year 2040. The Project water demand is 31 AFY. In a normal year condition, the OMWC has more than enough water supplies to serve the Project's water demand.

Table 4.19-6: Normal Year Supply and Demand

	Annual Demands (acre-feet)			
	2025	2030	2035	2040
Supply Totals	25,651	26,726	27,802	27,802
Demand Totals	10,042.2	11,961.1	15,254.9	17,943.9
Difference	**15,609**	**14,765**	**12,547**	**9,858**

Table 4.19-7 presents the comparison of OMWC's supply and demand with a single dry year. Under this hydrologic condition, there is a surplus of water supply from the year 2025 to 2040. The surplus water supply volume is greater than 8,000 AF through year 2040. The Project water demand is 31 AFY. In a normal year with a single dry year condition, the OMWC has more than enough water supplies to serve the Project's water demand.

Table 4.19-7: Single Dry Year Supply and Demand

	Annual Demands (acre-feet)			
	2025	**2030**	**2035**	**2040**
Supply Totals	25,651	26,726	27,802	27,802
Demand Totals	10,544.5	12,559.2	16,017.6	18,841.1
Difference	**15,107**	**14,167**	**11,784**	**8,961**

Table 4.19-8 presents the comparison of OMWC's supply and demand with multiple dry years. Under the hydrologic condition with multiple dry years, there still exists a surplus of water from the year 2025 to 2040. The surplus water supply volume never decreases past 8,000 acre-feet even in the fifth dry year. This surplus exists from the year 2025 to year 2040. The Project water demand is 31 AFY. In the multiple dry years condition, the OMWC has more than enough water supplies to serve the Project's water demand.

Table 4.19-8: Multiple Dry Years Supply and Demand

		2025	**2030**	**2035**	**2040**
Year 1	Supply Totals	23,500	25,651	26,726	27,802
	Demand Totals	9,564	10,920	13,185	16,546
	Difference =	**13,936**	**14,731**	**13,541**	**11,256**
Year 2	Supply Totals	23,500	25,651	26,726	27,802
	Demand Totals	9,555	11,309	13,843	17,093
	Difference =	**13,945**	**14,342**	**12,884**	**10,710**
Year 3	Supply Totals	24,575	25,651	26,726	27,802
	Demand Totals	9,667	11,711	14,533	17,657
	Difference =	**14,908**	**13,940**	**12,193**	**10,145**
Year 4	Supply Totals	24,575	25,651	26,726	27,802
	Demand Totals	10,107	12,128	15,257	18,240
	Difference =	**14,468**	**13,523**	**11,469**	**9,562**
Year 5	Supply Totals	25,651	26,727	27,802	27,802
	Demand Totals	10,545	12,559	16,018	18,841
	Difference =	**15,107**	**14,167**	**11,784**	**8,961**

The analysis in the WSA demonstrates that the OMWC will have sufficient water supplies to serve the existing and future water uses of the area, including the Project, under normal, single dry, and multiple dry years.

Therefore, the OMWC would have sufficient water supplies available to serve the Project and near future development during normal, single dry, and multiple dry years. Furthermore, the Project

would implement **Mitigation Measures MM 4.19-3**, which requires the operator to provide information on any groundwater that will be used. Implementation of **Mitigation Measures MM 4.19-4** would also be required, which consists of installing water meters on all facilities. Potential impacts associated with water supply would be less than significant with mitigation.

Mitigation Measures

MM 4.19-3. Prior to issuance of building or grading permits, the owner/operator shall provide information on any groundwater that will be used. Unmetered water wells cannot be used as a source of groundwater for the permit activity. Groundwater may only be used in a permitted activity from a water well equipped with a water meter. A copy shall be sent to all Groundwater Sustainability Agencies and the Kern County Water Agency after being posted on the website. The information submitted on the permit shall include the following data:

a. The source and estimated amount of any groundwater being used in the permit activity.

b. Confirmation that any water well used in permit activity is metered.

c. The source and estimated amount of any reclaimed water used in the permit activity.

MM 4.19-4. Water meters shall be installed on all facilities. Once operations of the first facility constructed on-site have commenced, the Master Developer or subsequent future land owners shall be required to submit annual reports to the Kern County Planning Department and the Kern County Environmental Health Services Department detailing the annual water usage on site.

Level of Significance after Mitigation

With implementation of **Mitigation Measures MM 4.19-3** and **MM 4.19-4**, impacts would be less than significant after mitigation.

Impact 4.19-3: The Project would result in a determination by the wastewater treatment provider which may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments.

As previously described, the Project would be served by NORSD, where wastewater collection would be provided by the NORSD WWTP. The nearest sewer main is a 10-inch trunk sewer line that runs along Airport Drive, east of the Project site. The existing outfall sewer runs approximately 1.5 miles southwest of the Project site and discharges to the WWTP, which has a capacity of 7.5 MGD. The average monthly flow is between 5.4 and 5.9 MGD. Additionally, 13 capacity-related projects are proposed to improve NORSD facilities (NORSD 2023). Thus, the Project is not expected to increase the demand for wastewater treatment services beyond NORSD WWTP's

capacity. Furthermore, the Project proponent would be required to obtain a will-serve letter from NORSD before obtaining a building permit. The operation of the proposed facility is not expected to generate a significant amount of wastewater. Therefore, it is anticipated that there would be adequate capacity to serve the Project. Impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Impacts would be less than significant.

Impact 4.19-4: The Project would generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste-reduction goals.

The Project would generate solid waste that would be disposed of by a permitted hauler at the Bena Landfill at 2951 Neumarkel Road approximately 16 miles southeast of the Project site. As of 2019, the Bena Landfill has a remaining capacity of 32,808,260 cubic yards of the maximum 53,000,000-cubic-yard capacity (CalRecycle 2019a). The permitted maximum daily disposal is 4,500 tons per day. The next closest landfill to the Project site is the Shafter-Wasco Landfill, approximately 21 miles northwest. As of 2019, the landfill can accept up to 1,500 tons per day, has a remaining capacity of 7,901,339, and a maximum permit capacity of 21,895,179 (CalRecycle 2019a).

Construction

The construction phase is anticipated to last approximately 24 months. Construction, for analysis within studies prepared for this Draft EIR, was originally analyzed to begin in December 2024 and conclude in November 2026, with operation proposed in 2026. Should the commencement of construction be delayed, December 2024 represents a conservative estimate for this document. Solid waste generated by the construction of the Project is not anticipated to be significant. Construction of the Project would not require demolition of existing structures, as the Project site is currently vacant. Nonhazardous construction refuse and solid waste would be either collected and recycled or disposed of at the Bena Landfill, the Shafter-Wasco Landfill, or another Class III landfill. Any hazardous waste generated during construction would be disposed of at an approved location. Vegetation collected from clearing and grubbing activities would be either disposed of through the City of Bakersfield's organics curbside collection service or self-hauled to a composting facility, community composting program, or other collection activity or program, as required by SB 1383. During the construction phase, waste materials will be recycled where feasible, with remaining unrecyclable materials disposed of in landfills in compliance with all applicable regulations including Kern County Building code requirements. Common construction waste may include metals, masonry, plastic pipes, rocks, dirt, cardboard, or green waste related to land development. The Project would not generate any acutely hazardous material, and any other hazardous waste (such as fuels, greases, and solvents) generated or used during construction would be disposed of at an approved facility.

Nonhazardous construction refuse and solid waste would either be collected and recycled, or disposed of at a local landfill, either the Bena Landfill or the Shafter-Wasco Landfill. SB 1374 requires that jurisdictions summarize their progress in diverting C&D waste from the waste stream in annual reports. A pricing incentive (for example, a premium gate fee for mixed C&D) is charged at the Bena, Shafter-Wasco, Taft, and Tehachapi Landfills to encourage the recycling of C&D waste. The Bena Landfill is the closest and has adequate capacity; therefore, it would most likely receive solid waste from the Project site. The Bena Landfill is a Class III landfill and, therefore, accepts wastes from C&D as well as industrial sources. Tthe Project would implement **Mitigation Measure MM 4.19-5**, which requires that debris and waste generated shall be recycled to the extent feasible. Additionally, as part of compliance with CALGreen requirements, Kern County implements the following construction waste diversion requirements: submittal of a Construction Waste Management Plan and recycle and/or reuse a minimum of 65% C&D waste. Therefore, construction impacts of the Project on existing landfills are anticipated to be less than significant.

Operations

The Project would produce waste during operational activities, which would include typical refuse generated by office and warehouse uses. Most of these materials would be collected and delivered back to the manufacturer or to recyclers. Nonrecyclable waste would be placed in covered dumpsters and removed regularly by a certified waste-handling contractor for disposal at a Class III landfill. Based on CalRecycle's estimated solid waste generation rate for manufacturing and warehouse facilities, the Project is estimated to generate 30,340 pounds per day (CalRecycle 2019b); however, this serves as a conservative estimate as the primary operation of the facility will be warehousing and distribution of prepackaged goods, not manufacturing. As described above, the Bena Landfill is permitted to accept 4,500 tons of solid waste per day and has a remaining capacity of 32,808,260 cubic yards. The Bena Landfill is planned to continue operations through April 1, 2046, and is expected to serve the Project throughout its operational phase. Additionally, as described above, the Project would implement **Mitigation Measure MM 4.19-5**, which requires debris and waste generated shall be recycled to the extent feasible. Therefore, impacts related to landfill capacity would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.19-5** would be required.

MM 4.19-5. During construction and operation, debris and waste generated shall be recycled to the extent feasible. The provisions listed below shall apply to the Project:

a. A Recycling Coordinator shall be designated by the project applicant to facilitate recycling as part of the Construction, Operation and Maintenance, and Decommissioning, Trash Abatement and Pest Management Program.

b. The Recycling Coordinator shall facilitate recycling of all construction waste through coordination with contractors, local waste haulers, and/or other facilities that recycle construction/demolition wastes.

c. The Recycling Coordinator shall also be responsible for ensuring wastes requiring special disposal are handled according to State and County regulations that are in effect at the time of disposal.

d. Contact information of the coordinator shall be provided to the Kern County Planning and Natural Resources Department prior to issuance of building permits.

e. The project applicant shall provide a storage area for recyclable materials within the fenced project area that is clearly identified for recycling. This area shall be maintained on the site during construction and decommissioning. A site plan showing the recycling storage area for construction shall be submitted prior to the issuance of any grading or building permit for the site.

Level of Significance After Mitigation

With the implementation of **Mitigation Measure MM 4.19-5**, impacts would be less than significant after mitigation.

Impact 4.19-5: The Project would comply with Federal, State, and Local management and reduction statutes and regulations related to solid waste.

The Project would generate solid waste during the construction and operation of the two warehouses and office buildings. Common construction waste may include metals, masonry, plastic pipes, rocks, dirt, cardboard, or green waste related to land development. AB 341 requires Kern County to attain a waste diversion goal of 75% by 2020 through reduction, recycling, or composting. In addition, as part of compliance with CALGreen requirements, Kern County implements the following construction waste diversion requirements:

- Submittal of a Construction Waste Management Plan.
- Recycle, reuse, or both, a minimum 65% C&D waste.
- Recycle or reuse 100% of tree stumps, rocks, and associated vegetation and soils resulting from land clearing.

Furthermore, the California Solid Waste Reuse and Recycling Access Act of 1991, as amended, requires expanded or new development projects to incorporate storage areas for recycling bins into the Project design. The Project would be required to comply with all federal, State, and local statutes and regulations related to the handling and disposal of solid waste. Additionally, the Project would implement **Mitigation Measure MM 4.19-5**, which requires recycling of debris and waste generated to the extent feasible. Compliance with the established regulatory framework would ensure less than significant impacts regarding compliance with management and reduction statutes and regulations related to solid waste, which would be further reduced by Mitigation Measure MM 4.19-5.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.19-5** would be required.

Level of Significance After Mitigation

With the implementation of **Mitigation Measure MM 4.19-5**, impacts would be less than significant after mitigation.

4.19.5 Cumulative Setting, Impacts, and Mitigation Measures

The Project's contribution to an increased need for utilities and service systems is considered in the context of other past, present, and reasonably foreseeable future projects in the area. The geographic scope of analysis for impacts on utilities and service systems includes projects within the service area for each utility provider described above, which includes demands on water supply, stormwater drainage, and solid waste disposal. The scope for impacts on water would be the OMWC District, and wastewater would be the service area of the NORSD WWTP. The scope for impacts on stormwater drainage would be the Project site, and the scope for impacts on solid waste disposal includes projects that rely on the same solid waste disposal facilities.

Project impacts would be cumulatively considerable if the incremental effects of the Project, when combined with other past, present, or reasonably foreseeable projects, as listed in Chapter 3, Project Description, would result in a significant cumulative effect. Physical impacts on public services, utilities, and service systems are usually associated with population in-migration and growth in an area, which increases the demand for a particular service, leading to the need for expanded or new facilities, thereby limiting the potential to contribute to the demand for a particular service.

As described above, the Project would result in less than significant impacts with mitigation on water, wastewater, stormwater drainage, electricity telecommunications, natural gas, and solid waste disposal (during construction and operation).

Water Supply

Various proposed projects within the region would further impact the existing water supply that is derived from the Kern County Subbasin. The Project and other cumulative projects could substantially decrease groundwater supplies; thus, this impact is considered potentially significant. The Project would obtain its water supply from the OMWC and has secured a will-serve letter at the time of this writing (Appendix H.3). The WSA completed for the Project determined that there are sufficient supplies for both Project construction and operation. Other projects in the vicinity would be required to comply with applicable Kern County Development Standards and to be approved by the Kern County Public Works Department. Furthermore, the Project would implement **Mitigation Measure MM 4.19-3**, which requires the operator to provide information on any groundwater that will be used by the Project. Implementation of **Mitigation Measure MM 4.19-4** would also be required, which consists of installing water meters in all facilities. However, the basin is currently overdrafted, and the District's GSP has been deemed inadequate along with the other Kern subbasin plans where other similar known and unknown projects could occur. Thus, the cumulative impacts of any use of groundwater in the area are considered significant and unavoidable after all feasible and reasonable mitigation.

Wastewater

NORSD has two improvement projects planned to accommodate growth in the NORSD service area. Given NORSD's planned improvement projects, which would add capacity of 12 MGD and 18 MGD, and the buildout dates of the Project, the cumulative impact on NORSD WWTP's capacity would be less than significant. A will-serve letter has been secured from the NORSD indicating the Project can be served by the District and demonstrates the Project's incremental contribution to wastewater services would be less than cumulatively considerable (Appendix H.3). Depending on the facilities proposed to be built by these projects, other cumulative projects in the vicinity would be required to comply with similar regulations and policies regarding wastewater, thus minimizing impacts. Therefore, cumulative impacts related to wastewater would be less than significant.

Stormwater Drainage

The Project would be required to retain the stormwater per Kern County's drainage requirements and all other applicable standards. On-site detention basins would be designed to accommodate a 100-year storm event and would detain runoff and release it at a rate no greater than the pre-development condition of the Project site. Additionally, the development of a SWPP is required (see Section 4.10, *Hydrology and Water Quality*), and a hydrologic study and final drainage plan would be created that would detail engineering design measures to manage stormwater flows and reduce potential increases in stormwater runoff to off-site areas. Other projects in the vicinity would be required to offset substantial increases in stormwater per County requirements, implement best management practices, and comply with the NPDES General Construction Permit and their respective SWPPP as applicable. Therefore, the Project would not contribute to a cumulatively considerable impact related to stormwater drainage.

Electric Power

Electric power for the construction and operation of the Project would be brought to the site through a PG&E service connection. The Project would connect to existing infrastructure, and the operation of the Project would be consistent with the planned electricity demand; therefore, the Project would not require PG&E to construct any new physical improvements related to the provision of electricity service. Furthermore, in compliance with **Mitigation Measure MM 4.19-1**, before issuance of grading and building permits, the Project proponent shall coordinate with PG&E staff to determine the specific requirements regarding any potential electric service or facility issues needed to adequately accommodate the Project. The project Proponent shall comply with and adhere to all requirements identified by PG&E to mitigate impacts to electric services and facilities as needed. As such, the Project would not contribute to a cumulatively considerable impact related to electricity facilities.

Natural Gas

PG&E would provide natural gas service to the Project site. The Project would include the connection to an existing gas line. Implementation of **Mitigation Measure MM 4.19-2** would require the Project proponent to coordinate with PG&E staff to determine the specific requirements

regarding any potential natural gas service or facility issues needed to adequately accommodate the Project. The Project proponent shall comply with and adhere to all requirements identified by PG&E to fully mitigate impacts to natural gas services and facilities, as needed as Project construction progresses. With the implementation of **Mitigation Measure MM 4.19-2**, the Project's incremental contribution to natural gas impacts would be less than cumulatively considerable. Furthermore, other cumulative projects would also be required to comply with State and local policies.

Telecommunications

The Project in combination with cumulative projects would increase the demand on telecommunication facilities. However, demand associated with the Project and other cumulative development would be minimal and is expected to be within the planning forecasts of the affected telecommunications provider. Therefore, cumulative impacts related to telecommunications facilities would be less than significant.

Solid Waste

The Project would generate solid waste during construction and operation; however, existing landfills have capacity to accommodate solid waste generated by the Project, and the Project would comply with all regulations related to solid waste. Impacts would be less than significant. Implementation of **Mitigation Measure MM 4.19-5** would further reduce the quantity of material destined for disposal at local landfills. As such, the Project's contribution to this cumulative impact would be less than significant. Similar to the Project, other planned projects are expected to comply with State and local waste-reduction policies. Therefore, the Project is not expected to result in a cumulative impact on Kern County landfills.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.19-1** through **MM 4.19-5** would be required.

Level of Significance After Mitigation

With the implementation of **Mitigation Measures MM 4.19-1** through **MM 4.19-5**, cumulative impacts would be significant and unavoidable for water supply after mitigation.

Section 4.20

Wildfire

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Section 4.20

Wildfire

4.20.1 Introduction

This section of the Draft Environmental Impact Report (Draft EIR) describes the affected environment and regulatory setting regarding wildfire. It also evaluates the impacts on wildfire that would result from the implementation of the proposed IPG Industrial Project (Project), and identifies mitigation measures that would reduce these impacts, if necessary.

This section is informed by the 2023 Biological Resources Assessment prepared by Dudek (Appendix C), Project plans, the California Department of Forestry and Fire Protection (CAL FIRE), and Kern County Fire Hazards Severity Zone (FHSZ) maps.

4.20.2 Environmental Setting

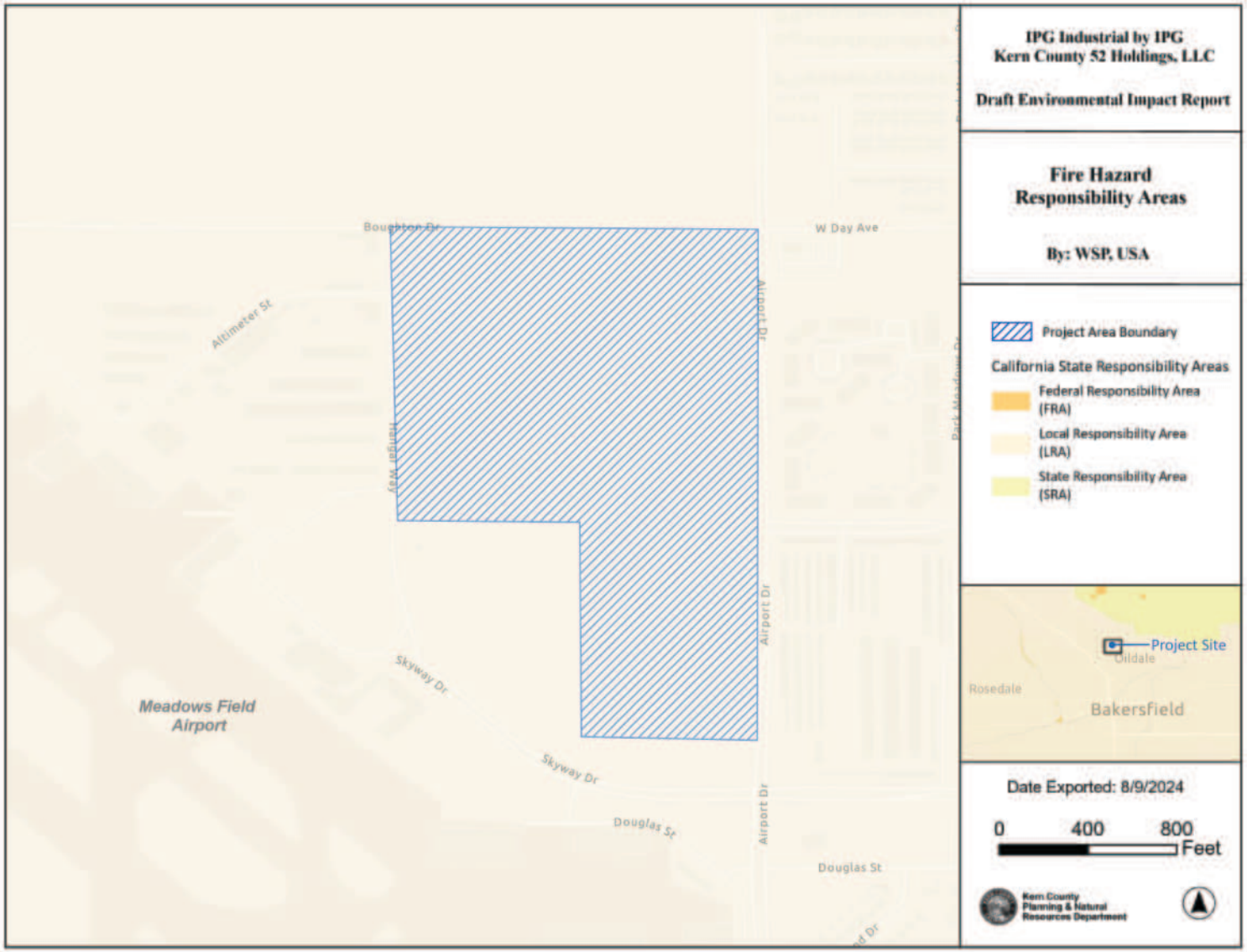
Site Characteristics and Fire Environment

The Project site is currently undeveloped. Based on the Biological Resources Assessment (Appendix C), the 49.05 acres of the Project site are predominantly non-native grassland. Non-native grassland habitat is grassland that is dominated by non-native species. These grasslands typically occur in areas with a history of disturbance. Historically, the site has been routinely disked yearly for fire and weed control. The Project vicinity is characterized by industrial and commercial uses (for example, distribution, storage, and shipping centers), transportation, vacant land, and residential uses to the east of the Project site.

CAL FIRE provides FHSZ maps based on factors such as fuel, slope, and fire weather to identify the degree of fire hazard throughout California (such as, moderate, high, or very high). While FHSZs do not predict when or where a wildfire will occur, they do identify areas where wildfire hazards could be more severe, and therefore, greater potential damage. According to the FHSZ map published by CAL FIRE, the Project is located approximately 1.10 miles away from a high FHSZ in a state responsibility area (SRA). However, the Project site is located within a Local Responsibility Area (LRA) (CAL FIRE 2024a) (**Figure 4.20-1**). According to the 2007 CAL FIRE, Kern County FHSZ Maps for the LRAs, the Project site is classified as LRA "Moderate" and LRA "Unzoned" (CAL FIRE 2007).

Moderate zones are typically wildland-supporting areas of low fire frequency and relatively modest fire behavior. An Unzoned designation indicates that the area is urbanized and not susceptible to wildland conflagrations.

Figure 4.20-1: Fire Hazard Responsibility Areas



Regional Wildfire Conditions

Kern County (the County) encompasses the southern portion of the Central Valley floor and is bound to the west by the southern slopes of the coastal mountain ranges and to the east by the southern slopes of the Sierra Nevada. Both mountain ranges are surrounded by and intermingled with areas highly susceptible to wildfires such as steep, hilly areas covered by grass and woodlands. Wind also represents a factor that influences the spread of wildfire (KCFD 2020b).

Fire History

Fire history information provides an understanding of fire frequency, fire type, most vulnerable Project areas, and significant ignition sources. CAL FIRE's Incident Map fire history represents active and prior incidents (CAL FIRE 2024b). Based on a review of these maps, no fires in the recorded history have burned across the Project site.

Vegetation (Fuels)

Based on the Biological Resources Assessment (Dudek 2023), the vegetative type across most of the Project site (approximately 49.05 acres) is considered *Avena* spp. – *Bromus* spp. alliance. This general habitat is grassland dominated by non-native species, typically in areas with a history of disturbance. Annual brome grasses and wild oat grassland dominate the plant species composition, and native annual forbs constitute a significant cover. Of the 24 plant species observed at the Project site, 33% are native plant species and 67% are non-native plant species. The current landowner has routinely disked the Project site for the past three years to control fire and weeds; the previous landowner also disked the Project site annually.

4.20.3 Regulatory Setting

Federal

There are no federal wildfire regulations applicable to this Project.

State

2022 California Fire Code

The 2022 California Fire Code (Title 24, Part 9 of the California Code of Regulations) establishes regulations to safeguard against the hazards of fire, explosion, or dangerous conditions in new and existing buildings, structures, and premises. The fire code also establishes requirements intended to provide safety for and assistance to firefighters and emergency responders during emergency operations. The provisions of the fire code apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure throughout California. Chapter 6 (Building Services and Systems) of the California Fire Code focuses on building systems and services as they relate to potential safety hazards and when and how they should be installed. Building services and

systems are addressed and include emergency and standby power systems, electrical equipment, wiring and hazards, and stationary storage battery systems. Chapter 33 (Fire Safety During Construction and Demolition) of the code outlines general fire safety precautions to maintain required levels of fire protection, limit fire spread, establish the appropriate equipment operation, and promote prompt response to fire emergencies. The fire code includes regulations regarding fire-resistance-rated construction; fire protection systems, such as alarm and sprinkler systems (for inhabited structures); fire service features, such as fire apparatus access roads; means of egress; fire safety during construction and demolition; and wildland-urban interface areas.

2022 California Building Code, Chapter 7A

Chapter 7 of the 2022 California Building Code details the materials, systems, and assemblies used in the exterior design and construction of new buildings within a Wildland-Urban Interface Fire Area. A Wildland-Urban Interface Area is defined in Section 702A as a geographical area identified by the state as an FHSZ, in accordance with the Public Resources Code Sections 4201 through 4204 and Government Code Sections 51175 through 51189, or other areas designated by the enforcing agency to be at significant risk from wildfires. The building code details the materials, systems, and assemblies used for structural fire resistance and fire-resistance-rated construction separation of adjacent spaces to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings.

Public Resources Code 4291–4299

California Public Resources Code Section 4291-4299 et seq. requires that brush, flammable vegetation, or combustible growth within 100 feet of buildings be maintained. Vegetation that is more than 30 feet from the building, less than 18 inches high, and important for soil stability, may be maintained; as may single specimens of trees or other vegetation that is maintained to manage fuels and not form a means of rapid-fire transmission from other nearby vegetation to a structure. Additionally, the Public Resources Code outlines infraction fees, certification, and compliance procedures applicable to state and local building standards, including those described in subdivision (b) of Section 51189 of the Government Code.

Local

Metropolitan Bakersfield General Plan

The Project is located within the Metropolitan Bakersfield General Plan (MBGP) planning area and, therefore, is subject to policies and measures of the MBGP. The Safety Element of the MBGP contains goals, policies, and implementation measures related to wildfire and apply to the Project, which are listed below.

Chapter VIII. Safety Element

Goals

Goal 1: Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry.

Goal 2: Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development of metropolitan police and fire facilities and services.

Goal 3: Provide for the coordinated planning and development of service areas for police and fire protection to ensure an equitable burden of responsibility between County and City in Metropolitan Bakersfield.

Goal 4: Assure that fire, hazardous substance regulation and emergency medical service problems are continuously identified and addressed in a proactive way, in order to optimize safety and efficiency.

Policies

Policy 2: Require discretionary Projects to assess impacts on police and fire services and facilities. Project.

Policy 4. Monitor, enforce and update as appropriate all emergency plans as needs and conditions in the planning area change, including the California Earthquake Response Plan, the Kern County Evacuation Plan, and the City of Bakersfield Disaster Plan.

Policy 6: Promote fire prevention methods to reduce service protection costs and costs to the taxpayer.

Kern County Community Wildfire Protection Plan

The Kern County Community Wildfire Protection Plan (CWPP) was developed in response to the federal Healthy Forests Restoration Act. The CWPP addresses hazards and risks of wildland fire throughout the County and makes recommendations for fuel reduction projects, public outreach and education, structural ignitability reduction, and fire response capabilities. The goal of the CWPP, adopted in March 2022, is to enable local communities to improve their wildfire-mitigation capacity, identify high fire-risk areas, and prioritize areas for mitigation, fire suppression, and emergency preparedness. The CWPP enhances public awareness by helping residents better understand the natural- and human-caused risk of wildland fires (SWCA 2022).

Kern County Emergency Operations Plan

The Kern County Emergency Operations Plan (EOP), adopted on May 1, 2022, is an all-hazards document that provides for the integration and coordination of planning efforts of the County with those of its cities, special districts, and the State region. The purpose of the EOP is to provide the basis for a coordinated response before, during, and after a disaster affecting the County or other

jurisdictions in the EOP's Operational Area. The EOP establishes policies, stipulates an emergency management organization, and assigns roles and responsibilities to ensure the effective management of emergency operations. The EOP also identifies sources of external support that might be provided through mutual aid and specific statutory authorities by other jurisdictions, State and federal agencies, and the private sector (Kern County OES 2022).

Kern County Multi-Jurisdiction Hazard Mitigation Plan

The purpose of the multi-hazard mitigation plan is to reduce or eliminate the long-term risk to people and property from natural hazards and their effects in the County. The 2019-20 Update to the Plan is to help Kern County become less vulnerable to losses from future disasters. Hazard mitigation is the use of sustained, long-term actions to reduce the loss of life, personal injury, and property damage that can result from a disaster. The multijurisdictional plan includes the County and the incorporated municipalities of Arvin, Bakersfield, California City, Delano, Maricopa, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco. The County also encompasses areas of land controlled by federal and State land management agencies, including the CAL FIRE, Bureau of Land Management, and Bureau of Reclamation. While other levels of government have jurisdiction in these parts of the County, the Hazard Mitigation Plan could also be used to document and coordinate mitigation efforts among federal, State, and local jurisdictions. This plan also covers 49 special districts that include school, airport, community service, water, recreation and park, sanitation, and other districts.

The plan also defines and discusses local conditions relating to wildfires. Applicable plans and policies described in the plan include Healthy Forests Restoration Act (2003), California Fire Code (2016), California Building Standards Code (2019), Hazardous Environmental Conditions in Kern County Code, §17.32, and Required Operational Permits in Kern County Code, §17.32. Historic wildfire events along with recent large wildfire events within the County are also documented. The severity and extent of wildfire hazards, warning time, secondary hazards, and climate change impacts are discussed in the plan. The plan also analyzes vulnerabilities to wildfire in terms of population, property, and infrastructure.

Kern County Fire Code

Chapter 17.32 of the Kern County Municipal Code details the Kern County Fire Code, which is an adoption of the 2022 California Fire Code with some amendments. The purpose of the County's fire code is to regulate the safeguarding of life, property, and public welfare to a reasonable degree from the hazards of fire, hazardous materials release, or explosion due to handling of dangerous and hazardous materials; conditions hazardous to life or property in the occupancy and use of buildings and premises; the operation, installation, construction, and location of attendant equipment; the installation and maintenance of adequate means of egress; and providing for the issuance of permits and collection of fees.

Kern County Fire Department – Ready, Set, Go!

The Kern County Fire Department (KCFD) offers the Ready, Set, Go! Wildfire Action Plan, which provides guidance for evacuation during a wildfire event. The plan also describes processes to

prepare property for wildfires and to improve property survival during a wildland fire. The publication defines defensible space as the required clearance between a structure and natural vegetation that provides firefighters with the room they need to defend the structure and describes how individuals can create this buffer (KCFD 2020b).

Lake Isabella Dam Failure Evacuation Plan

The Lake Isabella Dam Failure Evacuation Plan was developed and is maintained by the Kern County/Operational Area Office of Emergency Services. It provides the basic framework for response to an actual or potential failure of the Lake Isabella Dam, in accordance with the requirements of the Dam Safety Act (Government Code [GC] § 8589.5). The plan describes the specific actions to be taken by various response organizations and establishes a process and procedures for the mass evacuation and short-term support of populations at risk below the Dam. The plan defines evacuation routes within the County, separated into zones: North, Northwest, Southwest, Southeast, and Central. The North Zone indicates to travel north on the nearest major street, Airport Drive, North Chester or Manor Street to Merle Haggard Drive (Kern County Fire Department 2009).

4.20.4 Impacts and Mitigation Measures

Methodology

Wildfire impacts are considered on the basis of (1) off-site wildland fires that could result due to the Project, and (2) on-site generated combustion that could affect surrounding areas. The Project's potential impacts associated with wildfires have been evaluated using a variety of resources, including CAL FIRE maps showing FHSZs, CAL FIRE's Fire and Resource Assessment Program, and fire history and vegetation data from the Biological Resources Assessment (Dudek 2023), Project location maps, and Project characteristics. Using the aforementioned resources and professional judgment, impacts were analyzed according to the California Environmental Quality Act (CEQA) significance criteria described below.

Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist identify the following criteria, as established in Appendix G of the CEQA Guidelines, to determine whether a Project could potentially have a significant impact with respect to wildfires. A Project would have a significant impact with respect to wildfires if it would be located in or near SRAs or lands classified as very high FHSZ, and if that project would:

- Substantially impair an adopted emergency response plan or emergency evacuation plan.
- Exacerbate wildfire risks, due to slope, prevailing winds, or other factors, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.

- Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.
- Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

Project Impacts

Impact 4.20-1: The Project would substantially impair an adopted emergency response plan or emergency evacuation plan.

The Project site is not classified as being within, or near (approximately 20 miles away) from a very high FHSZ, however, is located approximately 1.10 miles from a high FHSZ As indicated above, the Project site falls within plans such as KCFD's Ready, Set, Go! Plan, which provides guidance for evacuation during a wildfire event (KCFD 2020b), as well as the County's EOP, which identifies an emergency management program, provides standard operating procedures, and provides for public awareness and education (Kern County 2022). The above emergency response plans provide guidelines on emergency preparedness and outlines the responsibilities of all agencies during an emergency, however, do not identify evacuation routes. Thus, the Project would not impair adopted emergency plans identified above, and is not within a very high FHSZ. Additionally, the Project would adhere to any applicable guidelines set forth in the plans and not conflict with the processes or procedures outlined by the plans.

Construction

The Project site contains five access driveways along Airport Drive (east of Project site), where Airport Drive extends north to intersect at Merle Haggard Drive, roughly 0.5 miles north of the Project site. Airport Drive is an established evacuation route. The project would not require permanent roadway closures, including Airport Drive. However, temporary closures could occur during construction.

Project construction also could inhibit access by emergency vehicles, heavy construction-related traffic could interfere with emergency response or emergency evacuation procedures in the event of an emergency, such as a wildfire, dam failure, or a chemical spill. This would be addressed through the preparation of a Construction Traffic Control Plan, ensuring that roadways surrounding the Project site are not impeded during construction, and emergency access is maintained to the area (see **Mitigation Measure MM 4.17-4** in Section 4.17, *Transportation and Traffic*). This Construction Traffic Control Plan must at minimum, address ensuring emergency access, temporary lane closures, minimizing construction traffic during the a.m. and p.m. peak hours, and must be consulted with the County to develop coordinated plans for vehicle routing and detours. Through implementation of **Mitigation Measure MM 4.17-4**, emergency access would be maintained at all times during construction, and appropriate detours would be provided, as necessary. Also, in compliance with applicable Fire Code and Building Code requirements, construction managers and personnel would be trained in fire prevention and emergency response.

Therefore, construction of the Project would have less than significant impacts on impairment to emergency or evacuation plans. Impacts would be less than significant.

Operations

During operations, the Project would generate 1,430 vehicle trips per day (Section 4.17, *Transportation and Traffic*). To ensure operational traffic associated with the Project would not impair an emergency response plan or conflict with an emergency evacuation plan, **Mitigation Measure MM 4.17-1** would require the project applicant to construct intersection improvements to reduce traffic delay. Any additional improvements would be addressed through Transportation Traffic Impact Fees required by **Mitigation Measure MM 4.17-2**. To further reduce congestion at intersections, **Mitigation Measure MM 4.17-3** would require the preparation of a Transportation Demand Management program to reduce VMT associated with employee trips. Additionally, the Project is required to maintain Kern County Public Works Department development standards, off-site improvements are required. This includes right-of-way dedication on Airport Drive, Boughton Drive, and Hanger Way. In addition to right-of-way dedication, the road would require right-turn channelization and drive approach of 35 feet with a median along Airport Drive project frontage. Boughton Drive and Hanger Way would require a 45-foot half-width collector. These improvements would ensure operational traffic from the Project would not conflict with vehicular circulation or emergency access along local roadways, including during emergency evacuations. Thus, operation of the Project would not result in the impairment of an adopted emergency response plan or emergency evacuation plan and, thus, impacts would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measures MM 4.17-1, MM 4.17-2, MM 4.17-3 and 4.17-4** in Section 4.17, *Transportation and Traffic*, would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measures MM 4.17-1**, **MM 4.17-2, MM 4.17-3** and **4.17-4,** impacts would be less than significant after mitigation.

Impact 4.20-2: The Project would, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.

Slope and wind speed can influence the rate of which wildfire spreads. The Project site is described as relatively flat with a gentle northeasterly slope for a topographical relief of 50 feet. A 50-foot topographical relief across approximately 50 acres does not constitute a steep slope, as the gradient does not exceed 30%. Therefore, the Project is not anticipated to expose Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire due to sloping topography.

The nearest very high FHSZ is roughly 20 miles east of the Project, and the nearest high FHSZ is approximately 1.10 miles northeast of the site (CAL FIRE 2024a). Per wind rose plots for the city of Bakersfield (located south of the Project site), prevailing winds in August are typically blown from the southeast toward the northwest. By this measure, wildfires in the FHSZ (located northeast of the site) are anticipated to prevail northwest, away from the Project site (Western Regional Climate Center 2024). It is unlikely for wildfire to spread southwest from winds because the Project site is located near development. Development includes residential areas to the north and east and undeveloped vacant land to the north. There is a level of risk for wildfire due to the comingling of structures and vegetation fuels on vacant land surrounding the site. In the event of a wildfire once the facility is operational, the employees associated with the Project (437 employees over the course of three shifts) would rapidly evacuate at the time of the event or well in advance of an approaching wildfire in conformance with applicable County evacuation directives. As discussed in the Kern County Multi-Jurisdiction Hazard Mitigation Plan, dry weather may trigger wildfire events. Severe weather can be predicted, so special attention can be paid during weather events including lightning or wind events. Reliable National Weather Service lightning warnings are available on average of 24 to 48 hours prior to a significant electrical storm. Fire alerting is expected be reasonably rapid, allowing employees time to be properly evacuated in such events. Such measures would ensure that the exposure of Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire from prevailing winds would be minimized to the extent feasible.

Because of the existing and proposed conditions, the potential for wildfire on the Project site is considered low. The Project site is located on relatively flat terrain and is not within a high or very high FHSZ. Therefore, the construction and operation of the Project would not, due to slope, prevailing winds, and other factors, exacerbate the risk of wildfire. The Project would not expose occupants to pollutant concentrations from a wildfire or uncontrolled wildfire. Additionally, Project construction would comply with applicable existing codes and ordinances related to the maintenance of mechanical equipment, handling and storage of flammable materials, and cleanup of spills of flammable materials. Prior to issuance of grading or building permits, the Project proponent would also develop and implement a Fire Safety Plan, as required by **Mitigation Measure MM 4.9-11** (Section 4.9, *Hazards and Hazardous Materials*). Impacts would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.9-11** (Section 4.9, *Hazards and Hazardous Materials*) would be required.

Level of Significance After Mitigation

With the implementation of **Mitigation Measure MM 4.9-11,** impacts would be less than significant after mitigation.

Impact 4.20-3: The Project would require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.

Development would include the construction of two single-story buildings. Building 1 would total 655,690 square feet and Building 2 would total 267,440 square feet for a combined total of 923,130 square feet (including 15,000 square feet for dedicated office space). Development would also include related site improvements on 49.05 acres of privately owned land. The proposed Project would include off-site improvements along Boughton Road, Airport Road, and Hanger Way, adjacent to the Project site. Thus, this impact is considered potentially significant with the installation of new infrastructure that may exacerbate fire risk. The existing roads would be improved with new pavement, curbs and gutters, and sidewalks as well as right-of-way dedication on Airport Drive, Boughton Drive, and Hanger Way. In addition to right-of-way dedication, the road would require right-turn channelization and drive approach of 35 feet with a median along Airport Drive project frontage. Boughton Drive and Hanger Way would require a 45-foot half-width collector. All roadway improvements would comply with applicable Kern County Public Works Department development standards, and all off-site roadway work would be located in areas designated LRA Moderate and LRA Unzoned, where areas are either of low fire frequency or not susceptible to wildland conflagrations, respectively. Additionally, operation and maintenance associated with the above-mentioned infrastructure would adhere to County public road standards and County code.

Most fires in the dry valley areas and foothills are caused by lightning strikes on electrical systems (such as transmission lines) or vehicles. The installation of off-site electrical systems is not part of the Project and, therefore, would not result in increased fire risks that could result in temporary or ongoing impacts on the environment. Improvements to existing access roads would not be placed within a HFSZ as there are no such zones within the Project site, and vegetation would be cleared to reduce the available fuel load and create a defensible space; therefore, the Project would not result in increased fire risks that could result in temporary or ongoing impacts on the environment. Additionally, as discussed in Section 4.9, *Hazards and Hazardous Materials*, prior to issuance of grading or building permits, the Project proponent would also develop and implement a Fire Safety Plan, as required by **Mitigation Measure MM 4.9-11**. Project implementation of this mitigation measure would ensure that potential wildfire impacts related to installation or maintenance of associated infrastructure is reduced; therefore, impacts would be less than significant.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.9-11** (Section 4.9, *Hazards and Hazardous Materials*) would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.9-11,** impacts would be less than significant after mitigation.

Impact 4.20-4: The Project would expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

Vegetation loss due to wildfires can exacerbate landslide risk by destabilizing slopes. In the event that a significant wildfire was to burn in nearby areas, the Project site may be exposed to potential risks associated with landslides, flooding, and/or debris flow in the weeks, months, and years following the fire as a result in changes to the vegetative cover of the land and the rain absorption capacity of the soil. As indicated above, the Project site is located on relatively flat topography and within a Moderate and Unzoned LRA. Conditions for landslides are not present at the Project site, which is characterized by relatively gradual inclines across the site, as described in Section 4.7, *Geology and Soils*. Additionally, there are no areas classified as High FHSZs or areas prone to fires immediately adjacent to the Project site. As previously described, the nearest High FHSZ is located approximately 1.10 miles northeast of the site in a primarily residential area at an elevation of approximately 630 feet. Based on the nature and relatively flat topography of the area and because the area is not located on a hillside above the site, the Project site is not expected to experience impacts from landslides or runoff. CAL FIRE's Incident Map also records no fire events in the areas nearby the Project site (CAL FIRE 2024b). Additionally, the Project site has been routinely disked annually for fire and weed control by the current landowner for the last three years and the landowner before. Therefore, nearby areas are not expected to experience wildfires that would result in landslides or runoff that would expose people or structures to significant risks at the Project site. Thus, the Project is not anticipated to expose people or structures to downslope or downstream flooding or landslides as a result of post-fire slope instability.

Based on the fire history immediately surrounding the site, moderate FHSZ designation, and terrain, there is a low potential for the Project site to be at risk of post-fire slope instability or drainage changes. Therefore, the Project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes. Thus, impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance After Mitigation

Impacts would be less than significant.

4.20.5 Cumulative Setting, Impacts, and Mitigation Measures

Cumulative Setting

Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or substantially increase other environmental impacts. Cumulative impacts for a project are considered significant if the incremental effects of the individual projects are considerable when viewed in connection with the effects of past projects, and the effects of other projects located in the vicinity of the Project site. The geographic scope for cumulative impacts of wildfire is the planning area within the MBGP. This geographic scope was selected because the land within the region possesses relatively similar features and uses, including industrial and commercial uses (for example, distribution, storage, and shipping centers), transportation, vacant land, and residential uses. As shown in Chapter 3, *Project Description*, the area includes a variety of commercial and industrial developments. These have the potential to result in cumulative impacts to wildfire when considered together with the Project. However, the Project is not within an SRA or a very high or high FHSZ.

With regard to impairment of an adopted emergency response plan or emergency evacuation plan, all of the related Projects would be required to provide adequate emergency access in accordance with County fire and building code requirements (or similar codes/requirements in accordance with the applicable jurisdiction within Kern County) and prior to the issuance of a building permit. Project Regional access to the Project site is provided by SR-99 and Merle Haggard Drive via Airport Drive. As previously discussed, the Project site is not classified as being within a very high or high FHSZ and would comply with fire code and building code requirements including fire prevention and emergency response training for site personnel. As concluded in the discussion of Project impacts above, the Project would have a less than significant impact related to impairment of an adopted emergency response or evacuation plan. Similar to the Project, related Projects would be required to determine whether they are classified as being within a high FHSZ, identified within an emergency evacuation route or within an adopted emergency evacuation plan, and whether they meet the requirements of applicable fire code and building code. Therefore, the Project and related Projects are expected to result in a less than significant cumulative impact to an adopted emergency response plan or emergency evacuation plan.

Regarding cumulative impacts related to exposure of Project occupants to pollutant concentrations from a wildfire, while the Project is not within an LRA, SRA, or Federal Responsibility Area identified as having substantial or very high fire risk, some related Projects in the area may be. Similar to the Project, all related projects would be required to implement building and landscape design features in accordance with the fire code and building code to reduce wildfire risk and exposure of occupants to pollutant concentrations from a wildfire. Adherence to the fire code and building code requirements as well as implementation of Countywide plans, including the KCFD Strategic Fire Plan, the Kern County CWPP, the Kern County EOP, and the Kern Multi-Jurisdiction Hazard Mitigation Plan, in nearby cities and throughout the adjacent unincorporated areas would minimize potential impacts related to exposure to and the uncontrolled spread of a wildfire. As concluded in the discussion of Project impacts above, the Project would have a less

than significant impact related to exposure of Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Additionally, prior to issuance of grading or building permits, the Project would also be required to develop and implement a Fire Safety Plan, as required by **Mitigation Measure MM 4.9-11** (see Section 4.9, *Hazards and Hazardous Materials*). Therefore, the Project and related Projects are expected to result in a less than significant cumulative impact related to exposure of Project occupants to pollutant concentrations from a wildfire.

Related Projects may require associated infrastructure such as roads, fuel breaks, and power lines that could exacerbate fire risk or that may result in temporary or ongoing impacts on the environment. The County would review these projects for land use and zoning consistency and compliance with applicable requirements and analyze them for environmental impacts. The placement of infrastructure would adhere to all fire codes to minimize the potential fire risk such as siting and design. Additionally, prior to issuance of grading or building permits, the Project would also be required to develop and implement a Fire Safety Plan, as required by **Mitigation Measure MM 4.9-11**, (Section 4.9, *Hazards and Hazardous Materials*). Therefore, the Project and related Projects are expected to result in a less than significant cumulative impact related to the installation or maintenance of associated infrastructure.

Some related Projects could be proposed in areas that could expose people or structures to risks from downslope or downstream flooding or landslides as a result of post-fire slope instability. Based on the recent fire events in California, all Projects would be required to adhere to the County's zoning and land use designations and codes (or those of the applicable jurisdiction within Kern County), state and local fire codes, and regulations associated with drainage and site stability. These regulations, policies, and codes would reduce the potential for exposing people or structures to risks from downslope or downstream flooding or landslides as a result of post-fire slope instability. Each Project would require site-specific hydrology and drainage studies for effective drainage design. Therefore, the Project and related Projects are expected to result in a less than significant cumulative impact related to exposing people or structures to significant risks as a result of runoff, post-fire slope instability, or drainage changes.

Mitigation Measures

Implementation of **Mitigation Measure MM 4.9-11** (Section 4.9, *Hazards and Hazardous Materials*) would be required.

Level of Significance After Mitigation

With implementation of **Mitigation Measure MM 4.9-11**, cumulative impacts would be less than significant after mitigation.

Chapter 5

Consequences of Project Implementation

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Chapter 5

Consequences of Project Implementation

5.1 Environmental Effects Found to Be Less Than Significant

According to Section 15128 of the California Environmental Quality Act (CEQA) Guidelines, an Environmental Impact Report (EIR) must "contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and were therefore not discussed in detail in the EIR."

Kern County has engaged the public in scoping the environmental document for the proposed IPG Industrial Project (Project). Comments received during scoping have been considered in identifying issue areas that should receive attention in the EIR. The contents of this Draft EIR were established based on an Initial Study (IS)/Notice of Preparation (NOP) prepared following the CEQA Guidelines and on public and agency input received during the scoping process. Issues found to have no impact or less than significant impacts during the preparation of the IS/NOP do not need to be addressed further in this Draft EIR; no issues were excluded from analysis in the Draft EIR. The Draft EIR must include a comprehensive analysis of the environmental issue areas identified in Appendix G of the CEQA Guidelines.

After further study and environmental review, as documented in this Draft EIR, direct, indirect, and cumulative impacts of the Project would be less than significant or could be reduced to less than significant levels with mitigation measures for the following issue areas:

- Aesthetics and Visual Resources
- Agriculture
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use Planning
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Tribal Cultural Resources
- Wildfire

5.2 Significant Environmental Effects That Cannot Be Avoided

Section 15126.2(b) of the CEQA Guidelines requires EIRs to describe any significant impacts, including those that can be mitigated but not reduced to less than significant levels. Chapter 4 of this Draft EIR discusses the Project's potential environmental effects and proposed mitigation measures.

Table 5-1 summarizes impacts on resources that would be significant and unavoidable, even with the incorporation of feasible mitigation measures.

Table 5-1: Summary of Significant and Unavoidable Impacts of the Project

Resources	Project Impacts	Cumulative Impacts
Air Quality	There would be no significant and unavoidable Project impacts. With the implementation of **Mitigation Measure MM 4.3-1** through **MM 4.3-5**, the impacts would be less than significant.	The Project would have cumulatively significant and unavoidable impacts related to consistency with existing air quality plans as the County does not have jurisdiction and control over all potential projects in the San Joaquin Valley Air Basin and, thus, cannot ensure that such projects would fully offset their criteria emissions pursuant to a Developer Mitigation Agreement. Additionally, although the Project would implement **Mitigation Measures MM 4.3-1** through **MM 4.3-10**, the Project, in combination with all potential projects in the SJVAB, could result in significant levels of criteria pollutants due to the lack of methodology to assess the specific correlation between mass emissions generated and the effect on the public health and welfare. Therefore, it would be speculative to determine how the Project, in combination with all potential projects in the SJVAB would affect the number of days the region is in non-attainment, since mass emissions are not correlated with the concentration of emissions or how many additional individuals in the SJVAB would be affected by the health impacts mentioned. As such, cumulative impacts for criteria pollutants would be considered **cumulatively significant and unavoidable.**
Greenhouse Gases	There would be no significant and unavoidable Project impacts.	The Project would implement **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (Section 4.3, *Air Quality*), **MM 4.6-1 and MM 4.6-2** (Section 4.6, *Energy*) **Mitigation Measures MM 4.8-1, MM 4.8-2,** and **MM 4.17-3** (Section 4.17, *Transportation and Traffic*) to help reduce GHG emissions. However, without clear scientific or other criteria for determining the significance of the Project's contribution to global climate change, it is not possible to assess, with certainty, whether the Project's contribution would be cumulatively considerable within the meaning of California Environmental Quality Act Guidelines Sections 15065(a)(3) and 15130. Therefore, cumulative impacts associated with GHG emissions would be **significant and unavoidable**, regardless of the implementation of the aforementioned mitigation measures, as GHG impacts are exclusively

Resources	Project Impacts	Cumulative Impacts
		cumulative.
Noise	There would be no significant and unavoidable Project impacts.	The Project itself would result in a less than significant impact and **Mitigation Measures MM 4.13-1** through **MM 4.13-4** (Section 4.13, *Noise*, for full mitigation measures) would be implemented, requiring equipment laydown yards to be staged as far as possible from residences, construction equipment to be fitted with approved noise-reduction features, and construction vehicles to limit idling time and speeding on access roads. During operations, Project-level noise emissions would be further mitigated through the implementation of **Mitigation Measure MM 4.1-3**, as outlined in Section 4.1, *Aesthetics,* which requires installation of a vegetative barrier along the Airport Drive and Boughton Drive frontages, resulting in both a visual and noise buffer between the industrial operations and nearby residences and sensitive receptors. Project construction activities would generate worker trips per day, vendor trips, and haul truck trips that would result in substantial temporary increases in noise due to increased traffic. The existing baseline plus construction traffic noise levels along the analyzed roadway segments would not increase by a noise level of more than 5 A-weighted decibels, which is considered to be a readily perceivable increase. However, the Project would result in significant and unavoidable cumulative noise-related impacts due to the temporary increase in construction noise. Therefore, even with the implementation of **Mitigation Measures MM 4.1-3,** and **MM 4.13-1** through **MM 4.13-4**, cumulative noise impacts would still be considered **significant and unavoidable**.
Utilities and Service Systems	There would be no significant and unavoidable Project impacts.	With the implementation of the Project, sufficient groundwater supplies will continue to be available during future normal, dry, and multiple dry years in the County. Regardless, as the Kern County Subbasin is currently over-drafted and the District's Groundwater Sustainability Plan has been deemed inadequate, along with the other Kern subbasin plans where other similar known and unknown projects could occur, the cumulative impacts of any use of groundwater in the area are considered significant and unavoidable after all feasible and reasonable mitigation. Therefore, cumulative impacts related to water supply would be **significant and unavoidable,** despite the implementation of **Mitigation Measures MM 4.19-3** and **MM 4.19-4**.

Key:
GHG = greenhouse gas
SJVAB = San Joaquin Valley Air Basin

5.3 Irreversible Impacts

Section 15126.2(c) of the CEQA Guidelines defines an irreversible impact as an impact that uses nonrenewable resources during the initial and continued phases of the Project. Irreversible impacts can also result from damage caused by environmental accidents associated with a project. Irretrievable commitments of resources should be evaluated to ensure that such consumption is justified.

Build-out of the Project would commit nonrenewable resources during Project construction. During Project construction, oil, gas, and other fossil fuels and nonrenewable resources would be consumed, primarily in the form of transportation fuel for Project employees and delivery trucks. Water used during the construction phase is also required for dust suppression, soil compaction, and grading activities.

Project operations are expected to also require gas and other fossil fuels in the form of transportation fuel for employees, as well as water for operational activities. Therefore, an irreversible commitment of nonrenewable resources would occur as a result of long-term Project operations. However, assuming that those commitments occur in accordance with the adopted goals, policies, and implementation measures of the Metropolitan Bakersfield General Plan (MBGP), as a matter of public policy, those commitments have been determined to be acceptable. The MBGP ensures that any irreversible environmental changes associated with those commitments will be minimized, to the extent feasible.

Additionally, the Project would be required to adhere to the latest adopted edition of the California Building Code, which includes standards to reduce energy demand, water consumption, wastewater generation, and solid waste generation that would collectively reduce the demand for resources during construction and operation. This would result in the emission and generation of less pollution and effluent and would further lessen the impact of corresponding environmental effects. Although the Project would result in an irretrievable commitment of nonrenewable resources, the commitment of these resources would not be inefficient, unnecessary, or wasteful.

5.4 Growth Inducement

The MBGP recognizes that certain forms of growth are beneficial, both economically and socially. Section 15126.2(d) of the CEQA Guidelines provides the following guidance on growth-inducing impacts: “A project is identified as growth inducing if it “could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment.”

Growth inducement can result from new development that requires increased employment levels, removes barriers to development, or provides resources that lead to secondary growth. The Project does not include the construction of housing and would, therefore, not result in direct population growth as a result of additional housing.

As discussed in Section 4.11*, Land Use and Planning*, with respect to employment, the Project would promote development that is consistent with the economic and land use demands of the area, as defined by the goals and policies within the MBGP, and would not induce substantial growth. Implementation of the Project would create temporary and permanent employment positions. The Project would require a temporary workforce to construct the warehouse and distribution facility. The on-site construction workforce would consist of up to 503 full-time equivalent jobs; however, the average daily workforce would vary depending upon the stage of construction. During the operational phase, the facility would employ approximately 437 employees during up to three shifts, with additional indirect/induced economic impacts from the Project supporting approximately 159 additional jobs. Construction staff that are not local would likely be housed in existing communities. It is expected that operations staff would already reside in the area and operation of the Project would not result in a substantial influx of people (such as a new residential development, school, or other use that would result in large volumes of people residing near or traveling to the Project site).

As described in Section 4.14, *Population and Housing*, the unemployment rate in the Project region was 8.9% in June 2024. This regional unemployment rate is still above California's unemployment rate (5.3%) and the national average (4.3%). Thus, the temporary and permanent employees required by the Project could come from the surrounding areas and would not need to be relocated. The Project would not create additional infrastructure or road extensions that would indirectly induce population growth.

As described in Section 4.19, *Utilities and Service Systems*, Pacific Gas and Electric would supply electricity to the Project site. The Project proposes to use the existing electricity grid, and service laterals would be extended to the Project site from existing utility facilities along Boughton Drive and Airport Drive. Natural gas would also be required for Project operation and would also be provided by Pacific Gas and Electric. Although the North of River Sanitary District would serve the Project site for sewage disposal, the Project also would include on-site stormwater drainage consisting of inlets, underground piping, and surface basins. The basins would be designed to accommodate a 100-year storm event and would detain runoff and release it at a rate no greater than the Project site's predevelopment condition. Therefore, the Project would not require connection to existing storm drains or wastewater laterals. Because no extension of infrastructure to unserved areas would be required, no removal of physical barriers to growth would occur. In total, the Project is not likely to induce any growth within Kern County.

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Chapter 6

Alternatives

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Chapter 6
Alternatives

6.1 Introduction

The California Environmental Quality Act (CEQA) requires that an Environmental Impact Report (EIR) describe a range of reasonable alternatives to the Project, or to the location of the Project that would avoid or lessen any significant environmental impacts of the project, while feasibly attaining most of the Project's basic objectives. An EIR also must also compare and evaluate the environmental effects and merits of the alternatives. This chapter describes the alternatives considered but eliminated from further consideration and includes the reasons for the elimination, and includes a comparison of the environmental impacts of several alternatives retained with those of the proposed IPG Industrial Project (the Project).

The following are key provisions of the CEQA Guidelines (Section 15126.6):

- The discussion of alternatives shall focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives or would be more costly.
- The No Project Alternative shall be evaluated, along with its impacts. The No Project analysis shall discuss the existing conditions at the time the notice of preparation was published, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services.
- The range of alternatives required in an EIR is governed by a "rule of reason;" therefore, the EIR must evaluate only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project.
- For alternative locations, only locations that would avoid or substantially lessen any of the significant effects of the project need be considered for inclusion in the EIR.
- An EIR need not consider an alternative whose effects cannot be reasonably ascertained and whose implementation is remote and speculative.

The range of feasible alternatives is selected and discussed in a manner to foster meaningful public participation and informed decision-making. Among the factors that may be taken into account when addressing the feasibility of alternatives, as described in Section 15126.6(f)(1) of the CEQA Guidelines, are environmental impacts, site suitability, economic viability, availability of infrastructure, general plan consistency, regulatory limitations, jurisdictional boundaries, and whether IPG Kern County 52 Holdings, LLC (Project proponent) could reasonably acquire, control,

or otherwise have access to an alternative site. An EIR need not consider an alternative whose effects could not be reasonably identified, whose implementation is remote or speculative, and that would not achieve the basic Project objectives.

Per the CEQA Guidelines, this section discusses alternatives that are capable of avoiding or substantially lessening the Project's potentially significant environmental effects. Section 6.2, *Proponent Submitted Project Objectives*, restates the Project proponent's Project objectives. Section 6.3, *Project Overview*, summarizes Project features. Section 6.4, *Overview of Project Alternatives*, provides an overview of the alternatives. Section 6.5, *Alternatives Considered and Rejected*, presents alternatives to the project that were considered but eliminated for further analysis. Section 6.6, *Analysis Format*, explains the evaluation process of each of the alternatives in accordance with CEQA Guidelines Section 15126.6(d). Section 6.7, *Impact Analysis*, presents a comparative analysis of the impacts of the alternative and the Project, followed by a general explanation of attainability of Project objectives under each alternative. Section 6.8, *Environmentally Superior Alternative*, makes a determination about the environmentally superior alternative analyzed in this EIR.

6.1.1 Significant Impacts of the Project after Mitigation

Potentially significant adverse environmental impacts that would result from the Project are evaluated in Chapter 4, *Environmental Setting, Impacts, and Mitigation Measures*. The mitigation measures and impact conclusions are summarized in Chapter 1, *Executive Summary*, which includes a summary chart of impact conclusions for all topic areas. This EIR concludes that the Project has the potential to cause significant environmental impacts in the following categories:

- Air Quality (cumulative)
- Greenhouse Gas Emissions (cumulative)
- Noise (cumulative – construction)
- Utilities and Service Systems (cumulative – water supply)

Even with the mitigation measures described in Chapter 4, *Environmental Setting*, *Impacts, and Mitigation Measures*, of this EIR, impacts in these issue areas would be significant and unavoidable. Therefore, per the CEQA Guidelines, this chapter discusses alternatives that are capable of avoiding or substantially lessening effects on these resources. The significant and unavoidable impacts of the Project are discussed below.

Air Quality

As discussed in Section 4.3, *Air Quality*, with mitigation, the Project would have a less than significant impact related to conflicts with the adopted regulatory programs incorporated within San Joaquin Valley Air Pollution Control District's (SJVAPCD) ozone and particulate matter attainment plans, also referred to as an Air Quality Attainment Plan (AQAP). The Project would

also have a less than significant impact regarding exposure of sensitive receptors to substantial pollutant concentrations with the incorporation of mitigation measures.

The Project would require implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-5** in order to reduce the severity of construction-related emissions. With implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-5**, the Project would comply with all applicable SJVAPCD Rules and Regulations and would be consistent with the district's adopted AQAP, and therefore, would not conflict with or obstruct implementation of any applicable air quality plans. However, cumulative construction and long-term operational activity impacts would be significant and unavoidable because the County does not have jurisdiction and control over all potential projects in the San Joaquin Valley Air Basin. Additionally, because the amount of emissions generated by existing and future projects in the area is not available, it is possible that that together, these emissions would potentially exceed SJVAPCD's significance thresholds. For these reasons, cumulative localized air quality impacts associated with short-term construction and long-term operational activities would be considered significant and unavoidable.

Greenhouse Gas Emissions

As explained in Section 4.8, *Greenhouse Gas Emissions*, the Project's potential adverse effects related to direct and indirect greenhouse gas (GHG) emissions would be mitigated to less than significant levels. With the implementation of mitigation, the Project would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing emissions of GHG. However, there is currently no clear scientific or other criteria for determining the significance of the Project's contribution to global climate change.

Without the necessary science and analytical tools, it is not possible to assess, with certainty, whether the Project's contributions would be cumulatively considerable within the meaning of CEQA Guidelines Section 15065(a)(3) and 15130. CEQA, however, does note that more severe environmental problems have lower thresholds for determining that a project's contribution to cumulative impacts is significant. Given the position of the legislature in AB 32, which states that global warming poses serious detrimental effects, and the requirements of CEQA for the lead agency to determine that a project not have a cumulatively considerable contribution, the effect of the Project's total emissions of 13,974 $MTCO_2e$ per year could be considered cumulatively considerable.

To reduce the Project's emissions, **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (see Section 4.3 *Air Quality*, for full mitigation measures), **MM 4.6-1** and **4.6-2** (see Section 4.6, *Energy*, for full mitigation measures), and **MM 4.17.3** (see Section 4.17, *Transportation and Traffic*, for full mitigation measures) would be implemented to reduce emissions associated with energy use, waste generation, off-road equipment operations, motor vehicles, and area sources. **MM 4.8-1** and **MM 4.8-2** (see Section 4.8 *Greenhouse Gas Emissions*, for full mitigation measures) would also be implemented to reduce emissions associated with energy use, waste generation, off-road equipment operations, motor vehicles, and area sources.

As there are no clear scientific criteria for determining the significance of the Project's contribution to global climate change, the Project's cumulative impacts would remain significant and unavoidable despite implementation of the above Mitigation Measures. The Project's cumulative potential GHG contributions to global climate change is considered to be significant and unavoidable.

Noise

The Project would result in significant and unavoidable cumulative noise impacts due to the temporary increase in construction noise. The Project's construction activities would generate worker trips per day, vendor trips, and haul truck trips that would result in substantial temporary increases in noise due to increased traffic. The existing baseline plus construction traffic noise levels along the analyzed roadway segments would not increase by a noise level of more than 5 dBA, which is considered to be a readily perceivable increase. The proposed project itself would result in a less than significant impact and **Mitigation Measures MM 4.13-1** through **MM 4.13-4** (see Section 4.13, *Noise*, for full mitigation measures) would be implemented requiring equipment laydown yards to be staged as far as possible from residences, construction equipment to be fitted with approved noise-reduction features, and construction vehicles to limit idling time and speeding on access roads. However, even with the implementation of **Mitigation Measures MM 4.13-1** through **MM 4.13-4**, cumulative noise impacts would still be considered significant and unavoidable.

During operations, the Project's traffic noise levels would not result in a significant and unavoidable impact to off-site land uses at roadway segments in the Project's area based on the findings within the Noise and Vibration Analysis (Appendix I). During operations, project-level noise emissions would be further mitigated through implementation of **Mitigation Measure MM 4.1-3**, as outlined in Section 4.1, *Aesthetics,* which requires installation of a vegetative barrier along the Airport Drive and Boughton Drive frontages, resulting in both a visual and noise buffer between the industrial operations and nearby residences and sensitive receptors.

Utilities and Service Systems

As discussed in Section 4.19, *Utilities and Service Systems*, implementation of **Mitigation Measures MM 4.19-1** through **MM 4.19-4** would reduce all impacts from the extension of water, stormwater, wastewater, and electrical infrastructure. Therefore, the Project's potential to require or result in the relocation or construction of new or expanded wastewater treatment or storm water drainage, electric power, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects, would be less than significant. Additionally, with implementation of **Mitigation Measures MM 4.19-1** through **MM 4.19-4**, the project would have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years and impacts would be less than significant. Because the Project would not generate a significant amount of wastewater from operations, the Project does not have the potential to result in a determination by the wastewater service provider that it has an inadequate capacity to serve the Project's projected demand in addition to the provider's existing commitments.

Additionally, **Mitigation Measure MM 4.19-5**, would require the provision of a recycling coordinator to ensure the separation and proper disposal of recyclable materials and solid waste during construction. With mitigation, the Project's potential to generate solid waste in excess of State or local standards, or in excess of local infrastructure, or otherwise impair the attainment of solid waste reduction goals would be less than significant as well. Implementation of mitigation along with compliance with applicable statutes and regulations would also ensure compliance with policies to reduce waste sent to landfills, reducing impacts to less than significant.

In regard to cumulative impacts, the Project could result in significant impacts on utilities and service systems relative to water supply. As the Kern County subbasin is currently over drafted and the District's Groundwater Sustainability Plan has been deemed inadequate, along with the other Kern subbasin plans where the other similar known and unknown projects could occur, the cumulative impacts of any use of groundwater in the area are considered cumulatively significant and unavoidable after all feasible and reasonable mitigation.

6.2 Proponent Submitted Project Objectives

The Project proponent has defined the following objectives for the Project:

- Develop state-of-the-art warehouse and distribution facilities near major transportation corridor
- Meet regional demand for Class A industrial facilities that address local traffic patterns and needs
- Develop a visually appealing industrial Project that is consistent with the provisions of the Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards
- Promote land use compatibility with adjacent airport related uses by developing a warehouse and distribution facility
- Positively contribute to the local economy through new capital investment, the creation of new employment opportunities, expansion of the tax base, economic growth and development, and payment of development fees
- Site an industrial project in a location consistent with current and future market demands which minimizes conflicts with surrounding uses

6.3 Project Overview

The Project would include the development of a 923,130-square-foot warehouse distribution facility and associated improvements on approximately 49.05 acres located in the central portion of unincorporated Kern County. The facility contains two single-story buildings: one building (Building 1) would total approximately 655,690 square feet and the second (Building 2) would total 267,440 square feet, with a total of 15,000 square feet for office space. The warehouses would be primarily constructed from architecturally enhanced concrete panels and would not exceed 56 feet

in height above finished floor elevation. The primary function would be a high cube and cold storage warehouse storage to facilitate material handling equipment and storage uses, where cold storage would occupy up to 20% of the facility. The warehouses would serve trucks exclusively and would require truck doors of various types. Improvements to roadways would be required to adhere to Kern County Public Works Department development standards. Other improvements include utility, water, and gas lateral extensions and storm drainage systems.

6.4 Overview of Project Alternatives

Under CEQA, and as required in California Public Resources Code Section 21002.1(a), the identification and analysis of alternatives to a Project is a fundamental aspect of the environmental review process and is required to ensure the consideration of ways to mitigate or avoid the significant environmental effects of a Project. Based on the significant environmental impacts of the Project, the aforementioned objectives established for the Project, and the feasibility of the alternatives considered, two alternatives, including the No Project Alternative as required by CEQA, are considered in this chapter and summarized in **Table 6-1**. The Environmentally Superior Alternative, as required by CEQA, is described in Section 6.10, *Environmentally Superior Alternative*, below.

6.4.1 Alternative 1: No Project Alternative

The CEQA Guidelines require EIRs to include a No Project Alternative for the purpose of allowing decision-makers to compare the effects of approving the Project versus a No Project Alternative. Accordingly, Alternative 1, the No Project Alternative, assumes that the development of the proposed warehouse would not occur. The No Project Alternative would not require the Precise Development (PD) Plan or a Zone Variance (ZV) for construction and operation of a warehouse distribution facility and associated improvements. Under the No Project Alternative, the Project site would maintain the current zoning, land use classifications, and existing undisturbed land surrounded by industrial and commercial uses. No physical changes would be made to the Project site.

6.4.2 Alternative 2: Reduced Footprint Alternative

Alternative 2, the Reduced Footprint Alternative, would be developed at the Project site with a reduced footprint by approximately 30%. Under this alternative, only Building 1 would be constructed, with a site area of 35.17 acres featuring a 655,690-square-foot warehouse with 10,000 square feet dedicated to office space. This approach would decrease the overall development footprint, as well as reduce the number of employee and truck trips, traffic congestion, and emissions compared to the Project, along with a proportionate amount of demand for water, energy, utilities, and other resources. However, it would still require the same entitlements as the Project.

6.4.3 Alternative 3: Eastern Kern/Mojave Specific Plan Project Alternative Site

Alternative 3, the Eastern Kern/Mojave Specific Plan Project Alternative Site, proposes the same Project development and operation of a 923,130-square-foot warehouse distribution facility and associated improvements on approximately 49.05 acres, but located in the Mojave Desert, rather than the San Joaquin Valley of Kern County, specifically eastern Kern County in the adopted Mojave Specific Plan area (**Figure 6-1**). The Mojave Specific Plan encompasses approximately 31,000 acres in eastern Kern County, including the unincorporated community of Mojave, and functions as the transportation and aviation hub of eastern Kern County.

The intention of this Project alternative is to find a Project site with similar site features as the existing Project site and in unincorporated Bakersfield, such as: adjacency to major freeway access, industrial designation, and reduced travel distances required for distribution trucks, thereby resulting in similar related impacts to aesthetics, air quality, biological resources, and GHG emissions associated with the Project. The Specific Plan area has direct access off State Route 58 (SR 58), which connects the Riverside, San Bernadino, and Ontario Metropolitan transportation corridors, and also connects to State Highway 14 (Antelope Valley Freeway) with direct access to Southern California Interstate 5 into the City of Los Angeles and San Diego.

Alternative 3 would develop the same land area and all of the Project components. Approval of Alternative 3 would be required to comply with the Mojave Specific Plan and entitlements for the Project, which would be dependent on the site selected within the planning area. Impacts to water supply usage would be reduced to less than significant because the Mojave Specific Plan water basin is not subject to any adjudication or the Groundwater Management Sustainability Act (GSMA). The East Kern Air Pollution Control District is responsible for regional air quality of the area and is considered to be in attainment for emissions, while the SJVAPCD is in nonattainment for O_3 (8-hour) and $PM_{2.5}$ (federal) and O_3 (1-hour and 8-hour), PM_{10}, and $PM_{2.5}$ (State). As a Specific Plan with an existing Final EIR and sites zoned M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining) with an underlying LI (Light Industrial) land use designation, CEQA streamlining could be available for Alternative 3.

Figure 6-1: Alternative 3 Location

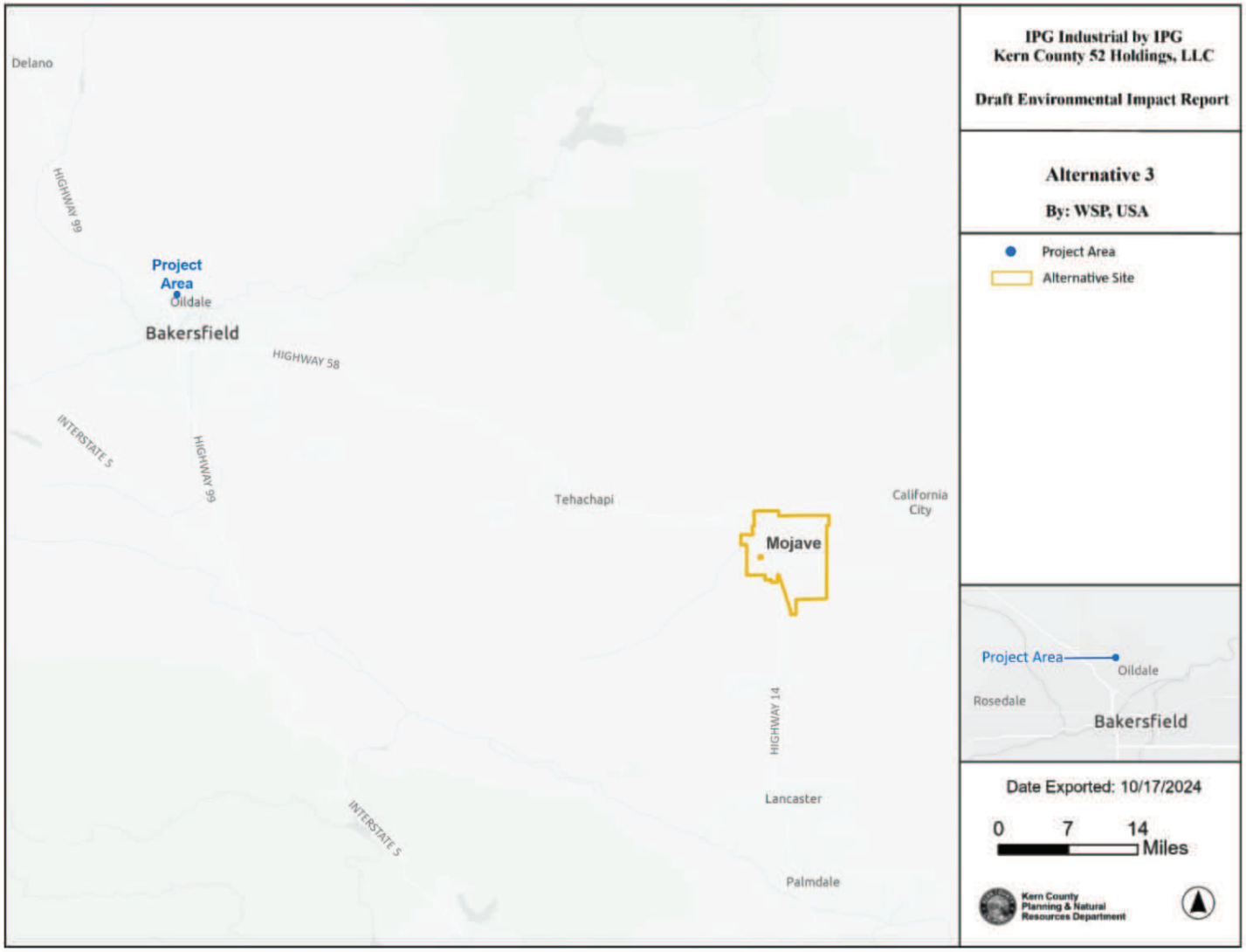

Table 6-1 provides a summary of the relative impacts and feasibility of each alternative. A complete discussion of each alternative is also provided below.

Table 6-1: Summary of Development Alternatives

Alternative	Description	Basis for Selection and Summary of Analysis
The Project	The Project would include the development of a 923,130-square-foot warehouse distribution facility and associated improvements on approximately 49.05 acres located in the central portion of unincorporated Kern County. The facility contains two single-story buildings: one building (Building 1) would total approximately 655,690 square feet and the second (Building 2) would total 267,440 square feet, with a total of 15,000 square feet for office space.	N/A
Alternative 1: No Project Alternative	No development would occur on the Project site. The Project site would remain unchanged.	• Required by CEQA • Avoids need for approval of ZV and PD Plan • Avoids all significant and unavoidable impacts • Less impact in all remaining environmental issue areas • Does not meet any of the Project objectives
Alternative 2: Reduced Footprint	Alternative 2, the Reduced Footprint Alternative, would be developed at the same Project site with a footprint reduced by approximately 30%. Under this alternative, only Building 1 would be constructed, with a site area of 35.17 acres featuring a 655,690-square-foot warehouse with 10,000 square feet dedicated to office space.	• Requires the same PD Plan and ZV • Reduces impacts to aesthetics, air quality, cultural resources, energy, geology and soils, noise, transportation and traffic, and tribal cultural resources due to the reduced footprint • Reduces environmental impacts associated with operational traffic, and associated air, noise and GHG emissions by approximately 30% • Meets Project objectives to lesser extent than the Project
Alternative 3: Eastern Kern/Mojave Specific Plan Project Alternative Site	Alternative 3, the Eastern Kern/Mojave Specific Plan Project Alternative Site, proposes the same project development and operation of a 923,130-square-foot warehouse distribution facility and associated improvements on approximately 49.05 acres, but in a different area of Kern County, specifically eastern Kern County in the adopted Mojave Specific Plan area (Mojave Specific Plan 2003).	• Greater impacts to biological resources • Similar impacts in all remaining environmental issue areas • Meets all Project objectives

CEQA = California Environmental Quality Act
GHG = greenhouse gas
PD = Precise Development
ZV = Zone Variance

6.5 Alternatives Considered and Rejected

Alternatives may be eliminated from detailed consideration in an EIR if they fail to meet most of the Project objectives, are infeasible, or do not avoid or substantially reduce any significant environmental effects (CEQA Guidelines Section 15126.6(c)). Alternatives that are remote or speculative, or the effects of which cannot be reasonably predicted, also do not need to be considered (CEQA Guidelines Section 15126(f)(3)). Kern County considered several alternatives to reduce the Project's significant and unavoidable impacts. Per CEQA, the lead agency may make an initial determination as to which alternatives are feasible and warrant further consideration, and which are infeasible. The following alternatives were initially considered but were eliminated from further consideration in this EIR because they do not meet the project objectives or were infeasible:

The Infill Alternative was considered relative to the requirements of CEQA Section 21061.3, which states an infill site, by definition, must meet either of the following criteria (CEQA 2023):

> (a) The site has not been previously developed for urban uses and both of the following apply:
>
> > (1) The site is immediately adjacent to parcels that are developed with qualified urban uses, or at least 75 % of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25% of the site adjoins parcels that have previously been developed for qualified urban uses.
> >
> > (2) No parcel within the site has been created within the past 10 years unless the parcel was created as a result of the plan of a redevelopment agency.
>
> (b) The site has been previously developed for qualified urban uses

The Infill Alternative was rejected due to there being no suitable infill sites for the size of the land area located in the administrative boundaries of unincorporated Kern County for the Project. Additionally, choosing this location would potentially cause impacts to be more significant than the Project due to the potential need for additional changes in land use designation and zoning proximate to existing development, including residences or other sensitive receptors.

Transit-oriented development (TOD) creates compact, mixed-use communities near a transit station where people enjoy access to jobs and services. A TOD Alternative was considered and rejected as there are currently no suitable TOD sites within the administrative boundaries of unincorporated Kern County for siting the Project.

6.6 Analysis Format

In accordance with CEQA Guidelines Section 15126.6(d), each alternative is evaluated in sufficient detail to determine whether the overall environmental impacts would be less, similar, or greater than the corresponding impacts of the Project. Furthermore, each alternative is evaluated to determine whether the Project objectives identified in Chapter 3, *Project Description*, of this EIR, would be mostly attained by the alternative. The Project's impacts that form the basis of comparison in the alternatives analysis are those impacts which represent a conservative assessment of Project impacts. The evaluation of each of the alternatives follows the process described below.

a) The net environmental impacts of the alternative after implementation of reasonable mitigation measures are determined for each environmental issue area analyzed in this EIR.

b) Post-mitigation significant and less than significant environmental impacts of the alternative and the Project are compared for each environmental issue area as follows:

– Less: Where the impact of the alternative after feasible mitigation would be clearly less adverse than the impact of the Project, the comparative impact is said to be "less."

– Greater: Where the impact of the alternative after feasible mitigation would be clearly more adverse than the impact of the Project, the comparative impact is said to be "greater."

– Similar: Where the impacts of the alternative after feasible mitigation and the Project would be roughly equivalent, the comparative impact is said to be "similar."

c) The comparative analysis of the impacts is followed by a general discussion of whether the underlying purpose for the Project, as well as the Project's basic objectives would be substantially attained by the alternative.

Table 6-2 provides a summary and side-by-side comparison of the Project with the impacts of each of the alternatives analyzed. Please note that in Alternatives 1 through 3 in **Table 6-2,** the references to "less, similar, or greater," refer to the impact of the alternative compared to the Project, and the abbreviated impacts—no impact (NI), less than significant (LTS), or significant and unavoidable (SU)—refer to the significance conclusion of the specific alternative.

6.7 Impact Analysis

6.7.1 Alternative 1: No Project Alternative

Environmental Impact Analysis

Aesthetics

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. The Project site would remain in its current state as undeveloped land and no change to the scenic vistas or existing visual character and quality of the site would occur. Impacts to scenic resources and daytime and nighttime views in the area would not occur. Therefore, there would be no impact, and the No Project Alternative would result in less impact to aesthetics compared to the Project.

Agricultural Resources

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. The Project site would remain in its current state, consisting of undeveloped, nonagricultural land currently designated for industrial use. As such, the No Project Alternative would not involve changes to the existing environment. Therefore, there would be no impact on agriculture and forestry resources, and the No Project Alternative would result in similar impacts related to agriculture and forestry resources compared to the Project.

Air Quality

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. No construction activities or operational activities that would generate air emissions would occur. No exceedance of the SJVAPCD's regional and localized significance thresholds or conflicts with the attainment of the standard would occur, nor would the No Project Alternative contribute to a cumulative net increase of criteria pollutants in the Project region. Therefore, there would be no impact, and the No Project Alternative would result in less impact to air quality compared to the Project.

Biological Resources

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. Existing biological resources on the Project site, including special-status and wildlife species, would remain undisturbed since no construction or operations would occur. The Project site would remain in its current state as undeveloped land and would not contribute to a cumulative loss of wildlife species, As such the No Project Alternative would not have a substantial adverse effect on any species identified as a candidate, sensitive, or special-status species, on any riparian habitat or other sensitive natural communities, on federally protected wetlands; interfere substantially with the movement of any native resident or migratory fish or wildlife species; conflict with any local

policies or ordinances protecting biological resources; or conflict the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State Habitat Conservation Plan. Therefore, there would be no impact, and the No Project Alternative would result in less impact related to biological resources compared to the Project.

Cultural Resources

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. The Project site would remain undeveloped, and no ground-disturbing activities would occur. As such, disturbance to potential on-site historical resources, archaeological resources, or human remains would not occur. Therefore, there would be no impact, and the No Project Alternative would result in less impact related to cultural resources compared to the Project.

Energy

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. No new energy consumption or activities would occur. As such, the No Project Alternative would not result in wasteful, inefficient, or unnecessary consumption of energy resources and would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency. Therefore, there would be no impact, and the No Project Alternative would result in less impacts related to energy compared to the Project.

Geology and Soils

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. The Project site would remain undeveloped, and no ground disturbance would occur. Therefore, the No Project Alternative would do none of the following:

- Directly or indirectly cause potential substantial adverse effects involving rupture of a known earthquake fault, strong seismic ground shaking, seismic- related ground failure, and landslides
- Result in substantial soil erosion or loss of topsoil
- Result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse
- Be located on expansive soil
- Contain soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems
- Directly or indirectly destroy a unique paleontological resource or unique geologic feature

Therefore, there would be no impact, and the No Project Alternative would result in less impact related to geology and soils compared to the Project.

Greenhouse Gas Emissions

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. Emissions associated with the construction and operation of a warehouse and distribution center would not occur. Therefore, those emission that contribute to GHGs would be eliminated and no impacts would occur related to generating emissions that may have a significant impact on the environment or consistency with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Therefore, there would be no impact, and the No Project Alternative would result in less impact related to GHGs compared to the Project.

Hazards and Hazardous Materials

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. The Project site would remain in its current condition. Therefore, this alternative would do none of the following:

- Involve the routine transport, use, or disposal of hazardous materials associated with the Project site
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment
- Emit hazardous waste within 0.25 mile of a school
- Be located on a site that is included on a list of hazardous materials sites
- Result in a safety hazard or excessive noise
- Impair implementation of an adopted emergency response plan
- Expose people or structures to significant risk of loss, injury, or death involving wildland fires
- Generate vectors

Therefore, there would be no impact, and the No Project Alternative would result in less impacts related to hazardous materials compared to the Project.

Hydrology and Water Quality

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. The Project site's existing hydrology and water quality would remain unchanged as no development or ground disturbance related to the proposed warehouse and distribution facility would occur at the Project site. As noted previously, the basin is currently over drafted and the District's Groundwater Sustainability Plan (GSP) has been deemed inadequate along with the other Kern subbasin plans where the other similar known and unknown Projects would occur.

This alternative would do none of the following:

- Violate water quality standards or waste discharge requirements
- Contribute to the existing decrease of groundwater supplies
- Substantially alter the existing drainage patterns of the site or area in a manner that would result in substantial erosion or sedimentation on- or off-site
- Result in flooding on-site or off-site
- Create or contribute to substantial runoff water which would exceed the capacity of existing or planned stormwater drainage system, or impeded or redirect flood flows
- Result in flood hazards, tsunami, or seiche zones
- Conflict with or obstruct implementation of a water quality plan

Therefore, there would be no impact, and the No Project Alternative would result in less impact related to hydrology and water quality compared to the Project.

Land Use Planning

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. The No Project Alternative would not develop any new uses at the Project site, and consequently, would not require entitlements for a PD Plan or ZV. As such, the No Project Alternative would not cause a significant environmental impact due to physically dividing an established community or conflicting with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. Therefore, there would be no impact, and the No Project Alternative would result in less impact related to land use and planning compared to the Project.

Mineral Resources

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. There are no mineral resources on the Project site or in proximity. As such, the No Project Alternative would have no impact on, or result in the loss of, the availability of a locally important mineral resource recovery site delineated on a local general plan, Specific Plan, or other land use plan. Therefore, the No Project Alternative would result in similar impacts related to mineral resources compared to the Project.

Noise

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. Noise sources from construction and operation would not be on-site, and existing noise conditions would remain the same. Therefore, the No Project Alternative would do none of the following:

- Result in generation of a substantial temporary or permanent increase in ambient noise levels
- Generate excessive ground-borne vibration

- Expose people residing or working in the Project area to excessive noise levels

Therefore, there would be no impact, and the No Project Alternative would result in less impact related to noise compared to the Project.

Population and Housing

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. Without the influx of new jobs and work force resulting from the Project, no net increase of the existing county population would occur and incidentally, no new demand for housing and related services would need to be met. Therefore, there would be no impact, and the No Project Alternative would result in less impact related to population and housing compared to the Project.

Public Services

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. No new demand for fire or law enforcement protection services would occur. As such, the No Project Alternative would not result in the need for new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection and law enforcement protection. Therefore, there would be no impact and the No Project Alternative would result in less impact related to public services compared to the Project.

Recreation

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. Without the occurrence of potential population increases incidentally increasing the demand and use of recreational places and facilities, there would be no impact on recreational resources, and the No Project Alternative would result in less impact related to recreation compared to the Project.

Transportation and Traffic

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. No construction and operational related trips would be generated. Existing traffic patterns and volumes on nearby roadways would remain unchanged. As such, the No Project Alternative would not conflict with a program, plan, or ordinance or policy addressing the circulation system, nor would the No Project Alternative conflict or be inconsistent with CEQA Guidelines Section 15064.3(b) related to vehicle miles traveled (VMT). In addition, the No Project Alternative would not substantially increase hazards due to geometric design features or result in inadequate access. Therefore, there would be no impacts and the No Project Alternative would result in less impacts related to transportation and traffic compared to the Project.

Tribal Cultural Resources

Under the No Project Alternative, no development would take place on the Project site, and the proposed warehouse and associated improvements would not be constructed. The Project site would remain undeveloped, and no ground-disturbing activities would occur. According to record searches and tribal resource consultations, no known tribal resources are present on the Project site. As such, the No Project Alternative would not cause a substantial adverse change in the significance of tribal cultural resources with cultural value to a California Native American tribe that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or as a resource determined by the lead agency. Therefore, there would be no impact, and the No Project Alternative would result in less impact related to tribal cultural resources compared to the Project.

Utilities and Service Systems

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. There would be no new demand for utilities and service systems on the Project site. Therefore, the No Project Alternative would done none of the following:

- Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects
- Generate solid waste in excess of State or local standards
- Conflict with federal, State, and local management and reduction statues and regulations related to solid waste

Therefore, there would be no impact and the No Project Alternative would result in less impact related to utilities and service systems compared to the Project.

Wildfire

Under the No Project Alternative, no development would take place on the Project site and the proposed warehouse and associated improvements would not be constructed. Therefore, the No Project Alternative would do none of the following:

- Substantially impair an adopted emergency response plan or emergency evacuation plan
- Expose occupants to pollutant concentrations from a wildfire
- Require the installation or maintenance of associated infrastructure
- Expose people or structures to significant risks

Therefore, there would be no impact and the No Project Alternative would result in less impacts related to wildfire compared to the Project.

Comparison of Impacts

The No Project Alternative would avoid all significant and unavoidable impacts associated with the development of the Project. This alternative would result in less environmental impact compared to the Project.

Relationship to Project Objectives

The No Project Alternative would not achieve any of the project objectives listed above in Section 6.2, *Project Objectives*. Although this alternative would create less environmental impacts overall, the objectives that shape the Project would not be realized under this alternative.

6.7.2 Alternative 2: Reduced Footprint Alternative

Under the Reduced Footprint Alternative, the Project footprint would be reduced by approximately 30% (from 49.01 acres to 35.17 acres) by eliminating the construction of Building 2 from the Project. The Reduced Footprint Alternative would instead develop a 655,690-square-foot warehouse inclusive of 10,000 square feet of office space on 35.17 acres. Due to the elimination, 13.86 acres and a 267,440-square-foot warehouse with 5,000 square feet of office area and associated infrastructure improvements would not be developed compared to the Project.. The reduced footprint alternative would include improvements to off-site roadways, utilities, water treatment facilities, gas lateral extensions, storm drainage systems, and associated infrastructure, similar to the Project.

Environmental Impact Analysis

Aesthetics

There are no officially designated scenic vistas or State scenic highways or potentially eligible highways in the vicinity of the Reduced Footprint Alternative Project site.

While this alternative would avoid development on a portion of the Project site, this alternative would still include the development of a warehouse and associated infrastructure. As explained in Section 4.1, *Aesthetics and Visual Resources*, the existing Project site would be considered to have an "average" visual quality. The impacts associated with the Project's visual modifications would dominate current views but would not contrast with or strongly degrade the visual character in relation to the surrounding zoning. Similar to the Project, the Reduced Footprint Alternative would be required to implement **Mitigation Measures MM 4.1-1** through **MM 4.1-3**, which would be incorporated to reduce visual impacts that would occur from Project colors and features and ensure that the Project would utilize landscaping as a buffering screen. With implementation of **MM 4.1** through **MM 4.1-3**, the visual changes would conform with the surrounding industrial, commercial, residential, and transportation uses, and impacts to existing visual character and scenic quality from public views near the Project site would be reduced to less than significant.

Despite the reduced size of the warehouse and associated infrastructure under the Reduced Footprint Alternative as compared with the Project, the potential for impacts related to light and glare during construction and operation would be reduced, although potentially significant, considering the nearest residential uses across Airport Drive. Therefore, this alternative would be required to implement **Mitigation Measure MM 4.1-4**, which includes demonstrating consistency with the applicable provisions of the Outdoor Lighting – Dark Skies Ordinance (Chapter 19.81 of the Kern County Zoning Ordinance), demonstrating that the Project is designed to minimize glare, and demonstrating that on-site building utilizes nonreflective materials. Similar to the Project, with the implementation of **MM 4.1-4** and compliance with applicable local development standards and regulations, lighting impacts onto adjacent properties and roads during operations would be less than significant for the Reduced Footprint Alternative.

Cumulative development in the area would consist of industrial uses, guided by the Land Use Element of the Metropolitan Bakersfield General Plan (MBGP). Per the MBGP, cumulative industrial projects would be encouraged to utilize landscaping, similar to the Project site, in order to upgrade the visual character by maintaining screening of these industrial uses. Despite the reduced size of the Reduced Footprint Alternative, the development of industrial uses would ultimately alter the landscape from the original form. However, similar to the Project, the MBGP would ensure industrial uses of the Reduced Footprint Alternative would not clash with surrounding uses through design requirements. Similarly, reasonably foreseeable projects would increase light sources in the area, but with adherence to the Outdoor Lighting – Dark Skies Ordinance, sources of light and would be minimized. Furthermore, reasonably foreseeable projects within the area would go through project-level environmental review and would be held to the same standards as the Project and Reduced Footprint Alternative. The incorporation of consistent colors of surrounding landscape and vegetation screening as required by **Mitigation Measures MM 4.1-1** through **MM 4.1-3** would further ensure visual quality is consistent with policies in the MBGP for industrial uses. Therefore, like the Project, cumulative impacts to visual character under the Reduced Footprint Alternative would be less than significant.

The Reduced Footprint Alternative would have similar overall impacts to aesthetics compared to the project, but to a lesser extent of the project being implemented due to the reduction in project size under this alternative. Impacts regarding visual character would remain less than significant.

Agricultural and Forestry Resources

The Project site is not within an area designated for, or that supports farmland or forest land. The Project site is primarily made up of vacant or disturbed land, or nonagricultural or natural vegetation. Therefore, implementing the Project would not result in permanent changes to the environment that, due to location or nature, would result in conversion of farmland or forest land to nonagricultural use or non-forest use. Additionally, per the land use designation and combined zoning district, the Project site is intended to be utilized for light industrial uses. The Project site does not contain agricultural or forest resources to support timberland, forest land, or production of timber. The Project would not conflict with existing zoning for, or cause rezoning of, forest land or timberland, nor would it conflict with timber production. Similar to the Project, implementation

of this alternative would not result in the conversion of farmland or forest land to nonagricultural or non-forest use, and no impacts would occur.

Air Quality

The use of construction vehicles, heavy equipment operation, and worker carpool trips would be reduced compared to the Project due to significantly smaller demands as a result of the reduced project size. Similar to the Project, this alternative would also require implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-5** in order to reduce the severity of construction-related emissions. As similar heavy equipment would be required on a daily basis under this alternative, with a site plan reduced by approximately 30% from the Project, construction impacts would be less than significant with mitigation. Overall, based on the above, with implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-5**, the Project would comply with all applicable SJVAPCD Rules and Regulations and would be consistent with the AQAP. So, similar to the Project, construction impacts under this alternative would not conflict with or obstruct implementation of applicable air quality plans. Therefore, due to the reduced size of the alternative, impacts from construction would be less than the Project and would be less than significant.

During operation of the Reduced Footprint Alternative, emissions would be reduced compared to the Project, as fewer commuting and truck trips would be required with the reduced Project scale and number of on-site employees. As such, operational impacts would be less than the Project and would be less than significant.

With regard to exposure to sensitive receptors, the Reduced Footprint Alternative would have a decreased impact compared to the Project due to its smaller size. While the Project has the potential to expose sensitive receptors to substantial pollutant concentrations during construction, implementation of **Mitigation Measures MM 4.3-6** through **MM 4.3-10** in addition to aforementioned **MM 4.3-1** through **MM 4.3-5**, would reduce impacts to less than significant levels. The Reduced Footprint Alternative would reduce the operations and, in turn, the possible impacts on nearby sensitive receptors. As such, project-level impacts would be less than significant and less than the Project.

With regard to objectionable odors, neither construction nor long-term operations of the Project are anticipated to generate any significant objectionable odors. Given the smaller development footprint and reduced operational capacity of the Reduced Footprint Alternative, impacts would be less than the Project.

Cumulative construction impacts would be significant and unavoidable for the Project because the County does not have jurisdiction and control over all potential projects in the San Joaquin Valley Air Basin. As cumulative construction impacts would be significant and unavoidable, the Reduced Footprint Alternative would also obstruct the air quality planning goals set forth by SJVAPCD. Therefore, similar to the project, impacts would be significant and unavoidable.

Based on the above, impacts under the Reduced Footprint Alternative would result in less overall impacts related to air quality compared to the project. However, even with implementation of similar mitigation as proposed for the project, impacts to cumulative air quality under this

alternative would likely remain significant and unavoidable. While this alternative would avoid disturbing 13.86 acres of land, cumulative impacts related to air quality would be similar compared to the project.

Biological Resources

As it relates to impacts on candidate, sensitive, or a special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or the U.S. Fish and Wildlife Service (USFWS), as with the Project, the Reduced Footprint Alternative would have an impact to burrowing owls, San Juaquin Jit Fox, Crotch Bumble Bees, and nesting birds.

With implementation of **Mitigation Measures MM 4.4-1** through **MM 4.4-12**, which generally include conducting preconstruction surveys and implementing avoidance procedures, among other measures, impacts would be reduced to less than significant. However, while this alternative would avoid disturbing 13.86 acres of land within the Project site, the undisturbed land would remain surrounded by industrial and commercial uses, transportation, vacant land, and residential uses to the east of the Project site, continuing to constitute inhospitable habitat for candidate, sensitive, or special-status species. Therefore, impacts would remain less than significant, similar to the Project.

With regard to impacts on any riparian habitat or other sensitive natural community, jurisdictional waters identified in local or regional plans, policies, or regulations or by CDFW or USFWS, the Project site consists almost entirely of non-native grassland, which is not considered sensitive by CDFW. Sensitive natural communities and riparian habitats are absent from the Project site. No impact would occur under the Reduced Footprint Alternative, similar to the project.

As it relates to the movement of any resident or migratory fish or wildlife species, there are no perennial water features present within the Project site, and therefore no potential corridors for aquatic species. In addition, no wildlife nursery sites have been identified on or in the vicinity of the Project site, but native birds could potentially nest on the Project site. Through implementation of **Mitigation Measures MM 4.4-3** through **MM 4.4-12**, the Reduced Footprint Alternative would not be expected to adversely impact nesting birds and impacts would be less than significant, similar to the project.

Implementation of the above-referenced mitigation measures would ensure consistency with local policies and ordinances protecting biological resources. The Reduced Footprint Alternative, as with the project, would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan or other approved local, regional, or State Habitat Conservation Plan.

Based on the above, impacts under the Reduced Footprint Alternative would be less than significant with implementation of mitigation. However, even with a reduced project footprint, special-status species have the potential to occupy the Project site. Given the number of present and reasonably foreseeable future development projects in the region, the Reduced Footprint Alternative would make a considerable contribution to cumulative biological resource impacts, even with mitigation. Nonetheless, impacts would remain less than significant, similar to the Project.

Cultural Resources

While no historical or archaeological resources that meet any of the criteria for listing in the California Register for Historic Resources were identified within the Project site, ground-disturbing activities associated with the project have the potential to encounter undocumented archaeological resources that could qualify as historical resources. Similar to the project, the Reduced Footprint Alternative would implement **Mitigation Measures MM 4.5-1** through **MM 4.5-4**, which include measures to retain a Lead Archaeologist and measures to implement if historical resources and/or human remains are encountered during the course of grading or construction. In addition, there is no indication that any particular location within the Project site has been used for purposes of human burial in the recent or distant past. In the unlikely event that human remains are inadvertently discovered during project construction activities, implementing **Mitigation Measure MM 4.5-4**, which provides measures to implement if human remains are uncovered during project construction, would ensure that any human remains encountered are appropriately addressed, and impacts would be less than significant.

Based on the above, implementing mitigation similar to that of the Project, impacts to cultural resources under this alternative would be less than significant. However, the Reduced Footprint Alternative would result in less impact related to cultural resources compared to the Project due to the reduction in ground disturbance required under this alternative.

Energy

Similar to the Project, while the Reduced Footprint Alternative does not include any unusual design characteristics that would necessitate the use of equipment that would be less energy-efficient than at comparable construction sites in the region or state, this alternative would implement **Mitigation Measure MM 4.3-3** to further reduce energy consumption through regular vehicle maintenance. **Mitigation Measures MM 4.6-1** and **MM 4.6-2** would require that the alternative incorporate energy efficient building design standards and green building measures into overall Project design. Both the Project and the Reduced Footprint Alternative would comply with all State energy efficiency policies. Given the reduced size and energy demand of the Reduced Footprint Alternative, it is therefore assumed that impacts would be less than the Project and less than significant.

Geology and Soils

Construction of the Reduced Footprint Alternative would be subject to all applicable ordinances of the Kern County Building Code (Chapter 17.08). Kern County has adopted the California Building Code 2022 Edition (California Code of Regulations Title 24). Adherence to all applicable regulations would mitigate any potential fault rupture-related impacts associated with this alternative. Similar to the project, the Reduced Footprint Alternative would be required to implement **Mitigation Measure MM 4.7-1** and **MM 4.7-7**, which generally includes requiring a geotechnical evaluation to evaluate soil conditions and geologic hazards, a California registered engineer to design project facilities to handle seismic activity, ground shaking, and liquification, use of existing roads to the greatest extent feasible, and grading limitations with implementation of erosion control best management practices (BMPs).

Additionally, erosion impacts of the Reduced Footprint Alternative during construction would be mitigated through the implementation of a Storm Water Pollution Prevention Plan and appropriate BMPs, as required by **MM 4.7-8** and **MM 4.10-1**, as discussed in Section 4.10, *Hydrology and Water Quality*. Under the Reduced Footprint Alternative, a smaller area of ground cover would be disturbed, and thus a reduced impact related to the potential for soil erosion would occur compared to the Project. Impacts would be less than significant and less than the Project due to the reduced footprint.

As it relates to a unique paleontological resource or site or unique geologic feature, similar to the Project, under the Reduced Footprint Alternative any ground disturbance within the Project site could result in a potentially significant impact to paleontological resources. Therefore, the Reduced Footprint Alternative would be required to implement **Mitigation Measures MM 4.7-9** through **MM 4.7-11**, which would include retaining a qualified paleontologist and implementing measures if a paleontological resource is found during construction, to reduce impacts to paleontological resources. Therefore, impacts would be less than significant, similar to the Project.

As discussed above, with implementation of mitigation similar to that required for the project, impacts to geology and soils would be less than significant, and impacts to geology and soils would be similar compared to the Project due to the reduction in ground disturbance required under this alternative.

Greenhouse Gas Emissions

With regard to generation of GHGs, the Project would result in the temporary generation of emissions associated with various activities, including site preparation, grading, paving, building construction, and the application of architectural coatings. GHG emissions would be largely associated with off-road equipment use, as well as on-road vehicle operations associated with workers commuting to and from the Project site and haul-truck trips. Similar to the Project, the Reduced Footprint Alternative would be required to implement **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (Section 4.3, *Air Quality),* **MM 4.6-1** and **MM 4.6-2** (Section 4.6, *Energy),* and **MM 4.17-3** (Section 4.17, *Transportation and Traffic,*) which would ensure the project remains consistent with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHG emissions. Similar to the Project, the Reduced Footprint Alternative would have a significant and unavoidable cumulative impact; however, the impacts of the Reduced Footprint Alternative would be less compared to the Project due to its lower intensity of operations, including fewer trips and a lower demand for energy.

The Reduced Footprint Alternative would be required to use electric-powered off-road equipment and target a construction waste diversion rate of 80%, as part of **MM 4.8-1**, and provide electrical hookups for Transport Refrigeration Units (TRUs) as part of **MM 4.8-2**. The Reduced Footprint Alternative would have similar impacts relative to GHG emissions as the Project. As such, the Reduced Footprint Alternative would have a significant and unavoidable impact related to GHG emissions, and impacts would be similar to the Project.

Hazards and Hazardous Material

Similar to the project, the Reduced Footprint Alternative would be required to implement **Mitigation Measures MM 4.7-8** (Section 4.7, *Geology and Soils*), **MM 4.9-1** through **MM 4.9-13** (Section 4.9, *Hazards and Hazardous Materials*), **MM 4.15-1** (Section 4.15, *Public Services*), and **MM 4.17-4** (Section 4.17, *Transportation and Traffic*). These mitigation measures would in summary: require:

- Preparing a Soil Erosion and Sedimentation Control Plan
- Preparing a Spill Prevention Control and Countermeasures Response Plan
- Testing for leaks and remediation
- Providing methods to avoid spills and minimizing impacts in the event of a spill through procedures for handling and disposing hazardous materials
- Safely applying nontoxic, approved herbicides as approved by the CDFW and USFWS
- Preparing/providing a Fire Safety Plan that is approved by the Kern County Fire Department
- Preparing/providing a Construction Traffic Control Plan that is approved by the Kern County Public Works Department

Implementing these mitigation measures would reduce impacts to the public or environment through the routine transport, use, or disposal of hazardous materials and through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

The Project site is not within 0.25 mile of an existing or proposed school and is not included on a list of hazardous materials sites. The Project, and in turn, the Reduced Footprint Alternative, is however within the Kern County Airport Land Use Compatibility Plan. The nearest aircraft operation facility identified by the Kern County Airport Land Use Compatibility Plan (ALUCP) is the Meadows Field Airport, a public airport located approximately 0.6 mile west of the Project site. As such, implementation of **MM 4.9-10** would mitigate potential impacts by ensuring compliance with requirements and regulations of the Federal Aviation Administration and the County's Planning and Natural Resources Department for both the Project and the Alternative.

Similar to the project, the Reduced Footprint Alternative is not anticipated to physically interfere with emergency vehicle access or personnel evacuation from the site during construction or operation of this alternative. As with the project, the Reduced Footprint Alternative would implement **Mitigation Measure MM 4.17-4** (Section 4.17, *Transportation and Traffic*), which requires preparation and submittal of a Construction Traffic Control Plan and would provide further assurances for emergency access.

As it relates to wildland fires, the Project site is not within an area of high or very high fire hazard. **Mitigation Measure MM 4.15-1** (Section 4.15, *Public Services*) would be implemented which includes the development and implementation of a fire safety plan for construction and operation

of the project in the event of a fire on the Project site. The Reduced Footprint Alternative would have less than significant impacts, similar to the Project.

Impacts under the Reduced Footprint Alternative and the Project would result in less than significant impacts after implementing mitigation measures, and the potential impacts from hazards and hazardous materials under the Reduced Footprint Alternative would be similar to the Project.

Hydrology and Water Quality

Similar to the project, the Reduced Footprint Alternative would be required to implement **Mitigation Measure MM 4.7-8**, which would require preparation of an Erosion and Sedimentation Control Plan and associated BMPs to prevent the occurrence of soil erosion and discharge. This alternative would also be required to implement **Mitigation Measure MM 4.9-3**, which requires the provision of a Hazardous Materials Business Plan. Implementing these mitigation measures would reduce impacts related to the following:

- Violating water quality standards or waste discharge requirements
- Substantially altering drainage patterns
- Creating or contributing runoff water that would exceed the capacity of existing or planned stormwater drainage systems
- Placing the project within a 100-year flood hazard area

As it relates to groundwater supplies, overall construction and operation-related water requirements under the Reduced Footprint Alternative would be reduced under this alternative as compared to the Project, as less grading would be involved during construction, and operation would involve a smaller building as compared to the Project. Through **Mitigation Measures MM 4.10-1** and **MM 4.10-2**, as with the Project, the Reduced Footprint Alternative would also not violate water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality. Nor would the alternative place housing in flood hazard areas or expose people or structures to flood risks.

Additionally, **MM 4.19-3** and **MM 4.19-4** (Section 4.19, *Utilities and Service Systems* includes full mitigation measures) would also require information and tracking via water meters on any groundwater used for project operation. Therefore, this alternative would not substantially deplete ground water supplies or interfere substantially with groundwater recharge. Furthermore, this alternative would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan as the Reduced Footprint Alternative would require implementation of BMPs and drainage control requirements that would be consistent with the Basin Plan.

The Project site is located well inland and far from the ocean or any enclosed or semi-enclosed water body such that there would be no potential threat from tsunami or seiche hazards, and impacts would be less than significant.

Overall, impacts related to hydrology and water quality would be less than significant with implementation of mitigation measures similar to those implemented under the Project. The Reduced Footprint Alternative would have a proportionally lessened impact related to hydrology and water quality compared to the Project due to the reduced footprint, which would result in reduced grading activities and would reduce the amount of impervious surface compared to the project.

Despite the basin being currently overdrawn and the district's GSP being deemed inadequate along with the other Kern County subbasin plans where the other similar known and unknown projects could occur, the Project is not contributing to the cumulative impact of any use of groundwater in the area, and therefore cumulative impacts are considered less than significant after all feasible and reasonable mitigation for both the Project and the Reduced Footprint Alternative.

Land Use Planning

The Project site has a general plan designation of Light Industrial and zone classification of M-1 PD H (Light Industrial – Precise Development Combining – Airport Approach Height Combining). While the footprint would be reduced, development of the Reduced Footprint Alternative would still require entitlements for a PD Plan and ZV to operate the warehouse and distribution facility on the Project site.

The Reduced Footprint Alternative would be located in the same area as the Project, which is within the Sphere of Influence of the Meadows Field Airport, located approximately 0.6 mile west of the Project. As such, **MM 4.11-1** and **MM 4.11-2** would reduce potential conflicts with airport operation frequencies and air space to less than significant. Impacts would be less than significant with mitigation under this alternative. Land use and planning impacts would be similar under the Reduced Footprint Alternative when compared to the Project.

Mineral Resources

According to the California Geological Survey, the Project site is not located on lands classified as a Mineral Resource Zone (MRZ), and there are no wells within the Project site. So, development of the Reduced Footprint Alternative would not result in the loss of availability of a known mineral resource or locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. Therefore, impacts would be less than significant under the Reduced Footprint Alternative and would result in similar impacts related to mineral resources compared to the Project.

Noise

The amount of on-site construction equipment for this alternative is assumed to be similar to the Project. As with the Project, construction activities associated with the Reduced Footprint Alternative would not result in any impacts related to noise levels and would not exceed existing thresholds. Under the Reduced Footprint Alternative, the extent and duration of construction activities would be reduced by 30%, in turn proportionally reducing the duration of noise associated with the Project by 30%. Therefore, noise impacts under the Reduced Footprint Alternative would be less than significant and less than the Project.

For operational activities, the Project would not generate noise that would surpass any standards or thresholds set by the County. Under the Reduced Footprint Alternative, Project operations would be reduced by 30%, and thus operational noise would be reduced by 30% as well. Therefore, operational noise impacts under the Reduced Footprint Alternative would not result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards with similar implementation of **Mitigation Measure MM 4.13-1** through **MM 4.13-4**. Impacts would be less than significant and less than the Project.

The vibration levels at the nearest residences would not reach the vibration level threshold for older residential structures during construction. Operation of the Reduced Footprint Alternative would involve worker truck trips that would be a sufficient distance from structures. Therefore, vibration impacts would be minimal and are not expected to have any measurable effect on the adjacent off-site sensitive receivers.

Based on the above, this alternative is expected to result in less than significant Project-related construction noise, construction, vibration, and operational noise impacts. These impacts would be less than those of the Project given the reduced area of development under the Reduced Footprint Alternative. However, cumulative noise impacts due to the temporary increase of construction noise would remain significant and unavoidable, despite being proportionally less than the Project.

Population and Housing

Similar to the Project, the Reduced Footprint Alternative would require a temporary workforce that is assumed to be similar in size to that required for the Project. The construction workforce would commute to the Project site from local communities. Further, given the unemployment rate and vacant housing rate in unincorporated areas of Kern County, sufficient workers and housing would be available to accommodate any direct population growth induced by the Project. Additionally, as with the Project, the Reduced Footprint Alternative would implement **Mitigation Measure 4.15-2** (Section 4.15, *Public Services*), encouraging a 50% local workforce for construction, thereby reducing the number of workers commuting into the area.

During operation, the workforce for the Reduced Footprint Alternative would be smaller than for the Project. Therefore, impacts under the Reduced Footprint Alternative would be less compared to the Project.

With regard to displacing housing units or people, the Project site is an undeveloped field with no existing structures within the boundaries for proposed development. There are no residences or people living on the Project site. Therefore, the Reduced Footprint Alternative would not displace any houses or people; Similar to the Project, no impact would occur.

Public Services

Similar to the Project, construction of the Reduced Footprint Alternative would result in a number of construction workers on the Project site and a corresponding increase in fire service demands. However, the Reduced Footprint Alternative would result in a shortened construction period due to the alternative's reduced size. The alternative would be required to implement **Mitigation Measure MM 4.9-11**, which would require the preparation of a fire safety plan. During operation,

the Reduced Footprint Alternative would require fewer on-site, permanent employees as compared to the Project. Impacts related to fire protection would be less than significant with mitigation for both the Project and Reduced Footprint Alternative.

With regard to law enforcement protection, increase in construction traffic would be temporary and thus would not have a significant adverse effect on the Kern County Sheriff's Office's (KCSO's) protective service provision or the California Highway Patrol's (CHP's) ability to patrol the highways. In addition, fencing would be installed around the perimeter of the Project site.

During operation of this alternative, as with the Project, the additional volume of worker vehicles and trucks accessing the Project site during daily operations may result in a decrease in level of service (LOS) at some surrounding intersections and may cause some delay in the flow of traffic (Section 4.17, *Transportation and Traffic*). Therefore, the Reduced Footprint Alternative would also implement **Mitigation Measures MM 4.17-1** through **MM 4.17-3**. **MM 4.17-1** would reduce LOS deficiency through the construction of intersection improvements. Any additional improvements would be addressed through the payment of Transportation Traffic Impact Fees required by **MM 4.17-2**. To further reduce traffic delay, **MM 4.17-3** would require the preparation of a Transportation Demand Management program to reduce VMT associated with employee trips. Therefore, impacts to the CHP would be less than significant with implementation of **MM 4.17-1** through **MM 4.17-3**, similar to the Project.

Furthermore, the Reduced Footprint Alternative would similarly implement **Mitigation Measures MM 4.15-1** and **MM 4.15-2**, requiring coordination with the County of Kern to pay necessary sales and use taxes, as well as make efforts to hire 50% of its workforce from the local communities. Thus, impacts would be less than significant under this alternative following implementation of similar mitigation measures proposed for the Project. Impacts related to public services would be similar compared to the project.

Recreation

Similar to the Project, the construction workforce would commute to the Project site each day from local communities under the Reduced Footprint Alternative. As a result, the Reduced Footprint Alternative would similarly not induce an increase in resident population that would contribute to an increased use of existing neighborhood or regional parks or other recreational facilities. Similarly, the Reduced Footprint Alternative would not include the construction of residences and would therefore not substantially increase the population. Impacts would be less than significant and similar to the Project.

With regard to the inclusion of the construction or expansion of recreational facilities, the Reduced Footprint Alternative would, like the Project, consist of a warehouse facility and accompanying structures and would not include recreational facilities or require the construction or expansion of facilities. Similar to the Project, no impact would occur. ,

Based on the above analysis, impacts would be less than significant. Given that both the Project and the Reduced Footprint Alternative would not include the construction of residences or recreational facilities, impacts related to recreation would be similar compared to the Project.

Transportation and Traffic

Similar to the Project, construction of the Reduced Footprint Alternative would not significantly impact local traffic, with the implementation of mitigation. **Mitigation Measures MM 4.17-1** through **MM 4.17-3**, require the Project proponent to do the following:

- Construct intersection improvements to reduce a LOS deficiency for consistency with MBGP policy
- Pay the required Transportation Traffic Impact fees
- Implement a Transportation Demand Management program to reduce project-related VMT

With regard to consistency with CEQA Guidelines Section 15064.3(b), operational trips would be reduced under this Alternative as compared to the Project as a result of the reduced size of the facility. Under both the Project and Reduced Footprint Alternative, VMT would not exceed countywide thresholds.

The Reduced Footprint Alternative would be subject to the requirements outlined in the Kern County Public Works Division Nine – Standards for Traffic Engineering. Chapter V of the document outlines requirements for line of sight, including uncontrolled intersections, alleys and minor driveways, controlled intersections, T-intersections, and landscaping. As with the Project, through the implementation of a Construction Traffic Control Plan and consistency with the standards outlined in Standards for Traffic Engineering, hazards due to geometric design features would be less than significant for the Reduced Footprint Alternative and would be similar to the Project.

With regard to emergency access, as this alternative would not cause a significant increase in congestion or significantly worsen the existing service levels at intersection roadways, the Reduced Footprint Alternative would have a less than significant impact on emergency access during construction and operation. As with the project, the Reduced Footprint Alternative would also be required to implement **Mitigation Measure MM 4.17-4**, which would provide further assurances for emergency access.

Based on the above, impacts would be less than significant. Given the reduction in operational trips and VMT under the Reduced Footprint Alternative as compared to the Project, the Reduced Footprint Alternative impacts related to transportation would be less.

Tribal Cultural Resources

Under the Reduced Footprint Alternative, overall construction and operational methods, workforce, and timing would be reduced when compared with the Project. There are no tribal cultural resources within the Project site or the surrounding area. Therefore, the Project would not cause a substantial adverse change in the significance of a tribal cultural resource. With implementation of **Mitigation Measures MM 4.5-1** through **MM 4.5-3** (Section 4.5, *Cultural Resources*) similar to the mitigation for the Project, impacts to tribal cultural resources under this alternative would be less than significant. However, the Reduced Footprint Alternative would result in less potential impact

related to tribal cultural resources compared to the Project due to the reduction in ground disturbance under this alternative.

Utilities and Service Systems

Eliminating 13.86 acres and 267,440 square feet from project development would result in reduced demand for utilities and service systems due to the smaller size of the development and associated infrastructure. Therefore, all construction and operational methods, workforce, and timing for the Reduced Footprint Alternative would be reduced in comparison with the Project.

As with the Project, the construction and operation of a warehouse, distribution facility, and associated infrastructure would result in the generation of wastewater, and require new connections for water, wastewater, electrical power, and telecommunications. The Reduced Footprint Alternative, similar to the Project, would be required to implement **Mitigation Measures MM 4.19-1** through **MM 4.19-3** in order to reduce all impacts associated with the construction of new water, stormwater, wastewater, and electricity connections and utility line extensions. Similar to the Project, the Reduced Footprint Alternative would be required to report any groundwater usage associated with project operation and to equip all groundwater wells on-site with water meters as outlined in **MM 4.19-4**.

The Reduced Footprint Alternative would generate less solid waste compared to the Project. However, similar to the Project, the Reduced Footprint Alternative would be required to implement **Mitigation Measure MM 4.19-5**, which would require the provision of a recycling coordinator to ensure the separation and proper disposal of recyclable materials and solid waste during construction.

The Reduced Footprint Alternative would reduce the size of the development and thereby operational water demands in comparison to the Project. As described in Section 4.19, *Utilities and Service Systems*, the Oildale Mutal Water Company (OMWC) would serve the Project. According to the Project's Water Supply Assessment (Appendix H.2), OMWC would be able to meet the Project's water demand under projected normal, single dry, and multiple dry years. Therefore, OMWC would be able to meet the lesser demands of the Reduced Footprint Alternative, providing sufficient supply to the Project site. However, as the basin is currently over drafted and the District's GSP has been deemed inadequate along with the other Kern subbasin plans where the other similar known and unknown projects could occur, the cumulative impacts of any use of groundwater in the area are considered significant and unavoidable after all feasible and reasonable mitigation for both the Project and the alternative.

This Reduced Footprint Alternative is expected to result in similar cumulative impacts compared to the Project in regard to utilities and service systems with implementation of **Mitigation Measures MM 4.19-1** through **MM 4.19-5**. When comparing cumulative impacts, the impacts would be less than the Project in regard to water demand, wastewater, and solid waste generation due to the reduced footprint and number of employees. However, the Project would be located within the critically overdrafted Kern Subbasin and contribute to the water demand of the region. Therefore, cumulative impacts relative to water supply would be significant and unavoidable, similar to the Project.

Wildfire

As with the Project, this alternative is not classified as being within a high fire hazard severity zone and is not anticipated to physically impede the existing emergency response plans, emergency vehicle access, or personnel access to the site. The Project site is not located along an identified emergency evacuation route and is not identified in any adopted emergency evacuation plan. Also, in compliance with applicable Fire Code and Building Code requirements, construction and operations managers and personnel would be trained in fire prevention and emergency response. Therefore, the Reduced Footprint Alternative would not substantially impair an adopted emergency response plan or emergency evacuation plan.

The Project site is designated as an Unzoned Local Responsibility Area (LRA), which is considered an area with low fire frequency. The potential for wildfire on the Project site is not considered high. Similar to the project, the Reduced Footprint Alternative would be required to implement **Mitigation Measures MM 4.9-11** (Section 4.9, *Hazards and Hazardous Materials*), which would require the development and implementation of a fire safety plan for use during construction and operation, further reducing the fire risks on-site. As such, impacts under this alternative related to exposing project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire would be less than significant.

With regard to the installation or maintenance of associated infrastructure, the Project would construct new internal roads from the existing road network to the Project that would act as access roads in the event of an emergency. Furthermore, the Project would extend service laterals for potable water from an existing water line located within Wible Road. A new substation would be located on-site and would provide power generation for the Project.

The Reduced Footprint Alternative would be required to implement a Fire Safety Plan as outlined in **Mitigation Measure MM 4.9-11** (Section 4.9, *Hazards and Hazardous Materials*) in order to ensure potential wildfire impacts, including flooding, landslides, or other drainage changes related to installation or maintenance of associated infrastructure are reduced. As such, similar to the Project, the Reduced Footprint Alternative would not include significant risks related to downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

Additionally, as with the Project, to ensure that operational traffic would not impair an emergency response plan or conflict with an emergency evacuation plan, **Mitigation Measures MM 4.17-1** through **MM 4.17-4** (Section 4.17, *Transportation and Traffic*) would be required. **Mitigation Measure MM 4.17-4** would require the establishment of a Construction Traffic Control plan to ensure that emergency access is maintained at all times during construction, and that appropriate detours are provided as necessary. During operation of the alternative, **MM 4.17-1** would require the project applicant to construct intersection improvements to reduce traffic delay. Any additional improvements would be addressed through the payment of Transportation Traffic Impact Fees required by **MM 4.17-2**. To further reduce congestion at intersections, **MM 4.17-3** would require the preparation of a Transportation Demand Management program to reduce VMT associated with employee trips. Therefore, as with the Project, the Reduced Footprint Alternative would have a less than significant impact to emergency or evacuation plans during both construction and operation.

With implementation of similar mitigation proposed for the Project, this alternative is expected to result in less than significant impacts to wildfire, similar to the Project. The Reduced Footprint Alternative would likely result in similar impact due to the reduced footprint compared to the Project.

Comparison of Impacts

Because of the approximate 30% reduction in project size for the Reduced Footprint Alternative, all construction and operational methods, workforce, and timing would be proportionally reduced in comparison with the Project. Accordingly, the Reduced Footprint Alternative would result in less or similar impacts for the majority of environmental issue areas. Notably, this alternative would not eliminate cumulative significant and unavoidable impacts associated with air quality, GHG emissions, noise (cumulative due to temporary noise increase from construction), and utilities and service systems (water supply).

Relationship to the Project Objectives

The Reduced Footprint Alternative would achieve all of the Project objectives listed above in Section 6.2, *Proponent Submitted Project Objectives*, but to a lesser degree than the Project due to its reduced size. This alternative would be a visually similar state-of-the-art warehouse and distribution facility sited near a major transportation corridor. By adhering to the development standards set forth in the Kern County Zoning Ordinance, this alternative would implement a visually appealing industrial project with substantial landscaping for added visual buffer from the nearest residential developments.

Additionally, this alternative would meet regional demand for Class A industrial facilities, which addresses local traffic patterns and needs and promotes land use compatibility with adjacent airport related uses. This alternative would contribute to the local economy through new capital investment, the creation of new employment opportunities, expansion of the tax base, economic growth and development, and payment of development fees. Overall, the location of this alternative is consistent with current and future market demands which minimizes conflicts with surrounding uses.

As mentioned above, the Reduced Footprint Alternative would achieve all of the Project objectives listed in Section 6.2, only to a lesser extent than the Project due to its reduced scale.

6.7.3 Alternative 3: Eastern Kern/Mojave Specific Plan Project Alternative Site

Alternative project sites are typically evaluated in CEQA documentation to avoid, reduce, or eliminate significant and unavoidable impacts associated with the Project by considering the proposed development in an entirely different location. To be considered, an alternative site must have the capability of fulfilling all or most of the objectives of the Project, and thus must be large enough to support a similar facility and have similar ease of access to transportation corridors.

However, an alternative site may not meet the basic objectives of the Project, as listed in Section 6.2, *Proponent Submitted Project Objectives*, and likewise, may not avoid or substantially reduce the environmental impacts of the Project.

Alternative 3, the Alternative Site Location – Eastern Kern County/Mojave Specific Plan, proposes the same project: construction and operation of a 923,130 square-foot, two building single-story warehouse distribution facility and associated improvements, but sited in a different location within eastern Kern County, specifically in the Adopted Mojave Specific Plan Area, on a vacant lot. This alternative would be located near State Route 58 (SR 58) in the Mojave Desert, which serves as a major transportation corridor compared to SR 99 within the San Joaquin Valley. Alternative 3 would also include improvements to off-site roadways, utilities, water treatment facilities, gas lateral extensions, storm drainage systems, and associated infrastructure, similar to the Project.

The Mojave Specific Plan Area encompasses approximately 31,000 acres in eastern Kern County, including the unincorporated community of Mojave, and functions as the transportation hub of eastern Kern County. Alternative 3 would operate at the same capacity as the Project. Required entitlements for Alternative 3 would be dependent on the site selected, noting preference would be for a site similarly designated for industrial use. Alternative 3 would develop the same land area and all of the Project components. Approval of Alternative 3 would be required to comply with the Mojave Specific Plan.

Environmental Impact Analysis

Aesthetics

With regard to impacts related to scenic vistas, there are no officially designated scenic vistas or State scenic highways or potentially eligible highways in the vicinity of the Mojave Specific Plan Area, although, portions of Route 58 and Route 14 are listed as an eligible State scenic highway Although the Mojave Specific Plan is within the greater desert landscape compared to the Project being within the Valley, both the Project and the Alternative would moderately change the existing character of their respective sites as seen from surrounding roadways.

Alternative 3 would be required to implement **Mitigation Measures MM 4.1-1** through **MM 4.1-3**, which would be incorporated to reduce visual impacts that would occur from Project colors and features and ensure that the Project would utilize landscaping to upgrade the visual character and screening of industrial uses. Furthermore, the Mojave Specific Plan Area is characterized by industrial, commercial, and extractive resource land uses. This Alternative would be required to adhere to Mojave Specific Plan policies to ensure compatible land uses throughout the plan area, specifically between industrial and residential uses. Therefore, Alternative 3 would maintain the existing character planned for Mojave Specific Plan Area and would not introduce a new incompatible aesthetic feature. With mitigation and adherence to plan policy, the Alternative would conform to the surrounding character, and therefore, impacts would be less than significant, similar to the Project.

Despite the new location of the warehouse and associated infrastructure under Alternative 3, the potential for impacts related to light and glare during construction and operation would be similar

to the Project. As such, this alternative would be required to implement **Mitigation Measure MM 4.1-4**, which includes demonstrating consistency with the applicable provisions of the Outdoor Lighting – Dark Skies Ordinance (Chapter 19.81 of the Kern County Zoning Ordinance). This would ensure that the alternative can demonstrate effective glare minimization and the utilization of nonreflective materials for on-site buildings. Impacts related to light and glare under Alternative 3 would be less than significant, similar to the Project.

Cumulative development in the area would consist of industrial and residential uses, guided by the Mojave Specific Plan. Despite the change in location under Alternative 3, increased development of industrial use would still alter the existing undisturbed landscape from the original form. However, similar to the Project, the Mojave Specific Plan would ensure all reasonably foreseeable industrial projects are compatible with surrounding uses through aesthetic design guidelines such as lighting and landscaping to achieve consistent character. Furthermore, reasonably foreseeable projects within the plan area would go through project-level environmental review and would be held to the same development standards as Alternative 3. The incorporation of consistent colors of surrounding landscape and vegetation screening as required by **Mitigation Measures MM 4.1-1** through **MM 4.1-3** would further ensure visual quality is consistent with policies in the Mojave Specific Plan for industrial uses. Therefore, like the Project, cumulative impacts to visual character and applicable policies under Alternative 3 would be less than significant.

Agricultural and Forestry Resources

For this alternative, impacts to agricultural resources would be similar to the Project. And as with the Project, Alternative 3 would not require the conversion of Prime Farmland to nonagricultural uses, particularly with consideration of land that is similarly zoned and designated for industrial use by the Mojave Specific Plan. In the Mojave Specific Plan Area, there are no Prime or Unique Farmlands, Farmlands of Statewide Importance, or cultivated agricultural lands, nor are there any forestry lands. Therefore, Alternative 3 would not require the conversion of agricultural or forestry lands to urban uses as the Alternative would be on industrially zoned and designated land.

There are currently no forestry resources or designated forest lands or timberlands located in the Mojave Specific Plan. Therefore, impacts to agricultural and forestry uses under Alternative 3 are not applicable, and there would be no impacts. Alternative 3 would have similar impacts compared to the Project because Alternative 3 would also not require the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural uses. Project and cumulative impacts would be similar to the Project and would have no impact on agricultural or forestry resources.

Air Quality

The use of construction vehicles, heavy equipment operation, and worker carpool trips would be similar compared to the Project. This alternative would also require the implementation of **Mitigation Measures MM 4.3-1** through **MM 4.3-5**, adjusted with respect to the requirements of Eastern Kern Air Pollution Control District (EKAPCD) in order to reduce the severity of construction-related emissions. As similar heavy equipment on a daily basis would be required under this alternative as with the project, impacts would be less than significant with mitigation for

construction impacts. Overall, based on the above, with implementation of **Mitigation Measure MM 4.3-1** through **MM 4.3-5**, any potential impacts to criteria pollutants designated as nonattainment within the EKAPCD would be reduced and construction of Alternative 3 would not result in a conflict with or obstruct implementation of applicable air quality plans. Therefore, impacts from construction would be less than significant. Operational emissions would be similar to the Project, and the alternative is assumed to create a similar number of daily passenger and truck trips. These emissions would be below the EKAPCD's regional significance threshold for all pollutants. As such, operational impacts would be less than significant and similar to the Project.

With regard to exposure to sensitive receptors, the impact of Alternative 3 cannot be predicted without knowledge of the specific alternative site and the locations of nearby sensitive receptors. While the proposed **Mitigation Measures MM 4.3-6** through **MM 4.3-10,** in addition to previously discussed **MM 4.3-1** through **MM 4.3-5**, would reduce impacts from pollutant concentrations during construction, it is conservatively assumed that impacts would be significant and unavoidable, similar to the Project.

With regard to objectionable odors, neither construction nor long-term operations of the Project are anticipated to generate any significant objectionable odors. Alternative 3 would construct and operate the same business activities as the Project, and similarly would not generate any significant objectionable odors. Impacts would thus be similar to the Project and less than significant.

Similar to the Project, cumulative construction impacts would be significant and unavoidable. However, Alternative 3 would fall under the jurisdiction of the EKAPCD, which has higher thresholds for air quality impacts. As such, Alternative 3 would still result in significant and unavoidable impacts, however impacts would be less than the Project.

Overall, even with implementation of similar mitigation proposed for the Project, impacts to Project and cumulative air quality under this alternative would likely remain significant and unavoidable. Alternative 3 would result in similar overall impacts related to air quality compared to the Project.

Biological Resources

With regard to biological resources, without knowledge of the specific site and accompanying biological resources and due to the lack of detailed biological resource surveys and field reconnaissance, impacts could be greater than the Project. However, under the Mojave Specific Plan, Alternative 3 would be required to comply with Policy 4.4.3, which requires a biological survey be conducted. Alternatively, a project applicant may demonstrate the site is urbanized with nonsensitive status through the identification of applicable studies. Although the widely undeveloped nature of Eastern Kern County could lend itself to greater impacts on potential habitat for sensitive desert species, the prospective Alternative 3 Project site would likely be supported by the Department if only surrounded by existing and established industrial and commercial uses that are considered inhospitable habitat for candidate, sensitive, or special status species.

In addition to the provisions set forth in the Mojave Specific Plan, Alternative 3 would implement similar Mitigation Measures modeled after **MM 4.4-1** through **MM 4.4-12**, requiring retention of a qualified Lead Biologist, Worker Environmental Awareness Training Programs, preconstruction

surveys and incidental take permits tailored for desert species and their potentially suitable habitats. Therefore, impacts would remain less than significant and similar to the Project.

With regard to conflicts with local policies or Habitat Conservation Plans, impacts would be site-specific based on the location chosen for the Project. As such, Alternative 3 would be required to comply with Policy 4.4.1 through Policy 4.4.4., which ensure new developments carried out under the Mojave Specific Plan would not conflict with local policies or Habitat Conservation Plans. As such, project and cumulative impacts would be similar to the Project.

Overall, project impacts under Alternative 3 would be assumed to be less than significant, with compliance of the Mojave Specific Plan and implementation of desert-specific Mitigation Measures modeled after **MM 4.4-1** through **MM 4.4-12**. Alternative 3 would be required to comply with the policies set forth in the Mojave Specific Plan to promote the retention of natural settings and use of native or adaptable vegetation as special-status species have the potential to occupy the chosen Alternative 3 Project site. However, given the number of present and reasonably foreseeable future development projects in the region, Alternative 3 would make a considerable contribution to cumulative biological resource impacts, even with mitigation. Therefore, cumulative impacts would be significant and unavoidable, greater than the Project.

Cultural Resources

Because Alternative 3 would include similar improvements to the chosen Project site, it would require ground disturbance at a similar level as the Project. This Alternative would be required to implement similar mitigation measures as described in **Mitigation Measures MM 4.5-1** through **MM 4.5-4** for the Project, as well as to adhere to all federal, State, and local regulations governing cultural resources, including California Penal Code, Section 622.5. In addition, Alternative 3 would be required to comply with Policy 7.2.1 and 7.2.2 of the Mojave Specific Plan, which support private efforts to enhance and promote historical and community resources and encourage participation by all members of the community in activities which promote the community and create local pride.

Although Alternative 3 lacks site specific historical or archaeological literature reviews and site surveys, previous literature analyses initiated through the development of the Mojave Specific Plan have revealed the presence of approximately 61 archaeological sites, the location of which were not identified due to the sensitivity of the sites. As explained in the Mojave Specific Plan Final EIR, development activity within the Specific Plan area has the potential to disturb/displace some of these sites. The extent of archaeological resources or potential impact to these resources cannot be determined without subsurface excavation. Since the Project area consists of large undeveloped areas, additional, unidentified archaeological remains could be present and potentially impacted by future development. However, with compliance with the Specific Plan Policies and Mitigation Measures mentioned above, and the development review process, potential impacts to cultural resources under Alternative 3 are assumed to be less than significant, similar to the Project.

As described above, without site specific historical and archaeological literature reviews and site reconnaissance, it is unknown whether Alternative 3 would have been used for purposes of human burial in the recent or distant past. However, in the unlikely event that human remains are

inadvertently discovered during project initial implementation activities, this alternative would comply with Health and Safety Code Section 7050.5, which includes requirements similar to **Mitigation Measure 4.5-4**, and would ensure that any human remains encountered are appropriately addressed and impacts would be less than significant and similar to the Project.

Overall, Alternative 3 would result in similar cultural resources impacts compared to the Project, with the compliance of the policies set forth in the Mojave Specific Plan, as well as the implementation of similar mitigation measures. Impacts would less than significant, similar to the Project.

Energy

With regard to significant consumption of energy resources, the Project is anticipated to have a less than significant impact to energy consumption during construction and operational activities through **Mitigation Measures MM 4.3-3** (Section 4.3, *Air Quality),* **MM 4.6-1**, **MM 4.6-2**, **MM 4.8-1**, and **MM 4.8-2** (Section 4.8, *Greenhouse Gas)* as well as to be in compliance with all State energy efficiency policies. Alternative 3 would be expected to implement similar energy efficient technologies within the project design. Given the similar size and activities planned under Alternative 3, it is therefore assumed that impacts would be similar to the Project and less than significant.

Geology and Soils

With regard to direct or indirect potential substantial effects involving earthquakes, ground shaking, ground failure, and landslides, Alternative 3 would have similar effects to the Project. According to the Mojave Specific Plan EIR, the community of Mojave is located in one of the most active seismic regions of the United States. All development must therefore be constructed in conformance with Seismic Zone 4 standards of the Uniform Building Code. Severe ground shaking would be anticipated in the event of movement along any of the major regional faults, such as the San Andreas, Garlock, Sierra Nevada, and Willow Springs-Rosamond. Liquefaction may occur in certain geologic and hydrologic environments, mainly areas where sands and silts were deposited in the last 10,000 years, and where groundwater is within 30 feet of the surface.

However, as mentioned within the Specific Plan EIR, the County will continue to enforce existing engineering requirements for new development pursuant to the Mojave Specific Plan. Compliance with existing standards and regulations would reduce impacts to development within the Mojave Specific Plan area to a less than significant level. As such, Alternative 3 would be located in an area similar to the Project, and impacts would likewise be similar to the Project and less than significant.

Furthermore, Alternative 3 would adhere to requirements of the NPDES, which includes requirements similar to **Mitigation Measure MM 4.7-8**, and **MM 4.10-1** (Section 4.10, *Hydrology and Water Quality*) and would comply with Kern County Grading Code (Section 17.28.070), which includes requirements to address potential soil erosion and loss of topsoil. Additionally, no septic tanks are proposed under this alternative, similar to the Project. Impacts would be less than significant and similar to the Project.

As it relates to unique paleontological resource or site or unique geologic feature, Alternative 3 would adhere to all applicable federal, State, and local regulations governing paleontological resources, including Public Resources Code Section 5097.5 and Section 30244. In addition, Alternative 3 would be required to adhere to Policy 4.5.1 through Policy 4.5.2 of the Mojave Specific Plan, which will ensure the conservation of known areas of mineral resources by limiting encroachment of incompatible urban uses. Therefore, impacts to paleontological resources would be less than significant and similar to the Project. Based on the above, impacts to geology and soils would be less than significant under Alternative 3 due to this Alternative maintaining all characteristics of the Project. Impacts would be similar to the Project.

Greenhouse Gas Emissions

With regard to generation of GHG emissions, the Project would result in the temporary generation of emissions associated with various construction activities, including site preparation, grading, paving, building construction, and the application of architectural coatings. GHG emissions would be largely associated with off-road equipment use, as well as on-road vehicle operations associated with workers commuting to and from the Project site and haul-truck trips. Similar to the Project, the Alternative Site Location Alternative would be required to implement **Mitigation Measures MM 4.3-3** and **MM 4.3-5** (Section 4.3 *Air Quality*), **MM 4.6-1** and **MM 4.6-2** (Section 4.6, *Energy),* and **MM 4.17-3** (Section 4.17, *Transportation and Traffic*) which would ensure the project remains consistent with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHG emissions. Additionally, Alternative 3 would be required to use electric-powered off-road equipment and target a construction waste diversion rate of 80% as part of **MM 4.8-1** and provide electrical hookups for TRUs as part of **MM 4.8-2** to further reduce GHG emissions.

Similar to the Project, Alternative 3 would have significant and unavoidable cumulative GHG impacts. However, impacts are anticipated to be less than the Project due to Alternative 3 being located on/near major highways or transportation corridors, including the Mojave Airport, State Routes 58 and 14, and the Southern Pacific Railroad line, which all lie within the Mojave Specific Plan area. Thus, VMT, and accordingly GHG emissions, may be reduced under this Alternative. As such, cumulative impacts would still be significant and unavoidable despite implementation of mitigation; however, impacts would be less than those of the Project.

Hazards and Hazardous Materials

With hazardous materials, Alternative 3 would be similar to the Project in the scope of its handling of hazardous materials and exposure of the public to emissions or vectors. Alternative 3 would require limited use of hazardous materials for construction and operational purposes (for example, vehicle fuel and maintenance fluids, on-site cleaning materials and solvents, herbicides, and landscaping maintenance), and these activities would adhere to **Mitigation Measure MM 4.9-3**, which includes the preparation of a Hazardous Materials Business Plan. The Mojave Specific Plan Area is designated as an Unzoned LRA by the California Department of Forestry and Fire Protection (CAL FIRE), and the primary land use within the scope of Alternative 3 as a warehouse and distribution facility would remain the same as the Project, as it would not generate vectors or include agricultural waste.

In addition, Alternative 3 would be required to comply with Policy 4.2.3 of the Mojave Specific Plan, which requires industrial and commercial businesses to comply with the County Hazardous Waste Management Plan. As such, with adherence to the policies set forth in the Mojave Specific Plan, and implementation of similar mitigation measures of the Project, Alternative 3 would result in less than significant impacts, similar to the Project.

Additionally, the Mojave Air and Space Port is located within the boundaries of the Mojave Specific Plan. It is similarly assumed that, due to the lack of a specific alternative site, Alternative 3 could be located within 0.25 mile of the active airport. However, any development within the jurisdiction of the ALUCP would be subject to the standards and requirements held within it. As such, impacts would be reduced to a less than significant level and would be similar to the Project. Overall, Alternative 3 would have a similar impact as compared to the Project, with the implementation of similar mitigation measures and adherence with the Mojave Specific Plan resulting in such impacts to be less than significant.

Hydrology and Water Quality

Development within the Mojave Specific Plan area could result in erosion and sedimentation due to construction related activities that could impact groundwater quality. As mentioned within the Mojave Specific Plan EIR, all new projects within the Specific Plan area would be required to implement BMPs pursuant to National Pollutant Discharge Elimination System (NPDES) requirements, as mentioned above. Implementation of existing NPDES measures would avoid impact during construction of individual projects, such as Alternative 3, on a project and cumulative basis.

Likewise, development within the Specific Plan area has the potential to result in long-term operational impacts to water quality due to the addition of urban pollutants and the increase in site activities. However, all regulated new development, including Alternative 3, would be required to implement BMPs per the NPDES program to address capture and treatment of runoff.

Similar to the project, Alternative 3 would include the completion of a NPDES completion form and would be required to implement **Mitigation Measure 4.7-8** (Section 4.7, *Geology and Soils*), which would require the preparation of an Erosion and Sedimentation Control Plan, including BMPs to prevent the occurrence of soil erosion and discharge. Alternative 3 would also be required to implement **Mitigation Measure MM 4.9-3** (Section 4.9, *Hazards and Hazardous Materials*), which would require the provision of a Hazardous Materials Business Plan. Additionally, as with the Project, Alternative 3 would implement **MMs 4.10-1** and **4.10-2** (Section 4.10, *Hydrology and Water Quality*), requiring the Project proponent to implement a Stormwater Pollution Prevention Plan and complete a hydrologic study and final drainage plan to minimize potential runoff increases from the Project site. Compliance with applicable regulatory requirements and implementation of the aforementioned mitigation measures would serve to reduce potential impacts related to impacts related to violating water quality standards or waste discharge requirements, substantially altering drainage patterns; or creating substantial soil erosion. Impacts would be less than significant and similar to the Project.

As it relates to groundwater supplies, Alternative 3 would implement **MM 4.19-3** and **MM 4.19-4** (Section 4.19, *Utilities and Service Systems* for full mitigation measures) to require information and tracking via water meters on any groundwater used for project operation. However, as the Mojave Specific Plan is not within a groundwater basin that is considered over drafted as is the case with the Proposed Project within the valley region, compliance with applicable regulatory requirements mentioned above and listed Mitigation Measures would result in cumulative impacts regarding groundwater to be less than significant, similar to the Project.

Similar to the Project, Alternative 3 would feature retention basins to facilitate groundwater recharge. Alternative 3 would be located well inland and far from the ocean or any enclosed or semi-enclosed water body such that there would be no potential threat from tsunami or seiche hazards and impacts would be less than significant. Overall, impacts related to hydrology and water quality would be less than significant with the implementation of similar mitigation measures, and is unlikely to result in effects to stormwater runoff or existing drainage patterns.

Land Use and Planning

With regard to land use consistency, Alternative 3 would be located within the Mojave Specific Plan area within Eastern Kern County, which is characterized by commercial and industrial uses. As mentioned in the Mojave Specific Plan EIR, new development would likely take place near existing developments and transportation corridors. Because the Specific Plan includes goals and policies to avoid or mitigate impacts to the existing Mojave environment, no physical division of the existing Mojave community is anticipated as new development occurs within the Specific Plan Area. As such, Alternative 3 would not have a high possibility of physically dividing an existing community or conflict with an existing land use plan, policy, or regulation. The Project site chosen in the Mojave Specific Plan area might or might not require changes in underlying Specific Plan or zoning, depending on the chosen location. As noted previously, selection of an alternative site that is similarly designated for industrial use would therefore allow the assumption that the impacts associated with Alternative 3 would be similar to the Project, and therefore less than significant.

Mineral Resources

According to the Mojave Specific Plan EIR, the Specific Plan area allows for mineral and petroleum exploration and extraction, primarily within an approximately 300-acre area to the northwest corner of the Specific Plan designated for mineral and petroleum uses. Additionally, several gravel pits are located within the eastern portion of the Specific Plan area. Gold and silver are also mined within a mile of the southwest boundary of the Specific Plan area at Soledad Mountain. As such, the potential for development within the Specific Plan area to affect these resources is potentially significant. It is unknown whether Alternative site would be located on a lot that contains active or inactive wells; however, County GIS data indicate that there are no mineral Assessor Parcel Numbers within the Mojave Specific Plan boundary. As a result, it is conservatively assumed that impacts to mineral resources would be similar for the Project.

Overall, due to the Alternative site's proximity to known mineral resources and the unknown status of current or past wells on the Project site, it is assumed that impacts would be less than significant.

Noise

Under this alternative, the number of on-site construction equipment is assumed to be the same as the Project, and construction activities under Alternative 3 would not result in any impacts related to noise levels and would not exceed existing thresholds. As with the project, operational activities under Alternative 3 would similarly result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards with similar implementation of **Mitigation Measures MM 4.12-1** through **MM 4.12-4**. Impacts would be less than significant.

The vibration levels at the nearest residences would not reach the vibration level threshold for older residential structures during construction. Due to the fact that the specific alternative site is not known, it is impossible to fully know whether operating Alternative 3 would involve worker truck trips that would be a sufficient distance (over 100 feet) from structures. However, Alternative 3 would likely be sited at an industrially designated location to avoid the need for a Specific Plan Amendment to the Land Use Element of the Mojave Specific Plan or a Zone Change. As a result, the alternative would be required to comply with Policy 3.8.4 of the Mojave Specific Plan that minimizes potential noise and health hazards through buffering, which would be utilized to separate service and heavy industry uses from any surrounding residences. Therefore, it is conservatively assumed that cumulative impacts would be significant and unavoidable due to the increased temporary noise due to construction, which is similar to the Project.

Population and Housing

Similar to the Project, Alternative 3 would require a temporary workforce that is assumed to be similar in size to that required for the Project. It is anticipated that the construction workforce would commute to the Project site from local communities. It is likewise assumed that given the unemployment rate and vacant housing rate in unincorporated areas of Kern County, a sufficient workforce and housing would be available to accommodate any direct population growth induced by Alternative 3. Additionally, as with the Project, Alternative 3 would implement **Mitigation Measure 4.15-2** (Section 4.15, *Public Services*), encouraging a 50% local workforce for construction, thereby reducing the number of workers commuting into the area for work. Therefore, impacts under Alternative 3 would be less than significant, similar compared to the Project.

Public Services

Similar to the project, construction of Alternative 3 would result in a number of construction workers on the Project site and increased fire service demands would occur during construction of this alternative. However, Alternative 3 would be required to implement **Mitigation Measure MM 4.9-12** (Section 4.9, *Hazards and Hazardous Materials*), which would require the preparation of a fire safety plan. During operation, the Project site would not require any additional employees to be on-stie on a permanent basis. Implementation of **Mitigation Measure MM 4.14-1** would also reduce fire risks on-site during operation of Alternative 3. Impacts related to fire protection would be less than significant with mitigation for both the Project and Alternative 3.

With regard to law enforcement protection, the Project site would be located in a relatively remote location. As with the Project, the increase in construction traffic associated with Alternative 3

would be temporary and thus would not have a significant adverse effect on the KCSO protective service provision or CHP's ability to patrol the highways. In addition, security fencing would be installed around the perimeter of the Project site.

During operation of this alternative, as with the Project, the additional volume of worker vehicles and trucks accessing the Project site during daily operations may result in a decrease in LOS at some surrounding intersections and may incidentally cause some delay in the flow of traffic (Section 4.17, *Transportation and Traffic*). Therefore, Alternative 3 would also implement **Mitigation Measures MM 4.17-1** through **MM 4.17-3**. **MM 4.17-1** which would reduce LOS deficiency through the construction of intersection improvements. Any additional improvements would be addressed through the payment of Transportation Traffic Impact Fees required by **MM 4.17-2**. To further reduce traffic delay, **MM 4.17-3** would require the preparation of a Transportation Demand Management program to reduce VMT associated with employee trips. Therefore, impacts to the CHP patrol would be less than significant with implementation of **MM 4.17-1** through **MM 4.17-3**, similar to the Project.

Furthermore, Alternative 3 would similarly implement **Mitigation Measures MM 4.15-1** and **MM 4.15-2**, requiring coordination with the County of Kern to pay necessary sales and use taxes, as well as make efforts to hire 50% of its workforce from the local communities. However, based on the above, impacts would be less than significant under this alternative following implementation of similar mitigation measures proposed for the project. Impacts related to public services would be similar compared to the Project.

Recreation

Similar to the Project, it is assumed the construction workforce would commute to the Project site each day from local communities under Alternative 3. As a result, Alternative 3 would similarly not induce an increase in resident population that would result in increased uses of existing neighborhood or regional parks or other recreational facilities. Alternative 3 would likewise also not include residences and would therefore not induce a substantial population increase. Impacts would be less than significant and similar to the Project.

With regard to the inclusion of the construction or expansion of recreational facilities, Alternative 3 would, like the Project, consist of a warehouse facility and accompanying structures and would not include recreational facilities or require the construction or expansion of facilities. No impact would occur, and impacts would be similar to the Project.

Based on the above, impacts would be less than significant. Given that both the Project and Alternative 3 do not include residences or recreational facilities, impacts related to recreation would be similar compared to the project and less than significant.

Transportation and Traffic

Similar to the Project, Alternative 3 would require similar trips for the construction of the warehouse and associated infrastructure; however, it is anticipated that local traffic would not be significantly impacted with the addition of construction traffic generated under this alternative. Compared to the Project, it is expected that vehicle trips during operation would be similar to the

Project, with potentially fewer VMT when considering the Alternative 3's proximity to regional transportation infrastructure. As a result, it is conservatively assumed that impacts would be similar to the Project and considered less than significant.

Similar to the Project, any LOS deficiencies would not result in significant environmental impacts under CEQA. All feasible mitigation would be required to maintain LOS at acceptable levels, and the Project proponent would be required to implement feasible intersection improvements. However, Alternative 3 would be required to implement conditions of feasible improvements that address deficiencies should there be any, such as **Mitigation Measure 4.17-2**, which would require the developer to pay the required Transportation Traffic Impact Fees that would be utilized for a fair share fee towards a long-term solution.

As it relates to increasing hazards due to a geometric design feature or incompatible use, Alternative 3 would maintain the same project characteristics. Similar to the project, Alternative 3 would be required to implement **Mitigation Measures MM 4.17-1** through **MM 4.17-4,** which would include off-site road improvements for affected major intersections within the Mojave Specific Plan area. Alternative 3 would conform to Kern County standards for site access and street design, impacts associated with increased hazards due to a design feature would be less than significant, similar to the Project.

With regard to emergency access, it is unknown whether the Project would cause a significant increase in congestion or worsen the existing service levels at nearby intersection and roadway segments without a site-specific traffic analysis. However Alternative 3 would be required to comply with Policy 6.1.1 and 6.1.2 of the Mojave Specific Plan, which ensure a circulation system that supports the types and intensities of land uses in the Mojave Specific Plan, as well as a roadway network that is consistent with the County's circulation grid policy. As a result, it is conservatively assumed that impacts would be similar to the Project.

Impacts to hazards caused by geometric design features would be similar to the Project and less than significant.

Overall, Alternative 3 would maintain all characteristics of the Project. As such, it is reasonably assumed that Alternative 3 would have similar impacts to the Project and considered to be less than significant with mitigation incorporated.

Tribal Cultural Resources

To convert the Project site to industrial uses and construct a warehouse and associated infrastructure, this alternative would require surface level ground disturbance throughout the Project site. Under Alternative 3, ground disturbance within the Project site would be shallow and would be unlikely to result in potentially significant impacts to tribal cultural resources. This alternative would be required to implement similar mitigation measures as described in **Mitigation Measures 4.5-1** through **MM 4.5-3** (Section 4.5, *Cultural Resources*) for the Project, as well as to adhere to all federal, State, and local regulations governing cultural resources, including California Penal Code, Section 622.5. Furthermore, Alternative 3 would be required to adhere to Policy 7.2.1 and 7.2.2 which would preserve and expand historical and community resources. As such, impacts

to tribal cultural resources under Alternative 3 are assumed to be similar to the Project and result in impacts that are less than significant.

Utilities and Service Systems

As with the Project, the construction and operation of a warehouse distribution facility and associated infrastructure would require water usage for dust suppression as well as minimal generation of wastewater, usage of electrical power, and telecommunications. It is unknown the extent to which Alternative 3 would alter stormwater drainage in the absence of a specific site and site plan. However, as with the project, Alternative 3 would be required to implement **Mitigation Measures MM 4.19-1** through **MM 4.19-3** in order to reduce all impacts associated with the development of new water, stormwater, wastewater, and electricity connections and utility line extensions during construction. Alternative 3, as with the Project, would also be required to report any groundwater usage associated with project operation and to equip all groundwater wells on-site with water meters as outlined in **MM 4.19-4**.

An increase in solid waste generation under Alternative 3 as compared to the Project is not anticipated. However, Alternative 3, would be required to implement **Mitigation Measure 4.19-5**, which would require the provisions of a recycling coordinator to ensure the separation and proper disposal of recyclable materials and solid waste during construction, similar to the Project.

With regard to operations, Alternative 3 would generate similar water, wastewater, stormwater, electricity, solid waste, and telecommunications demands as the Project. As such, implementation of **Mitigation Measures MM 4.19-1** through **MM 4.19-5** would be required to reduce impacts to said resources to a less than significant level, as with the Project.

While water demand would be similar to the Project, the Mojave Specific Plan is not within the boundaries of a groundwater basin that is considered over drafted as is the case with the Proposed Project within the valley region. A site-specific Water Supply Assessment would be required; however, it is conservatively assumed that cumulative water supply impacts would be similar to the Project, but a less than significant level with implementation of the above listed mitigation measures.

Alternative 3 would result in similar impacts to utilities and service systems compared to the Project, with regard to wastewater, stormwater, electricity, and solid waste utility providers in the area. Impacts to groundwater supply would be similar to the Project but be less than significant due to the Mojave Specific Plan not being within an over drafted groundwater basin. All other impacts would be similar to the Project, and less than significant with mitigation incorporated.

Wildfire

As with the project, this alternative is not classified as being within a high fire hazard severity zone and is not anticipated to physically impede the existing emergency response plans, emergency vehicle access, or personnel access to the site. Alternative 3 is anticipated to be located in a rural, sparsely developed area with limited population. Furthermore, the Project would be required to comply with Policy 9.4.1 through 9.4.4 of the Mojave Specific Plan, which ensure that new development does not degrade fire and law enforcements service levels. Although, the specific

Alternative Site is not known, Alternative 3 is not anticipated to be located along an identified emergency evacuation route or in any identified adopted emergency evacuation plan. As such, is it conservatively assumed that impacts regarding the impairment of an adopted emergency response plan or emergency evacuation plan would be similar to the Project, and less than significant.

Alternative 3 would be located in an area designated as Unzoned LRA, which are areas considered to have low fire frequency. The potential for wildfire on the Project site is not considered high. Similar to the project, Alternative 3 would be required to implement **Mitigation Measure MM 4.9-12** (Section 4.9, *Hazards and Hazardous Materials*), requiring the development and implementation of a fire safety plan for use during construction and operation, which would further reduce the fire risks on-site. As such, impacts under this alternative related to exposing project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire would be less than significant.

With regard to the installation or maintenance of associated infrastructure, Alternative 3 would likely be required to construct new internal roads from the existing road network to the Alternative 3 Project site that would act as access roads in the event of an emergency. As mentioned above, Alternative 3 would be required to implement a Fire Safety Plan per **MM 4.9-12** in order to ensure potential wildfire impacts, including flooding, landslides, or other drainage changes related to installation or maintenance of associated infrastructure are reduced. Additionally, as with the Project, Alternative 3 would be required to implement **MM 4.17-1** through **MM 4.17-4** (Section 4.17, *Transportation and Traffic*) so as to ensure compliance with applicable emergency evacuation plan regulations and emergency access is maintained at all times.

Overall, it is assumed that Alternative 3 would result in less than significant wildfire impacts, similar to the Project.

Comparison of Impacts

Alternative 3 would potentially result in less or similar impacts for a majority of the environmental issue areas, and notably reduce hydrology and water quality (groundwater supply only), and utilities and service systems (water supply only) to less than significant impacts. However, this alternative would not eliminate cumulative significant and unavoidable impacts associated with air quality, noise and GHG emissions.

Relationship to Project Objectives

Alternative 3 would achieve all of the Project objectives listed above in Section 6.2. This alternative would be a visually similar state-of-the-art warehouse and distribution facility situated near major regional transportation infrastructure. By adhering to Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards, this alternative would implement a visually appealing industrial project. Additionally, Alternative 3 would meet regional demand for Class A industrial facilities, which would address local traffic patterns and needs, and promotes land use compatibility with adjacent airport related uses. This alternative would contribute to the local economy through new capital investment, the creation of new employment opportunities, expansion of the tax base, economic growth and development, and payment of development fees.

Overall, the location of this alternative is consistent with current and future market demands which minimizes conflicts with surrounding uses. As such, Alternative 3 would achieve all project goals listed above in Section 6.2.

6.8 Environmentally Superior Alternative

As presented in the comparative analysis above, and as shown in **Table 6-2**, *Comparison of Alternatives*, there are a number of factors in selecting the environmentally superior alternative. An EIR must identify the environmentally superior alternative to the project. Alternative 1, the No Project Alternative, would be environmentally superior to the Project on the basis of its minimization or avoidance of physical environmental impacts. However, CEQA Guidelines Section 15126.6(e)(2) states:

> *The "no project" analysis shall discuss the existing conditions at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services. If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives.*

Because the No Project Alternative cannot be the Environmentally Superior Alternative under CEQA, the Environmentally Superior Alternative is considered to be Alternative 3: Alternative Site. When compared to the Project, Alternative 3 would result in similar impacts across all environmental resources, excluding GHG emissions, as Alternative 3 would generate a lessened impact due to the Mojave air basin's emissions attainment status and due to the widely undeveloped nature of East Kern lending itself to greater impacts on potential habitat for sensitive desert species. However, the significant and unavoidable impacts on a cumulative level for *Utilities and Service Systems* that would result from the Project would be reduced to less than significant levels under Alternative 3 since the Mojave Specific Plan is not within a groundwater basin that is subject to any adjudication or GSMA, nor considered over drafted.

It should be noted that the Project proponent lacks immediate control and access to such an alternative site location and although all project objectives could be met, as discussed above, such project objectives could not be met within the same time frame and/or with the same efficiency as the current proposal forecasts. The Project proponent would be required to identify and secure land use authority over such an alternative site location, whether by purchasing or leasing the land, and subsequently must apply for land use entitlements and conduct environmental review.

6.8.1 Comparative Impacts of Proposed Project to All Alternatives

Table 6-2 provides a summary of the comparative impacts of the Project to the alternatives analyzed in this EIR.

Table 6-2: Summary Comparison of Alternative Impacts

Issue Area	Project Summary of Impacts	Alternative 1 No Project	Alternative 2 Reduced Footprint Alternative	Alternative 3 Alternative Site
Aesthetics and Visual Resource	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Agricultural and Forest Resources	No Impact	Similar (NI)	Similar (NI)	Similar (NI)
Air Quality	Significant and unavoidable (cumulative)	Less (NI)	Less (SU)	Similar (SU)
Biological Resources	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Greater (SU)
Cultural Resources	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Energy	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Geology and Soils	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Greenhouse Gas Emissions	Significant and unavoidable (cumulative)	Less (NI)	Similar (SU)	Less (SU)
Hazards and Hazardous Materials	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Hydrology and Water Quality	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Land Use and Planning	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Mineral Resources	Less than significant	Less (NI)	Similar (LTS)	Similar (LTS)
Noise	Significant and unavoidable (cumulative)	Less (NI)	Less (SU)	Similar (SU)
Population and Housing	Less than	Less (NI)	Similar (NI)	Similar (LTS)

Issue Area	Project Summary of Impacts	Alternative 1 No Project	Alternative 2 Reduced Footprint Alternative	Alternative 3 Alternative Site
	significant			
Public Services	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Recreation	Less than significant	Less (NI)	Similar (LTS)	Similar (LTS)
Transportation and Traffic	Less than Significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Tribal Cultural Resources	Less than significant with mitigation incorporated	Less (NI)	Less (LTS)	Similar (LTS)
Utilities and Service Systems	Significant and unavoidable (cumulative – water supply)	Less (NI)	Similar (SU)	Similar (LTS)
Wildfire	Less than significant with mitigation incorporated	Less (NI)	Similar (LTS)	Similar (LTS)
Meet Project Objectives?	All	None	Most	All
Reduce Significant and Unavoidable Impacts	N/A	All	Partially	Some

NI = no impact
LTS = less than significant
SU = significant and unavoidable

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Chapter 7

Response to Comments

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Chapter 7
Response to Comments

This chapter is reserved for, and will be included in, the Final EIR.

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Chapter 8

Organizations and Persons Consulted

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Chapter 8

Organizations and Persons Consulted

8.1 Federal

Federal Aviation Administration

U.S. Bureau of Land Management

U.S. Department of Agriculture

U.S. Army Corps of Engineers

U.S. Environmental Protection Agency Region IX

U.S. Fish and Wildlife Service

8.2 State of California

California Air Resources Board

California Department of Conservation

California Department of Fish and Wildlife

California Department of Geologic Energy Management Division

California Department of Transportation

California Department of Water Resources

California Energy Commission

California Environmental Protection Agency

California Natural Resources Agency

California Public Utilities Commission

California Regional Water Quality Control Board, Central Valley Region

California State Senate

California State University Bakersfield Library

California Workforce Development Board

Governor's Office of Business and Economic Development

Native American Heritage Council

Public Policy Institute of California

State Air Resources Board Stationary Resource Division

8.3 Regional and Local

Bakersfield City Planning Department

Bakersfield City Public Works Department

Bakersfield Municipal Airport

Beardsley School District

California City Planning Department

California State University Bakersfield

Center for Biological Diversity

Center on Race, Poverty and the Environment

City of Arvin

City of Bakersfield

City of Maricopa

City of McFarland

City of Ridgecrest

City of Shafter

City of Taft

City of Tehachapi

City of Wasco

Defenders of Wildlife

Delano City Planning Department

Golden Empire Transit

Inyo County Planning Department

Kern Audubon Society

Kern Mosquito Abatement District

Kern Council of Governments

Kern County Agriculture Department

Kern County Airports Department

Kern County Administrative Officer

Kern County Environmental Health Services Department

Kern County Fire Department

Kern County Library

Kern County Public Works Department

Kern County Sheriff's Department

Kern County Superintendent of Schools

Kern County Water Agency

Kings County Planning Agency

Kern Valley Indian Council

Los Angeles Co Regional Planning Department

Los Angeles Audubon

Native American Heritage Council

Nature Conservancy

North Edwards Water District

North of River Municipal Waste District

North of the River Recreation and Park District

Pacific Gas and Electric Company

San Bernardino Co Planning Department

Santa Barbara County Resource Management Department

San Joaquin Valley Air Pollution Control District

San Joaquin Valley Center on Race, Poverty and the Environment

San Luis Obispo Co Planning Department

Santa Barbara Co Resource Management Department

Sierra Club, Kern Kaweah Chapter

Southern California Gas Company

South San Joaquin Valley Arch Info Center

Southern California Gas Company

Tejon Indian Tribe

Torres Martinez Desert Cahuilla Indians

Tulare County Planning and Development Department

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Chapter 9

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Chapter 9

List of Preparers

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Chapter 10

Bibliography

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Chapter 10

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Section 11

Acronyms and Abbreviations

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Chapter 11
Acronyms and Abbreviations

§	Section
°C	degrees Celsius
°F	Fahrenheit
µg/m3	microgram per cubic meter
AB 32	Assembly Bill 32
AB 52	Assembly Bill 52
ACBM	asbestos-containing building material
ACHP	Advisory Council on Historic Preservation
AEC	Advanced Environmental Concepts Inc.
AERMOD	American Meteorological Society/EPA regulatory dispersion model
AFY	acre-feet per year
AHERA	Asbestos Hazard Emergency Response Act
AIA	Airport Influence Area
ALUCP	Airport Land Use Compatibility Plan
APN	Assessor Parcel Number
AQAP	Air Quality Attainment Plan
AQMP	Air Quality Management Plan
ASCE	American Society of Civil Engineers
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
Basin	Tulare Lake Hydrologic Region, or Tulare Lake Basin

BAU	business as usual
BLM	Bureau of Land Management
BMP	best management practice
BPS	Best Performance Standards
BTU	British thermal units
C&D	construction and demolition
CA MUTCD	California Manual on Uniform Traffic Control Devices
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
CAL FIRE	California Department of Forestry and Fire Protection
Cal NAGPRA	California Native American Graves Protection and Repatriation Act
CalARP	California Accidental Release Prevention Program
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CalGEM	California Geologic Energy Management Division
CALGreen	California Green Building Standards Code
CalOES	California Office of Emergency Services
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CBC	California Building Code
CCR	California Code of Regulations
CDC	Centers for Disease Control
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission

CEQA	California Environmental Quality Act
CERCLA Act	Comprehensive Environmental Response, Compensation, and Liability
CESA	California Endangered Species Act
Cf	cubic feet
CFC	chlorofluorocarbons
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CH4	methane
CHL	California Historical Landmark
CHP	California Highway Patrol
CISN	California Integrated Seismic Network
CIWMB	California Integrated Waste Management Board
CMP	Congestion Management Program
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide
CO2	carbon dioxide
CO2e	carbon dioxide equivalent
COG	Council of Governments
Cortese list	State of California Hazardous Waste and Substances Sites List
County	Kern County
COVID-19	Coronavirus Disease 2019
CPUC	California Public Utilities Commission
CREC	Controlled Recognized Environmental Condition
CRHR	California Register of Historical Resources

CRM	CRM Tech
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
CWA	Clean Water Act
CWPP	Kern County Community Wildfire Protection Plan
dB	decibel
dBA	A-weighted decibel
DLRP	Division of Land Resource Protection
DMA	Development Mitigation Agreement
DOC	Department of Conservation
DOF	California Department of Finance
DPM	diesel particulate matter
Draft EIR	Draft Environmental Impact Report
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
EISA	Energy Independence and Security Act
EKAPCD	Eastern Kern Air Pollution Control District
EMFAC2021	EMissions FACtor model
EMS	Emergency Medical Services Division
EMT	emergency medical technician
EO	Executive Order
EOP	Emergency Operations Plan
EPA	U.S. Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
ESA	Environmental Site Assessment
EV	electric vehicle

EVCS	electric vehicle capable space
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHSZ	Fire Hazards Severity Zone
FHWA	Federal Highway Administration
FICON	Federal Interagency Committee on Noise
Fire Code	Kern County Code of Building Regulations
FIRM	Flood Insurance Rate Map
FPPA	Farmland Protection Policy Act
FTA	Federal Transit Administration
GAMAQI	2015 Guidance for Assessing and Mitigating Air Quality Impacts
GHG	greenhouse gas
GSA	Groundwater Sustainability Agency
GSMA	Groundwater Management Sustainability Act
GSP	Groundwater Sustainability Plan
GVW	R gross vehicle weight rating
GWh	gigawatt-hour
GWP	global warming potential
H	Airport Approach Height
H2S	hydrogen sulfide
HAP	hazardous air pollutant
Hazardous Waste Plan Plan	Kern County and Incorporated Cities Hazardous Waste Management
HCD	California Department of Housing and Community Development
HCM 6	Highway Capacity Manual, Sixth Edition
HCP	habitat conservation plan

HFC	hydrofluorocarbon
HMTA	Hazardous Materials Transportation Act
hp-hr/gal	horsepower hour per gallon
HRA	Health Risk Assessment
HREC	Historical Recognized Environmental Condition
HSC	Health and Safety Code
HSWA	Hazardous and Solid Waste Amendment
HUD	U.S. Department of Housing and Urban Development
ID No. 4	Improvement District Number 4
IES	Illuminating Engineering Society
IGY	International Geophysical Year
in/sec	inchers per second
IPCC	International Panel on Climate Change
IRA	Inflation Reduction Act
IRWM	Integrated Regional Water Management
IS	Initial Study
ISO	International Organization for Standardization
ISR	Indirect Source Rule
ITE	Institute of Transportation Engineers
ITP	incidental take permit
kBTU	kilo-British thermal unit
KCFD	Kern County Fire Department
KCGP	Kern County General Plan
KCPNR	Kern County Planning and Natural Resources Department
KCSO	Kern County Sheriff's Office
KCWA	Kern County Water Agency

KCZO	Kern County Zoning Ordinance
KEDC	Kern Economic Development Corporation
Kern COG	Kern Council of Governments
KGA	Kern Groundwater Authority
KOP	Key Observation Point
kWh	kilowatt-hour
LACFD	Los Angeles County Fire Department
LCFS	Low Carbon Fuel Standard
LDA	Light-Duty-Auto
Ldn	average day-night noise level
LDT	Light-Duty-Truck
Leq	equivalent noise level
LGC	LGC Geotechnical, Inc.
LI	Light Industrial
LOS	level of service
LRA	local responsibility order
LTS	less than significant
Lw	sound power level
M-1	District Light Industrial District
MBGP	Metropolitan Bakersfield General Plan
MBHCP	Metropolitan Bakersfield Habitat Conservation Plan
MBTA	Migratory Bird Treaty Act
MCY	motorcycle
MDV	medium-duty-vehicles
MGD	million gallons per day
MM	mitigation measures

MMT	million metric tons
MPO	metropolitan planning organization
MRZ	Mineral Resource Zone
MT	metric tons
MW	megawatt
MWh	megawatt-hour
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEHRP	National Earthquake Hazards Reduction Program
NESHAP	National Emission Standards for Hazardous Air Pollutants
NF3	nitrogen trifluoride
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Safety Administration
NI	no impact
NMFS	National Marine Fisheries Service
NO	nitric oxide
NO2	nitrogen dioxide
NO3	nitrates
NOI	Notice of Intent
NOP	Notice of Preparation
NOR	North of the River
NORMDWD	North of the River Municipal Water District
NORSD	North of the River Sanitary District

Nox	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NR	natural resources
NRHP	National Register of Historic Places
O3	ozone
OEHHA	California Office of Environmental Health Hazard Assessment
OMWC	Oildale Mutal Water Company
PD	Precise Development
PE	Petroleum Extraction
PFC	perfluorocarbon
PG&E	Pacific Gas and Electric
PL	Public Law
PM	particulate matter
PM10	particulate matter of 10 microns or less
PM2.5	particulate matter of 2.5 microns or less
Porter-Cologne	Porter-Cologne Water Quality Control Act
ppm	parts per million
PPV	peak particle velocity
PRC	Public Resources Code
Project	proposed IPG Industrial Project
PTO	Permit to Operate
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act of 1976
REC	Recognized Environmental Condition
RHNA	Regional Housing Need Allocation
R-MP	Resource–Mineral and Petroleum

RMP	Risk Management Program
RMP	Risk Management Program
ROG	reactive organic gas
ROG	reactive organic gases
RPS	Renewables Portfolio Standard
RTIP	Regional Transportation Improvement Program
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCS	sustainable communities strategy
SDC	Seismic Design Category
SF6	sulfur hexafluoride
SGMA	Sustainable Groundwater Management Act
SHRC	State Historical Resources Commission
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLCP	short-lived climate pollutant
SLF	Sacred Lands File
SMARA	The Surface Mining and Reclamation Act of 1975
SO2	sulfur dioxide
SOI	Sphere of Influence
SR	State Route
SRA	State responsibility areas

SRRE	Source Reduction and Recycling Element
SSC	Species of special concern
SSJVIC	Southern San Joaquin Valley Information Center
SSSC	side-street stop-controlled
SU	significant and unavoidable
Subbasin	Kern County Subbasin
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	California State Water Resources Control Board
TAC	toxic air contaminant
TCR	Tribal cultural resource
TOD	transit-oriented development
TRU	Transport Refrigeration Unit
TS	traffic-signal controlled
U.S.C.	United States Code
UCMP	University of California Museum of Paleontology
UFC	Uniform Fire Code
URF	Unit Risk Factor
USACE U.S.	Army Corps of Engineers
USDOT U.S.	Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWMP	Urban Water Management Plan
VERA	Voluntary Emissions Reduction Agreement
VMT	vehicle miles traveled
VOC	volatile organic compound

Vph	vehicles per hour
Warren-Alquist Act	Warren-Alquist Energy Resources Conservation and Development Act
WDR	Waste discharge requirements
WOTUS	Waters of the United States
WSA	Water Supply Assessment
WWTP	Wastewater Treatment Plant
ZEV	zero-emission vehicles
ZV	Zoning Variance

SECTION IV

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Fact Sheet

Frequently Asked Questions on Mandatory Consolidation or Extension of Service for Water Systems

Why are water systems encouraged to consolidate?

The State Water Resources Control Board is committed to ensuring all Californians have access to safe, clean, and affordable water for human consumption. Achieving this goal can be particularly challenging for small and disadvantaged communities that lack the resources to fund basic capital costs, let alone the ongoing costs of maintenance, energy, treatment and personnel needed to operate what are sometimes very complex systems.

Consolidating public water systems and extending service from existing public water systems to communities and areas which currently rely on under-performing or failing small water systems, as well as private wells, reduces costs and improves reliability.

Water provided by public water systems is subject to regulation by the United States Environmental Protection Agency (USEPA) and the State of California. Requirements include regular monitoring and testing for contaminants. Consolidating or extending service from a public water system to a community otherwise served by unreliable systems or unregulated private wells advances the goal of a reliable, accessible supply of safe drinking water for all California residents.

The authority to regulate public water systems under the state and federal Safe Drinking Water Acts (the Division of Drinking Water program) was transferred from the State Department of Public Health to the State Water Board July 1, 2014. Historically, the Division of Drinking Water asked public water systems to voluntarily consolidate when appropriate. To date, a number of systems have voluntarily consolidated, and many of these projects were funded by the Drinking Water State Revolving Fund Program, or the proceeds from the sale of state bonds (Proposition 84).

However, there remain many systems which could benefit by consolidation and extension of service. The situation has been exacerbated by the current severe drought and the water emergencies that a number of disadvantaged communities and small water systems are facing throughout the state.

Why is mandatory consolidation being implemented now?

On June 24, 2015, Governor Edmund G. Brown Jr. signed Senate Bill 88 (Statutes 2015, Chapter 27), authorizing the State Water Board to require systems that consistently fail to meet standards to consolidate with, or obtain service from, a public water system. Senate Bill 88 is crafted to expedite permanent solutions for failing water systems and those that have run out of water due to the drought.

Roughly 2 percent of public water systems do not reliably deliver drinking water that meets all state and federal drinking water standards. Through consolidation and extension of service the number of systems relying on contaminated water sources, unreliable or inadequate sources of supply, or having no water at all will be reduced or eliminated.

How does the State Water Board approach consolidations?

Public water systems experiencing chronic water quality failures or unreliable supplies are first provided technical assistance to analyze the problem and recommend a course of action. Enforcement may also be necessary to achieve compliance with Safe Drinking Water Act requirements. Lacking progress, the State Water Board may initiate discussions with the system and neighboring/adjacent public water systems regarding consolidation. These discussions will examine many factors such as:

- the capacity of a neighboring system to supply water to the affected community;
- the geographical separation of the two systems;
- the cost of required infrastructure improvements;
- the costs and benefits to both systems; and
- access to financing for the consolidated entity.

Consolidation may involve the actual physical consolidation of the participating water systems (physical consolidation), just the management of the participating water system (managerial consolidation), or both. If voluntary consolidation cannot be negotiated in a reasonable time period, the State Water Board may commence proceedings for direct mandatory consolidation or a mandatory extension of service pursuant to Health & Safety Code section 116682. In this case, consolidation letters will be sent to the consistently failing water system (subsumed system) and to the receiving system notifying them that they have six months to develop a plan for voluntarily consolidation.

A similar approach is taken when a residential area, not served by a public water system, is identified as a potential candidate for receiving an extension of service from an existing public water system.

What happens if systems do not consolidate after six months?

If the two systems have not developed a plan for consolidation within six months of the letters being issued, the Board may then order the two systems to consolidate.

What is the process for mandatory consolidation?

Before ordering a mandatory consolidation, the State Water Resources Control Board must find all of the following:

- The potentially subsumed system has consistently failed to provide safe drinking water;
- All reasonable efforts to negotiate consolidation or extension of service were made;
- Consolidating, or extending service, is technically and economically feasible;
- There is no pending local agency formation commission process that is likely to resolve the problem in a reasonable amount of time;
- Water rights and water contract concerns have been adequately addressed;
- Consolidating or extending service is the most efficient and cost- effective means for providing an adequate supply of safe drinking water; and
- The capacity of the proposed interconnection needed to accomplish the consolidation is limited to serving current customers of the subsumed water system.

Consultation with local and state agencies along with outreach to customers within the affected service areas must occur before ordering the consolidation or extension of service.

How will mandatory consolidations be paid for?

The State Water Board will provide funding as necessary and appropriate from Proposition 1, the Drinking Water State Revolving Fund (DWSRF) and monies made available from the emergency drought relief package, for consolidation or extension of service, including infrastructure improvements.

How does the State Water Board enforce an order for mandatory consolidation?

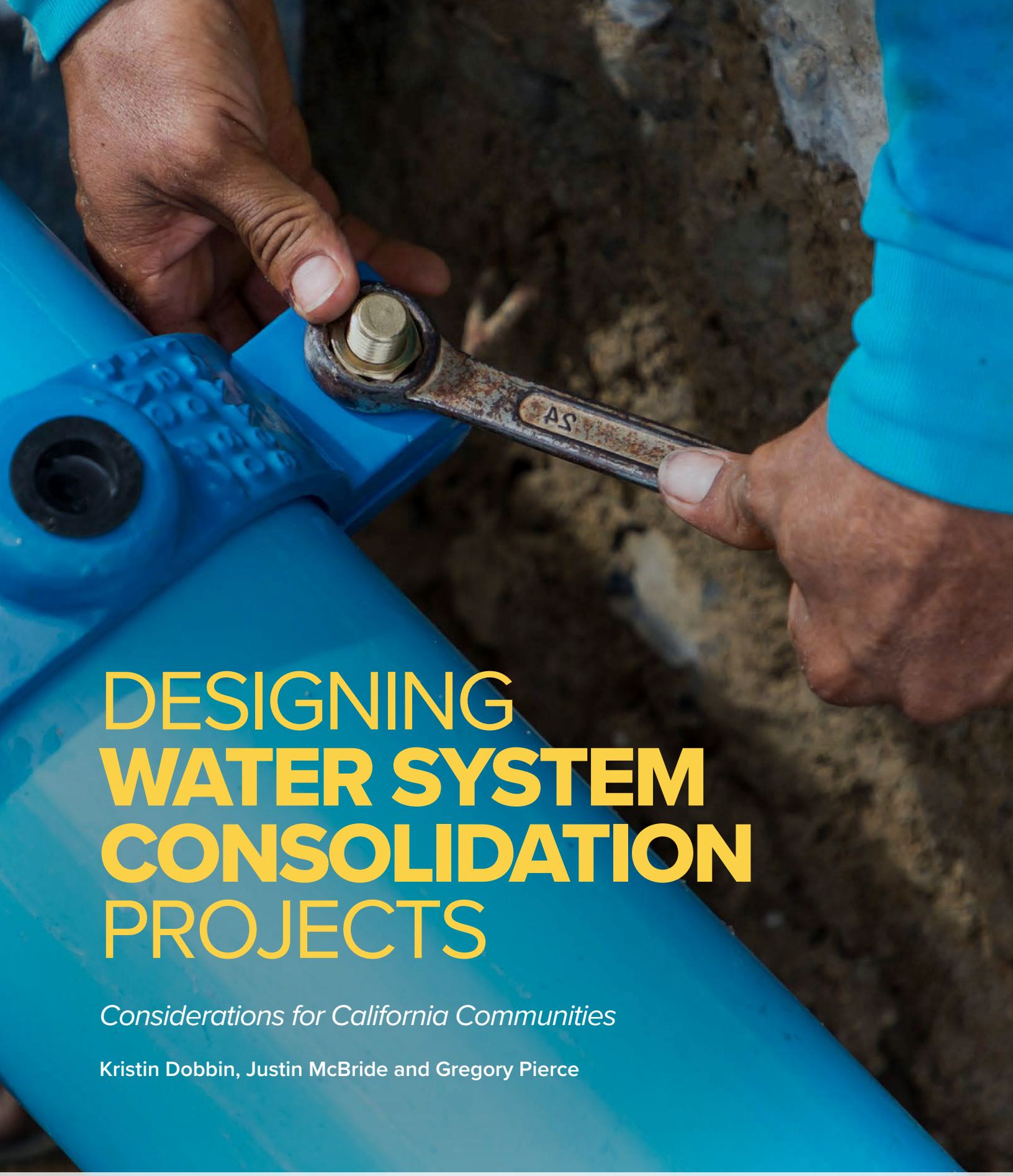
The authority for ordering mandatory consolidation is included in the California Safe Drinking Water Act and may be enforced by the State Water Board pursuant to Article 9 of the Health & Safety Code, including sections 116650 (citations) and 116655 (compliance order).

What liability relief is provided by Senate Bill 88?

Senate Bill 88 added section 116684 to the Health and Safety Code, limiting the liability of water systems, wholesalers, or any other agencies that deliver water to consolidated water systems. This liability relief is available regardless of whether the consolidation occurs through

the mandatory consolidation process or through a voluntary act. These new liability relief provisions will protect water systems involved in consolidations and remove a barrier that previously limited voluntary consolidations.

(This FAQ sheet was last updated on Nov. 7, 2016)



DESIGNING **WATER SYSTEM CONSOLIDATION** PROJECTS

Considerations for California Communities

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AUTHORSHIP

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ACKNOWLEDGEMENTS

We would like to thank the advisory committee members including Ryan Jensen of Community Water Center, Michael Claiborne and Nataly Escobedo Garcia of Leadership Counsel for Justice and Accountability, Blanca Surgeon of Rural Community Assistance Corporation; Karen Nishimoto, Bridget Chase and Michelle Frederick of the California State Water Resources Control Board; Camille Pannu of Columbia Law School (formerly UC Irvine) as well as many other external reviewers and experts who all provided invaluable feedback and input.

This guide was made possible through the generous support from the Water Foundation and is based upon work supported by the National Science Foundation SBE Postdoctoral Research Fellowship under Grant No. 2104829.

As a land grant institution, the UCLA Luskin Center for Innovation acknowledges the Gabrielino and Tongva peoples as the traditional land caretakers of Tovaangar (Los Angeles basin, Southern Channel Islands) and that their displacement has enabled the flourishing of UCLA.

DISCLAIMER

The regulation and governance of public water systems is complicated, nuanced, and ever changing. While unintentional, there are undoubtedly mistakes and omissions in this guide. Moreover, material accurate at the time of publication may not be later. As such, this guide is not legal advice, nor should it be used as such. The views expressed in this paper are those of the authors alone. They do not necessarily reflect the view of the National Science Foundation, department, or university.

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EXECUTIVE SUMMARY

California drinking water systems face unprecedented challenges, including drought, wildfires and groundwater contamination. Water system consolidation — defined here as the formal merging of some or all the governance, management and financial functions of drinking water provision — presents one possible solution to many of these challenges. Small water systems are particularly likely to benefit from consolidation, which can help pool resources, grow a system's customer base and increase Technical, Managerial and Financial (TMF) capacity.

Although consolidation (as defined above) may help systems better serve safe and affordable drinking water to their customers, including reducing costs and increasing sustainability, the process of consolidation itself is highly complex and can be costly and time consuming to implement. The benefits and challenges of any given consolidation project depend on how the project is designed and implemented. This guide details a range of possibilities for structuring and governing consolidation projects and provides a framework of nine key considerations to help stakeholders advance the most locally appropriate approach possible.

▶ Options for structuring consolidations

Three common approaches to structuring collaboration between participating partners include the following: umbrella organizations, mergers and acquisitions. However, endless other possibilities exist, and stakeholders should be as creative as possible in crafting the best possible approach for their local community.

Umbrella Organizations: Umbrella organizations are formed when systems create a new regional entity to formally collaborate on some aspect(s) of drinking water provision while retaining independence on others. Umbrella organizations typically involve the creation of a new overarching entity to coordinate between member agencies and perform specific predetermined functions. Umbrella organizations can be relatively easy to put together; they may increase economies of scale and sustainability; and, since all parties retain autonomy, they are often considered less politically risky than other options. However, depending on how they are designed and used, umbrella organizations can also have complicated decision-making processes, create management and government redundancies and have uncertain futures.

Mergers: A merger occurs when two or more water systems combine to form a new, single water system. In addition to the standard benefits of consolidation, mergers can provide representation for all residents of the new system and address staff and volunteer shortages. However, they often require formal approval by regulators, which can make them complicated to organize. Mergers may also have spillover effects into other services or government functions depending on the governing entities involved.

Acquisitions: An acquisition differs from a merger in that a single system essentially takes over another system without significant changes to the acquiring system. Acquisitions can be relatively straightforward and, in some cases, can address safe drinking water issues without instigating other changes. Like mergers, acquisitions are well suited to addressing staffing issues. Unlike mergers, not all acquisitions involve annexation, meaning that some residents may lack formal representation in the new consolidated system.

▶ Options for governing consolidated systems

The implementation and outcomes of a consolidation project are also heavily influenced

by how the consolidated entity will be governed. More than twenty distinct water system governance structures are possible, the details of which are provided in the water system entity statutory review in Appendix A. Generally, these options can be summarized into five categories: general purpose governments, independent special districts, investor-owned utilities (IOUs), nonprofits and joint powers authorities (JPAs).

General purpose governments: General purpose governments are public entities that perform many functions, of which water provision is only one. Cities and counties are the most common examples of this governance type. General purpose governments provide water either directly or through a subsidiary district governed by the general purpose government. Either way, these water systems can take advantage of larger public administrations to provide water but may suffer from inattention due to multiple priorities.

Independent special districts: An independent special district is a local government designed to perform a specific role for residents of a defined geography. These districts take a variety of forms with unique powers, requirements and designs. Many independent special districts provide specialized expertise and direct representation for residents, but typically they take substantial work to establish.

Investor-owned utility (IOU): An IOU is a private for-profit company that provides water to the public as a profit-generating enterprise for investors. IOUs are subject to additional regulation by the California Public Utilities Commission (CPUC) for rate setting and other considerations, although the degree of regulation depends on utility size. IOUs can, and in some cases must, provide low-income residents with rate subsidies, but decision-making among IOUs is not directly representative of the customers served.

Nonprofits: Nonprofit water cooperatives or associations provide water to members or shareholders at cost. Under California law, these are typically organized as mutual water companies (MWC), though some other formats exist. MWCs generally have less oversight than the above three governance types but are also relatively easy to establish and dissolve, and provide significant flexibility as many design and operation decisions are left to local discretion.

Joint powers authority (JPA): A JPA is a new legal entity created collaboratively by two or more public entities via a legal agreement (often a Joint Powers Agreement) to exercise common powers towards a specific, defined purpose. JPA members retain all their individual authorities and functions; however, they delegate authority on the defined subject to a newly established entity with a separate governing body, typically made up of representatives of member entities. JPAs are generally easy to establish but are constrained to exercising only the powers held in common by all members.

▶ Key considerations in consolidation

When contemplating the design of a consolidation project, stakeholders should keep the following key considerations in mind:

1. **Scope of powers and authorities:** Every type of governance structure has some distinct powers (e.g., wastewater provision, fire protection, eminent domain) that make it unique. Stakeholders need to carefully consider these powers when contemplating a merger, with an eye to the future to make sure the chosen consolidated entity will have the necessary powers for the system to continue to thrive.
2. **Implications for other services and powers:** Some types of water systems can provide other key services like solid waste collection, fire protection or wastewater. Others cannot.

Similarly, changing water system governance can introduce new ordinances, assessments or taxes that impact residents. Thus, water system consolidations need to be designed with careful attention to the non-water implications as well.

3. **Revenue and cost features:** Not all water systems have equal financial duties and privileges. Publicly owned water systems are bound by Proposition 218 to set water rates at the cost of delivering the service. IOUs have more discretion in setting rates but must get approval from the CPUC to change them, and all privately held systems cannot levy assessments or issue bonds in the same manner as publicly owned systems can.
4. **Technical, Managerial and Financial (TMF) capacity:** While consolidations often increase TMF capacity, not all approaches do so equally. When possible, stakeholders should be careful to avoid consolidations that unnecessarily increase complexity, which can lead to decreased TMF capacity long-term.
5. **Affordability:** The design of a consolidation project can influence water rates in a variety of ways, including potentially necessitating large-scale investment in infrastructure and possibly introducing new taxes. These impacts should be assessed across different income groups and constituencies. Availability of state or federal grants or financing may also influence affordability post-consolidation. Similarly, the governance of the consolidated system influences both how water rates are set and how customers can engage in rate-setting.
6. **Representation and transparency:** Publicly owned entities are subject to transparency laws such as the Brown Act and the Public Records Act. However, they restrict voting rights to those with U.S. citizenship. IOUs, on the other hand, are not directly governed by their customers at all, although some transparency measures are in place through CPUC oversight. MWCs often restrict participation in decision-making to homeowners. Precisely because representation and local control are often key concerns among residents contemplating consolidation, carefully attending to representation is essential in making any consolidation project a success.
7. **Flexibility and administrative transaction costs:** Certain approaches to consolidation require more time and resources to implement, such as regulatory approval and/or resident elections, whereas others may be easier (e.g., executing a JPA among various public agencies). Yet it is also important to look to the future. In the long term, some approaches allow for more flexibility and/or stability, meaning that savings may materialize in the long run.
8. **Sustainability and climate resilience:** Consolidation presents a unique opportunity for small and rural systems to be stronger in the face of challenges posed by climate change including by increasing the number or diversity of local water sources. However, like all other benefits, increased sustainability and resilience are not a guaranteed outcome of consolidation but rather need to be planned for and intentionally fostered.
9. **Access to safe, reliable drinking water:** Consolidations should increase access to safe, affordable drinking water and include as many partners as possible, particularly those most impacted by legacies of discrimination and historically marginalized in water planning.

INTRODUCTION

The water sector faces growing challenges related to aging and failing infrastructure; increasing water rates that outpace both inflation and household incomes; staffing shortages; natural disasters; and complex regulatory, management and treatment requirements among others. These challenges are often most acute for small community water systems, which, by nature of a small customer base, are less able to leverage economies of scale to provide safe, affordable and sustainable service. Small systems reliant on just one or a few water sources are also more vulnerable to water quality challenges and supply disruptions, including from climate-related disasters like drought and fire.

In California, the struggles of small systems manifest in almost every drinking water statistic. Currently, of California's approximately 2,800 Community Water Systems, 346 are out of compliance or consistently fail to meet primary drinking water standards. Another 508 are at risk of failing, according to the 2022 State Water Resources Control Board's (SWRCB's) Water Needs Assessment. Small water systems are disproportionately represented in both categories.[1] Similarly, 76 percent of the 149 water systems that were considerably "drought impacted" between 2012 and 2016 were very small systems serving fewer than 1,000 connections.[2]

Regional collaboration or partnerships provide one avenue to addressing these chronic small system challenges. Through collaboration, two or more utilities can work together for mutual benefit to overcome shared challenges and achieve safe, affordable drinking water in the long term.[3] In this guide, we specifically focus on one subset of regional solutions, known as consolidations, which we define as the formal merging of some or all of the governance, management and financial functions of drinking water provision into one. A consolidation that includes more than two partners is sometimes called a regionalization. In this guide we use the term consolidation to encompass these multi-partner projects as well as two-partner projects. By referring to "partners", our definition also intentionally encompasses projects that integrate residential areas previously unserved by a regulated water system, such as populations that rely on private domestic wells.

WHAT IS WATER SYSTEM CONSOLIDATION?

Consolidation entails the formal merging of some or all of the governance, management and financial functions of drinking water provision between two or more water providers or communities. This can occur with or without the phsycial interconnection of water infrastructure.

Consolidations could be physical, managerial or both. Physical consolidations entail the physical integration of the involved water systems into one unified system — for example, via an intertie or the construction of main and distribution lines to serve residents previously reliant on private domestic wells. In a "managerial" consolidation, in contrast, the physical infrastructure of two or more systems remains separate while the operation, management, and ownership of these systems are combined.

Water system consolidation has played an important role in the California SWRCB's efforts to combat persistent small system challenges and implement the state's 2012 Human Right

1 State Water Resources Control Board (2022) Drinking Water Needs Assessment

2 Pacific Institute (2017) Drought and equity in California

3 Rural Communities Assistance Partnership (2022) Regional collaboration for water and wastewater utilities

BEYOND CONSOLIDATIONS: WATER SYSTEM PARTNERSHIPS

While not analyzed further in this guide, water system partnerships are another important form of regional solution that local utilities, community leaders, policymakers and Technical Assistance Providers should all be aware of. Partnerships between water systems can take a wide variety of forms, including mutual aid agreements, shared bulk purchasing, sharing of equipment/staff, purchasing water and water wheeling. Partnerships are typically established via legal contracts that leave the legal structure and governance of participating systems unchanged. For this reason, partnership design includes options and considerations distinct from those discussed in this guide. Nonetheless, partnerships are a potential pathway for securing some of the same regional benefits as consolidation and are an important option to consider, especially where geographic or political barriers prevent consolidation. Moreover, in some cases, consolidation and partnerships might both be used in the same community. The UNC Environmental Finance Center's guide on crafting interlocal water and wastewater agreements is an excellent resource for exploring and designing these types of regional solutions.

to Water law (AB 685). Since 2015, the CA legislature has passed a series of bills aimed at facilitating consolidations, including SB 88, which authorized the SWRCB to mandate consolidations in cases where a public water system located in a disadvantaged community[4] consistently failed to provide safe drinking water. The state has also increasingly directed grant and subsidized loan funding to consolidation projects, including through the newly established Safe and Affordable Funding for Equity and Resilience (SAFER) program. These efforts have resulted in more than 200 completed consolidations, with another 200 underway.[5] Nonetheless, many more opportunities for consolidation remain across the state. The 2021 needs assessment identified 341 failing or at-risk systems as potential candidates for consolidation based on physical proximity to a compliant system.[6] Based on this analysis, the SWRCB has issued nearly 3,000 letters to small water systems recommending they consider consolidation with neighboring systems.

In many cases, consolidation projects materialize or accelerate in response to existing or emerging local water challenges. For example, the Cobb County Water District regionalization project (discussed on page 9) originated after a devastating wildfire led to a mass reduction of the customer base, which left the area's small water systems financially unviable. Similarly, consolidation may present a solution to water quality compliance issues, such as Ox-Bow Marina's struggle with arsenic contamination (see page 11). However, systems can also proactively pursue consolidation either in anticipation of future challenges, such as those presented by drought (for an example see the case of the Ukiah Valley Basin on page 8), or to secure benefits such as increased TMF capacity or greater economies of scale (see the Castle City Mobile Home Park example on page 14).

4 Per SB 88, a "disadvantaged community" is a rural unincorporated area with annual median income at 80 percent or less than the state's annual median income (California Health and Safety Code §116680).

5 State Water Resources Control Board California Water Partnerships Map. Available at: https://gispublic.waterboards.ca.gov/portal/apps/webappviewer/index.html?id=fabf64fbe50343219a5d34765eb7daad

6 State Water Resources Control Board (2022) Drinking Water Needs Assessment; Pacific Institute (2017) Drought and Equity in California.

As these diverse examples demonstrate, consolidation offers a wide range of potential benefits for participating partners, including but not limited to improved ability to meet regulatory requirements, new water sources, new funding sources, reduced costs through increased economies of scale, and more affordable water rates. Despite these opportunities and clear examples of success, there are often complexities and challenges presented by consolidation projects, including the following:

» Consolidation often requires significant changes to local water and broader governance arrangements subject to regulatory oversight and legal and policy restrictions.

» Sometimes residents or community leaders are reluctant to pursue these changes, afraid of future unknowns (especially costs) or that they may lose local control over their water system.

» Even when a consolidation project has everyone's full support, the projects can be time and resource intensive to implement.

Importantly, the unique benefits and challenges of any given consolidation project depend heavily on how the consolidation is designed. This guide explains the spectrum of possibilities for structuring and governing consolidation projects in California to help stakeholders understand the tradeoffs and ensure the most locally appropriate and beneficial approach possible.

USING THIS GUIDE

The term consolidation covers a diverse range of activities and institutional arrangements. Water systems have implemented many different forms of consolidation across the country. There is no one-size-fits-all solution. Rather, consolidations must always be tailored to local conditions and priorities. To do this effectively, community stakeholders need reliable information about their potential options and how they compare. To support this goal, this guide describes a spectrum of collaboration alternatives and accompanying governance options (Part I) and then provides a framework for considering the unique benefits and challenges of the potential combinations (Part II). Neither is exhaustive — rather, we seek to provide an informative starting point for productive conversations.

Stakeholders can use this guide in early conversations about the prospect of consolidation and the diversity of options therein, as well as to identify a smaller subset of preferred alternatives for further analysis. After or as a part of feasibility analysis or planning, this guide can facilitate individual and collaborative comparisons among select alternatives in support of a final decision. Regardless of how or when this guide is used, enlisting the help of local technical assistance providers, community-based organizations and/or SWRCB Division of Drinking Water staff to facilitate and guide these conversations will help set a strong foundation for success.

PUTTING THIS GUIDE INTO PRACTICE: THE DESIGNING CONSOLIDATIONS TOOL KIT

To accompany this guide, we have developed a tool kit, featuring resources like a side-by-side comparison tool for consolidation scenarios, a consolidation proposal evaluation tool and more. The tool kit resources are designed to support consolidation conversations at any stage of a consolidation process.

PART I: OPTIONS FOR STRUCTURING AND GOVERNING CONSOLIDATIONS

The unique benefits and potential challenges of any consolidation project are heavily influenced by how the consolidation is designed. Outcomes hinge on two key questions: 1) How will collaboration between the two or more partners (water systems and/or communities) be structured? and 2) How will the future consolidated entity be governed? In this section we discuss options for both.

▶ Options for structuring consolidations

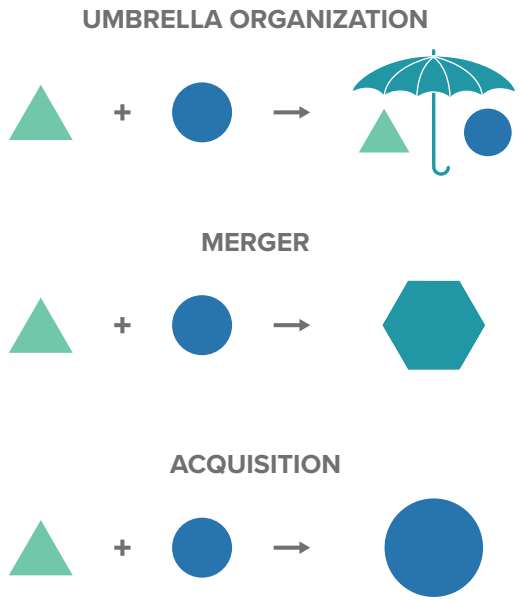
For the purposes of this guide, we define three broad approaches to consolidation: umbrella organizations, mergers and acquisitions (See Figure 1). Each is discussed in detail below. All three of these approaches can facilitate physical and/or managerial consolidation, as described in the introduction, and key benefits like increased economies of scale and climate resilience. Importantly, these options only represent points on what is a continuous spectrum of consolidation possibilities. Local needs may require a combination of these options.

UMBRELLA ORGANIZATIONS

In some cases, consolidation may involve the creation of a new regional or joint entity while retaining the pre-existing local entities involved in drinking water provision, thus creating an umbrella organization. In these cases, the umbrella organization may serve new roles, like operating new shared infrastructure. It also may assume some of the roles previously assigned to local entities, such as operating and maintaining local water distribution systems or billing customers. Meanwhile the pre-existing local entities will remain intact and independent, retaining some or all their previous functions and decision-making authority. Joint Powers Authorities or Agencies (JPAs, discussed below) are the most common types of umbrella organizations, although other governance arrangements are also possible. Notably, umbrella organization consolidations share many similarities to water system partnerships (see page 5). The key distinction we make in this guide is that umbrella organizations entail the formation of a new entity with a distinct governing body, whereas partnerships utilize collaborative agreements without creating a separate "Authority" or "Agency." Examples of such partnerships, which are not further covered in this guide, include water purchasing, water wheeling or shared services agreements.

FIGURE 1

Three options for structuring water system consolidations



Note: These are simplified scenarios with only two pre-existing entities. However, all three approaches can involve more systems of a variety of structures.

TABLE 1

Pros and cons of umbrella organizations

PROS

- May face less local resistance by retaining existing local decision making and governance structures.
- May be quicker and easier to implement than other alternatives, though some umbrella structures can be highly complex.
- JPAs are particularly flexible. Division of roles and responsibilities between the pre-existing entities and umbrella organization and representation/decision-making can be tailored and revisited in the future as needed.
- Can provide an avenue for collaboration while still maintaining separation where there are legal or financial hurdles to merging or dissolving existing entities (e.g., need or desire to maintain separate water rights).

CONS

- Depending on design, may be less efficient due to staffing, governing and/or operational redundancies which can increase time and resources needed for administration and governance.
- May be easier to dissolve, including potentially at the behest of only one or some partners.
- Umbrella organizations represent member agencies rather than residents directly meaning that decision-making may be more removed from customers than in other formats.

PREPARING FOR DROUGHT: THE UPPER RUSSIAN RIVER WATER AGENCY

Four county water districts serve water to residents of the Ukiah Valley Basin. As drought conditions intensified in Summer 2014, each system began to worry it would soon find itself without sufficient water. To prevent such a crisis, the four districts began working together to develop emergency interties that would provide back-up supplies. That winter, the districts signed a JPA to formalize their efforts and begin sharing resources among themselves, officially creating the Upper Russian River Water Agency. Leveraging this agreement, the districts contract among themselves to share staff for system maintenance, administration and management.

For now, the districts have retained their independent governing boards in addition to the Authority board, which is made up of one representative for each member agency. However, the districts are also leveraging the JPA to explore the possibility of further consolidation through a merger. In 2020, the Ukiah Valley Sanitation District, which provides sewer services in the region, formally joined the JPA to participate in these discussions.

MERGERS

As another approach to consolidation, two or more local entities may choose to fully combine through a merger. In these cases, two or more entities (typically water systems, but a merger can also include domestic well communities) dissolve and are replaced by a new or amended governing entity. Mergers differ from acquisitions (below) in that the process generally results in an entity that looks and functions differently than those that preceded it.

TABLE 2

Pros and cons of mergers

PROS

- The ability to develop something new makes mergers tailorable to local needs.
- Generally, ensures representation for all residents served by the consolidated system although governing board members will likely be elected across a larger population.
- May help address staff and volunteer shortages for small systems by pooling human resources across a larger population.

CONS

- Generally, requires service area and/or political boundary changes which can be time and resource intensive to implement.
- Can influence the provision of other services and cause changes in locally allowable land-uses (e.g., ordinances, zoning).
- Could alter local jobs tied to the pre-existing entities.
- Differences in the condition of infrastructure or the financial viability of participating entities may create roadblocks to a merger.

SEVEN DISTRICTS (AND COUNTING) JOIN FORCES AFTER THE VALLEY FIRE

The 2015 Valley Fire in Lake County left the area's water systems damaged and with far fewer rate payers than they had just months before. Even with state grants for repairs and upgrades, it was clear that many of the systems would not be financially viable on their own at their reduced sizes. This fact led the respective governing boards to decide that the best course of action would be to merge their systems. The initial 2018 phase of the project consolidated seven community water systems, dissolving six systems owned and operated by MWCs, county service areas, county water districts and California water districts and annexing their territory into the seventh, the Cobb Area County Water District. The Lake County Local Agency Formation Commission (LAFCo) made the necessary adjustments to Cobb Area's boundaries and, in doing so, drew the district's sphere of influence to include other area water systems. This foresight has facilitated the consolidation of two more systems into the district in recent years with fewer administrative hurdles.

ACQUISITIONS

In an acquisition, one water-providing entity takes over full ownership and operation of one or more other entities with minimal or even no changes to the acquiring entity. While the term acquisition may bring to mind privately owned water systems like investor-owned utilities (IOUs), they also occur between publicly owned entities or between public and private entities (see Walnut Ranch example on page 19). Among local government systems, an important distinction is whether the acquisition involves annexation or not. In cases without formal full annexation of the newly served territory, an Extraterritorial Service Agreement (ESA) can provide for water service instead. In these cases, drinking water service is provided to residents of the previous consolidated entity, but these residents are not considered residents of that city or district for the purposes of voting, taxation, etc. (See page 19 for more discussion of annexation). Like mergers and umbrella organizations, acquisition-style consolidations can be managerial (see example of Timberland Water Company on page 14), or physical (see Ox-Bow Marina example on page 11).

TABLE 3

Pros and cons of acquisitions

PROS	CONS
» Can help ensure safe, sustainable drinking water service without necessitating broader political or land-use changes. » In straightforward cases, review and approval by the necessary regulators (e.g., county LAFCo, CPUC) may be quicker than other alternatives. » Well suited to addressing staff or volunteer capacity issues.	» Residents may be subject to rules and rates without having representation in decision-making if not annexed into the new governing district. » For ESAs, certain criteria must be met for a county LAFCo to grant the necessary permission to provide drinking water service outside of a local government's boundaries. » Could alter local jobs tied to the consolidated system(s).

ACQUISITION BRINGS SAFE DRINKING WATER TO THE OX-BOW MARINA

The Ox-Bow Marina Mutual Water Company served approximately 200 customers using self-produced groundwater. Starting in 2008, the system's wells began to exceed regulatory requirements for arsenic, and work to find a sustainable solution began in earnest. In the nearby community of Isleton, the California American Water Company (Cal-AM), a large IOU, operated the community water system. Cal-Am was amenable to acquiring the system and applied to the California Public Utilities Commission (CPUC), the state regulator of IOUs, for permission to do so in 2015. Importantly, to solve Ox-Bow's water challenges, a physical intertie between the two systems needed to be constructed and improvements to the Marina's physical infrastructure were also needed. Ox-Bow Marina Mutual Water Company was eligible to receive state grant funding for these purposes, but at the time, as an IOU, Cal-Am was not. As such, Cal-Am worked with Ox-Bow Mutual Water Company to apply for and implement the project, and then completed their purchase of the water system in 2017.

▶ Options for governing consolidated systems

In addition to considering how to structure a potential consolidation project, stakeholders need to consider how a successfully consolidated entity will be governed. The more than 2,800 community water systems regulated by the state of California are governed by 26 distinct types of legal entities. Each type has different authorities and responsibilities under California law, and are subject to different requirements and regulations.[7] The water system entity statutory review in Appendix A provides some of these differences for twenty common types.

In this section, we summarize this information across five overarching categories: general purpose governments, independent special districts, IOUs, nonprofits and JPAs. Notably, we exclude from this discussion and the accompanying statutory review consideration of Tribal water systems, which are neither organized under nor subject to California laws. Nonetheless, Tribal water systems are involved in consolidation projects, both as consolidated and receiving systems, including sometimes with the non-Tribal state systems described herein for very similar reasons.

TABLE 4

Type and frequency of governance for California Community Water System consolidations completed 2015-2021

Governance of consolidated system	# of cases (n = 143)
General purpose government	41
Independent special district	47
Investor owned utility	37
Nonprofit	7
Joint powers authority	Unknown/ no data
Other (schools, private facilities, state-operated and Tribal systems)	11

7 Dobbin, K. B., & Fencl, A. L. (2021). Institutional diversity and safe drinking water provision in the United States. Utilities Policy, 73, 101306. https://www.sciencedirect.com/science/article/pii/S0957178721001405

GENERAL PURPOSE GOVERNMENTS

General purpose governments, particularly cities and counties, own and operate many water systems throughout the state. In these cases, the general purpose government bundles water service with many other functions such as trash collection, street maintenance, code enforcement and public safety, under the broad authority of a locally elected body. City owned and operated water systems typically fall directly under the jurisdiction of city council, although in some cases cities establish a dedicated governing board or commission with appointed or elected representatives to oversee their water system. County water systems, on the other hand, can be owned and operated under a variety of different formats including as a county service areas, county waterworks districts, or maintenance districts. Although these iterations can differ with respect to how and where they can be established and what services they can provide (see Appendix A), as political subdivisions of the county, the local board of supervisors is ultimately in charge.

TABLE 5

Pros and cons of general purpose governments

PROS	CONS
» Can integrate water resources management with other local planning. » Provides wide-reaching legal and financial powers. » Can leverage/share resources across a larger organization reducing costs (e.g., facilities). » General purpose elected officials are often more visible and familiar to residents, potentially increasing transparency, and access to decision-making.	» Water service can be impacted by political expediency (e.g., failure to adequately raise rates to avoid political pushback or not prioritizing water resulting in deferred maintenance) and is potentially vulnerable to spillover effects from unrelated crises (e.g., austerity or political upheavals). » Residents must be U.S. citizens to vote. » County owned and operated water systems are subject to intricate restrictions related to service area, conditions and duration. In these cases, the governing body also represents larger populations beyond the water service area, potentially limiting representation and accountability. » Consolidations with annexation into cities will result in significant changes for residents who will become city residents influencing taxes, zoning, ordinances, etc. These changes can result in strong preferences among residents and local government bodies alike.

INDEPENDENT SPECIAL DISTRICTS

A special district is a local government dedicated to a specific function or set of functions over a defined area. The geography of special districts may overlap or transcend general purpose government political boundaries. Common types of water system special districts in California include Community Services Districts, Public Utilities Districts, and County Water Districts. California law delineates important differences between these otherwise similar types of governments. For example, in some types of special districts only landowners are eligible to vote for the board of directors. Like cities and county subsidiary districts, special districts have specific requirements for formation, dissolution, and boundary changes. Along with general purpose local governments, special districts are subject to restrictions from Prop 218 and Prop 26 around flexibility in pricing and cannot charge above the cost of service provision to customers.

TABLE 6

Pros and cons of independent special districts

PROS	CONS
» Due to specialized nature, governing board members and staff can focus their attention exclusively or heavily on drinking water service. » Particularly compared to general purpose governments, special districts often have fewer restrictions related to the areas they can serve. » Because special districts have more narrow authorities and functions, annexation into a special district is generally less disruptive than into a city. » Local building/zoning ordinances not applicable for water service–related facilities.	» Difficult and costly to establish and dissolve due to all procedural and study requirements. » By nature of their narrow functions, multiple special districts for different purposes often serve overlapping areas, decentralizing decision-making for different government functions and potentially reducing resident involvement and accountability. » Voting rights tied to citizenship.

MANAGERIAL CONSOLIDATION BRINGS CHANGES FOR SOME AND EFFICIENCIES FOR ALL IN THE TAHOE CITY AREA

In January 2018 the Tahoe City Public Utility District (PUD), an independent special district providing water and wastewater service to unincorporated residents on the North Shore of Lake Tahoe acquired the Timberland Tract Water Company, an IOU. While the Timberland water system was not physically connected into any of Tahoe City PUD's several water distribution systems, the consolidation immediately brought needed repairs to the aging distribution system, improving the quantity and sustainability of local water service. The improvements also included the installation of water meters. To give residents time to adjust to metered water service, the board of directors implemented a 12-month grace period, during which time residents would pay a flat rate and become accustomed to monitoring their household usage. After this period, Timberland residents began paying base and consumption charges like other PUD customers. While physically distinct, at least for the foreseeable future, the consolidation under Tahoe City PUD increases operational and management efficiencies for all the district's customers.

PRIVATE ENTITIES RUNNING WATER SYSTEMS: MOBILE HOME PARK CONSOLIDATIONS

In addition to the five types of water system governance arrangements described in this guide, sometimes water systems are owned and operated by private businesses as one part of their standard operations. For example, mobile home parks operate as many as 13 percent of California water systems.[8] These types of systems are a common candidate for consolidation. A good example of this is the recent consolidation of Castle City Mobile Home Park into Placer County Water Agency (PCWA), a special act district created especially by the state legislature with broad ranging water management and wholesale drinking water authorities. The owners of the mobile home park had historically operated its own surface water treatment plant to service the park's approximately 300 residents. As their infrastructure neared the end of its useful lifespan and system-wide low-pressure challenges grew, management reached out to PCWA to see if they would be interested in consolidating. Funding for the project was obtained through the Proposition 1 water bond and the consolidation was completed in July 2021. Because PCWA was already a large regional district whose service area encompassed the mobile home park, the county LAFCo did not have to change the agency's boundaries. Castle City now benefits from enormously increased economies of scale. In another important benefit to the foothill community, the new system has the authority to provide fire protection.

8 Pierce, G., & Gonzalez, S. R. (2017). Public drinking water system coverage and its discontents: the prevalence and severity of water access problems in California's mobile home parks. Environmental Justice, 10(5), 168-173. https://www.liebertpub.com/doi/10.1089/env.2017.0006

INVESTOR-OWNED UTILITIES

Under California law, investor-owned utilities (IOUs) are regulated private corporations providing water (and other utility) service to the public. IOUs provide water to generate a profit, which, importantly, differentiates them from all other categories presented in this report. The IOU category does not include mobile home parks, which provide water tied to other services (rent) rather than as a good itself, or cooperatively owned nonprofit systems, which provide drinking water at cost to members. In IOUs, shareholders elect a board of directors to oversee business operations. Shareholders own shares in the IOU for investment purposes and are generally not customers themselves. Thus, IOU decision-makers are not elected by customers in the service area. Unlike with general purpose governments or special districts, IOUs have substantial leeway in determining how they will interact with customers and how transparent they wish to be about key decisions or processes. Also, unlike other governance types, all IOUs are subject to regulation concerning rates and service provision by the California Public Utilities Commission (CPUC), but the degree of oversight this entails depends on the size of the population served by the utility.

TABLE 7

Pros and cons of investor-owned utilities

PROS	CONS
» Able to, and in some cases mandated to, provide subsidized rates to eligible low-income customers, unlike local governments restricted by Prop 218 and Prop 26. » An IOU board has the legal obligation to ensure the long-term good of the corporation. » An IOU has the economic incentive to invest in the infrastructure of a system.	» No direct channels for representation for customers. » Board has obligations to shareholders as well as to customers. In some cases, this may lead to maximizing share value or profitability over other considerations. » IOUs do not have to comply with open government and transparency laws (e.g., the Brown Act, bilingual services act), which can reduce public access to information. » IOUs may not be interested in investing in disadvantaged communities with limited potential for profit. » Eligible for state grants/assistance although some limitations apply to protect the public interest integrity of state funds.

NONPROFITS

Nonprofit water providers — including public and mutual benefit corporations, homeowners associations and cooperatives — are exceedingly common in California. Such water systems are organized under a variety of different corporate and tax statuses, but they all have in common that they are privately owned but do not operate for profit. In California, special purpose cooperatives called mutual water companies (MWC) are the most common such system and are specially regulated by state law. In the case of MWCs, shareholders co-own their water system. Shareholder status is typically determined by homeownership within the water system's service area. MWCs and other similar iterations have substantial leeway in determining their own rules for operation within their organizational bylaws, including rules governing the company, such as the composition of the governing board.

JOINT POWERS AUTHORITIES

Joint powers authorities (also Joint powers agencies or JPAs) make up the fifth and final category of California water system governance. JPAs are collaborative governance structures in which two or more public entities create a new governing entity to jointly exercise common powers towards a specific, defined purpose. Eligible entities include not just local governments (cities, counties and special districts) but also state governments, federal governments and federally recognized Indian Tribes. Under California law, MWCs may also participate in JPAs as long as there is at least one public agency involved and the new entity strictly adheres to the requirement that JPAs only exercise powers common to all members. JPAs can take on various forms and functions, since each JPA is uniquely designed by its members. In creating a new legal entity, any debts, liabilities and other obligations related to the functioning of the authority lie with the new entity, not the forming members.

TABLE 8

Pros and cons of nonprofits

PROS	CONS
» Relatively easy to create, amend and dissolve. » Shareholders, including non-U.S. citizens, have a direct say in decision-making through annual shareholder meetings and by electing the governing board.	» Membership or shareholder status is typically tied to homeownership meaning that renters lack formal representation although depending on local bylaws renters may be able to vote as proxies. » Limited regulatory oversight, which can limit intervention opportunities. » Open government and transparency laws do not apply. MWCs are subject to some transparency requirements, though these are less stringent than the Brown Act. » State grant/assistance received may be taxable income.

TABLE 9

Pros and cons of JPAs

PROS	CONS
» Relatively easy to establish, amend and dissolve. » Does not require the consent of an oversight agency although the local LAFCo must be notified. » Highly flexible; the governing body and decision-making procedures of a JPA can be tailored to suit local needs, for example by requiring consensus for certain types of decisions. » Can designate which member agency's governing laws and statutes will apply to the new agency (e.g., purchasing, personnel rules and regulations).	» As umbrella organizations, JPAs may create redundancies in management, administration and governance functions requiring more time and resources to operate. » JPAs may only exercise powers common to all member agencies. » In many cases, JPAs require each member entity to independently weigh in on decisions prior to acting. This can make decision-making slow and arduous. » Members may be able to withdraw at any point depending on the stipulations in the agreement; in some cases, a single member can dissolve the entire authority on their own initiative.

PART II: CONSIDERATIONS IN DECIDING IF AND HOW TO CONSOLIDATE

Precisely because there are so many possibilities for structuring and governing a potential consolidation project, comparisons between two or more alternatives are helpful. This may include a non-consolidation alternative where the current structure and governance for water provision is retained without changes. In this section of the guide, we present nine criteria that can inform this process.

▶ Scope of powers and authorities

As discussed in Part I of this guide, different governing structures can provide distinct services and mediated by distinct powers for service provision. Moreover, communities pursuing consolidation may need or desire specific powers and authorities. As such, those considering consolidation should consider what powers might be needed to successfully implement and manage the consolidation and ensure that the project is designed in a way that can meet these goals. Given the time and effort required to make governance changes (see flexibility and administrative transaction costs section below), it is also wise to anticipate what powers and authorities may be needed in the future. For example, systems consolidating today may wish to add additional member agencies in the future, as happened with the Upper Russian River Water Authority (as described on page 8). Other key powers for consideration include the ability to provide fire protection and the power of eminent domain. You can consult Appendix A for more information about the specific powers and authorities of various governing entities.

▶ Implications for other services/ powers

The local entities that provide water in our communities sometimes serve broader roles or provide other services. When other services (e.g., wastewater, street sweeping, parks, etc.) are governed jointly with water, important implications arise for a consolidation project. For example, in a merger between two previously independent water systems, one of which also provides customers with sewer service, it would be important to either ensure that the governing structure for the consolidated system is statutorily authorized to continue this service, or to arrange for another new or existing entity with this power to assume this responsibility.

Similarly, where a special district or general purpose government is formed or expands into new territory, all of the powers and rules of that entity will apply to the new residents. This may entail significant changes for residents such as being subject to new ordinances, assessments or taxes. The expansion of powers is particularly acute with city annexation, since cities have broad powers and authorities. See below for an example of how annexation considerations differently affected three consolidation projects.

▶ Revenue and cost features

Unique financial features of governance types and consolidation structures are also important to consider. For rates and assessments, important differences exist between privately and publicly owned water systems. All local governments (general purpose governments and special districts) are limited in rate-setting by Proposition 218 to charging only the cost of service. Private systems, on the other hand, generally enjoy more flexibility for rate-setting structures (although IOUs must do so with strict oversight from the CPUC); they are not precluded from offering subsidized or low-income water rates like local governments. In fact, large IOUs are required by the CPUC to provide such a program. As another key difference, publicly owned systems can issue general obligation bonds and levy taxes and assessments — two things that privately owned systems generally cannot do. Private and public water systems also vary in their ability to access public grants and low or no interest public financing. Public water systems can generally access public grants and low or no interest public financing with fewer complications than privately held systems.

Among privately and publicly owned water systems there are also important differences. Some types of local government can set up special improvement districts within their territory that can allow services, rates or assessments to vary within their service area. This can be helpful for issuing debt or funding deferred maintenance in specific areas of a consolidated water system. However, such arrangements can also raise questions about equity among residents and may also impede a consolidation from taking full advantage of increased economies of scale. Among types of privately owned water systems, MWCs can place liens, whereas IOUs cannot.

▶ Technical, Managerial and Financial (TMF) capacity

TMF capacity relates to a system's ability to maintain compliance with water quality and monitoring standards and live up to requirements and best practices for management and financial solvency. Consolidations can improve TMF capacity in many ways, including by increasing a system's customer base (increasing economies of scale by spreading fixed costs among a larger population), helping to recruit and retain qualified operators or other staff, pooling human resources across a larger population, reducing volunteer or staff vacancies and facilitating new treatment or water sources to ensure safe drinking water. Importantly, not all consolidations

TO ANNEX OR NOT TO ANNEX? COMPARING RESIDENT CONCERNS AND DECISIONS ACROSS THREE DIFFERENT CONSOLIDATION PROJECTS

East Porterville — After hundreds of private domestic wells started going dry in the unincorporated community of East Porterville in 2013 and 2014, residents urgently needed to connect into the nearby City of Porterville water system. The design of the consolidation project, however, raised many thorny questions. On the one hand, the City of Porterville was reluctant to provide water outside of their city boundaries. On the other hand, many unincorporated residents were reluctant to annex their homes into the city, which would provide additional city services but also introduce new local ordinances, among other changes. Ultimately, a compromise was brokered using an Extraterritorial Service Agreement (ESA) whereby annexation would not occur imminently, but residents added to the extended city water system would agree to future annexation. This allowed the consolidation to move forward without all residents opting into the city system. Notably, this solution entails tradeoffs with other important considerations, including sustainability and representation; unconnected residents are left vulnerable to groundwater contamination and drought, while connected residents lack the ability to vote for City Council but are subject to their decisions regarding drinking water. It also affected economies of scale, bringing on fewer new customers than originally anticipated with the project.

Delhi — The ongoing consolidation of domestic well owners on the periphery Delhi County Water District in Merced County exemplifies how such considerations may be different depending on the governing entity involved. Well owners were initially reluctant to annex their properties into the Merced County Water District, but after reviewing the responsibilities and functions assigned to county water districts, whose authorities are far more limited than general purpose governments, most residents ultimately decided to support annexation. Like in East Porterville, residents had a choice of whether to abandon their wells and connect to the Delhi water system. But unlike in East Porterville, the entire residential area was annexed into the district as part of the project, which will likely prohibit the construction of any new domestic wells in the area.

Walnut Ranch — For the residents of Walnut Ranch, a water consolidation project presented an important bonus opportunity: the ability to simultaneously address their failing septic systems. The community, a subdivision in Colusa County served by a small water system owned by the investor-owned utility Del Oro, had struggled with water quality and supply issues for years. After one of the main wells collapsed, the system established an emergency intertie to the City of Colusa, and residents began pursuing consolidation. Some residents worried that the proposed project with the city was too expensive and proposed consolidating their water system with a neighboring industrial park instead. Others argued that by total annexation into the city, the area would gain access to the city sewer system. While less expensive in the short term, the industrial park consolidation would only defer future wastewater expenses. In the end, 92 percent of the community voted in favor of a county property assessment to fund the needed annexation study leading to the successful annexation of the community into the city in 2014.

will do so equally, and some alternatives may also present challenges. For example, complex consolidation projects with large upfront capital costs or complex financing, as well as those that employ improvement districts or other mechanisms to differentially charge customers, may also increase administrative complexity and staffing requirements. For exactly this reason, all consolidation alternatives should be carefully vetted to ensure that a resulting consolidated entity meets the State Water Board's TMF requirements, and that long-term sustainability is carefully fostered.

▶ Affordability

Affordability, defined as the ability for a household to pay for the basic water services without unreasonable hardship, is a central tenet of California's Human Right to Water (AB 685) and an important consideration in all consolidation projects. Increasing the number of customers served by a water system can result in everyone paying less for the same, or even better, service. Nonetheless, consolidation projects can result in significant capital investments on much-needed new infrastructure (e.g., physical interties, treatment facilities) or on previously deferred maintenance that, depending on the availability of state or federal funding and applicant eligibility to receive it, can also cause rates to go up in the short-term. Thus, while increasing economies of scale is a motivating factor that often drives consolidations, there can be some nuances in how this may affect affordability. As another example, an umbrella organization might facilitate new or improved shared infrastructure at a lower per-customer cost while also increasing administrative overhead due to the need to operate an additional district. Or, in the case of an acquisition via annexation into a city or special district, water rates may decrease but new taxes or assessments may still cause household expenses to rise.

Further, rate impacts may vary among customers. For example, in IOU acquisitions, low-income households may become eligible for special subsidies to offset potential increases. Thus, the rate implications of different consolidation alternatives and for different subsets of served residents need to be carefully analyzed including across income groups. In doing so, local stakeholders should be careful to distinguish between which additional costs from a consolidation project are solely related to the consolidation (e.g., engineering and planning studies, physical system intertie) and which are likely inevitable even if the consolidation did not occur (e.g., addressing deferred maintenance needs) and compare these costs to those expected in the absence of the consolidation (e.g., infrastructure replacement, treatment costs).

▶ Representation and transparency

Depending on its design, a consolidation project may increase, reduce, or have no effect on how some or all residents are represented in decision-making. Where a consolidation involves creating a JPA, local stakeholders choose the decision-making structure (see the example of The Easton Community Water System Authority below). In all other cases, however, representation will depend on the type of governing entity in charge of the consolidated system(s), making it essential to understand the options available. Among the possibilities summarized in Part One of this guide and described in detail in Appendix A, registered voters within the boundaries of cities and most independent special districts directly elect the governing board in charge of the system. In contrast, cooperatives and select independent special districts like California water districts often tie voting eligibility to homeownership. Among IOUs, leadership is elected by shareholders, and customers enjoy few direct channels to governing bodies. For these reasons, who will and will not be represented in the consolidated entity needs to be carefully considered. For

example, the formation of a MWC to serve two nearby communities, one of which has high home ownership rates and the other has high renter rates, will likely result in asymmetric representation of the two communities in decision-making spaces. This could potentially foster future conflict or inequities.

Consolidation structure also heavily influences representation. In some cases, acquisitions may not result in direct representation for the residents of the consolidated system(s) in local water decision-making. In East Porterville, residents chose an ESA in lieu of annexation; their water system is governed by residents of the City of Porterville. Walnut Ranch residents had a distinctly different outcome when the City of Colusa formally annexed their territory, ensuring equal rights and responsibilities as all other city residents (see examples on page 19).

These same factors influence the transparency of the consolidated system. Publicly owned entities have clear requirements for public meetings, transparency and language access, among other measures, to promote transparency (see Appendix A). Anyone can exercise these rights, whether they live inside or outside of a system's political boundary. MWCs, on the other hand, are only obligated to disclose financial information to shareholders, customers or local elected officials upon request. IOUs are subject to specific financial disclosure requirements to the CPUC, and if they are publicly traded, some financial information may be available through federal agencies. However, these requirements fall well short of financial disclosures for local governments mandated by California state law. Both IOUs and MWCs are required to have annual board of director meetings that are open to shareholders, but that may be closed to the general public. MWCs must also permit customers or local elected officials to attend with 24 hour advance written notice.

▶ Flexibility and administrative transaction costs

As mentioned in Part I of this guide, different governing structures have different requirements and procedures that must be followed when making changes to that structure, whether those changes adjust the governing board, change service boundaries, dissolve the entity entirely or create a new entity. These requirements are particularly important because they determine what is possible — and often, what is desirable.

For example, consolidation projects involving special districts and general purpose governments should be prepared to work closely with their county's local agency formation commission (LAFCo), which governs the creation of new public districts as well as boundary or service extensions for all such districts. LAFCos must follow all relevant state laws in approving boundary and service changes, which can limit the options available for implementing consolidations. As the decision-makers charged with orderly local development, local LAFCos' priorities may also need to be addressed for a proposal to be successful. Applicable LAFCo policies vary by county. Some LAFCos may formally or informally prohibit certain structures, such as acquisitions via Extraterritorial Service Agreements (ESA).

In other counties, an ESA may be simpler to implement than an annexation. Instead of the local LAFCo, consolidations involving IOUs require coordination with the CPUC. Both processes can be slow and bureaucratic and can involve mandatory fees, although fee waivers are often available in specific circumstances. For these reasons, a forward outlook is key when designing a consolidation to avoid the need to make additional changes later.

THE EASTON COMMUNITY WATER SYSTEM AUTHORITY TACKLES LONG STANDING ISSUES IN A PRIVATE WELL COMMUNITY

Washington Union High School is located in the unincorporated community of Easton in Fresno County. Starting in 2009, the SWRCB issued the school a series of compliance orders for exceedances of Maximum Contaminant Levels (MCLs) for dibromochloropropane (DBCP), Gross Alpha and 1,2,3-Trichloropropane (1,2,3-TCP). Ultimately, a planning study determined that consolidation with the nearby Washington Colony Elementary School was the most beneficial long-term solution. Because the two school systems were owned and operated by two separate school districts, the schools formed the Easton Community Water System Authority with a Joint Powers Agreement in 2015. The new umbrella organization managed both the construction project and the resulting shared system, which was completed in 2019.

The JPA established that a five-member board would govern the new authority. The respective school districts would each select two members, and the resulting four members would select an Easton community resident as the fifth. The flexible nature of the JPA structure provided the ability to include a representative from Easton, even though the community (where residents are served by private domestic wells) lacked a local public agency to formally represent it as a signatory. Residents in Easton have long been negatively impacted by poor water quality and, more recently, drought. By including a resident on the authority board from the beginning, the Easton Community Water System Authority has been able to look beyond finding a long-term solution for the high school and make progress towards a larger goal of advancing a community-wide water system serving residents and business as well.

▶ Sustainability and climate resilience

Any consolidation approach will affect future operations and service delivery. Ideally, a consolidation project will increase long-term sustainability and resilience under climate change. This can be particularly important for rural communities, which are more likely to have small, stand-alone water systems and are therefore at higher risk of related impacts, such as drought. Such sustainability can stem from larger financial reserves related to increased financial capacity, which in turn can allow for greater investment in infrastructure improvements and increased savings to handle planned and unplanned maintenance, repairs, and replacements. Increased sustainability and resilience can also arise from adding new water sources and redundant infrastructure (e.g., additional wells, storage tanks). Not all consolidations will have this effect, however. Depending on the specific arrangement, managerial consolidation via umbrella organization where pre-existing water systems retain ownership and responsibility for their water source may not increase the resilience of their systems to drought. As the climate crisis continues to affect local water resources and increase the frequency and intensity of shock events like droughts and wildfires, local stakeholders should consider how a prospective consolidation project can address not just current challenges, but future ones as well.

▶ Access to safe, reliable drinking water

Across California, low-income communities, communities of color, rural communities and

TWO COMMUNITIES FORM A NEW DISTRICT AND TAKE CONTROL OF THEIR WATER SYSTEMS

The unincorporated communities of Yettem and Seville in Tulare County know a lot about the challenges facing small water systems. Tulare County has owned and operated the Yettem water system as a county service area since it was built in 1995. For most of that time, the system struggled to blend water from its two wells to maintain compliance with nitrate standards. Meanwhile, residents experienced high monthly costs, a consequence of the system serving only 69 service connections. The Seville system, in turn, was turned over to the county as a court-appointed receiver in 2009 after the system fell into serious disrepair under private ownership. On top of nitrate issues, the system's crumbling infrastructure has led to frequent water outages, foreclosed opportunities for new construction and necessitated strict emergency conservation mandates, including regular outdoor watering prohibitions. To remedy these issues, Tulare County applied for millions in state grant funding to repair and combine the two systems. Once completed, the physical intertie will increase economies of scale, help address unaffordable rates, address Yettem's ongoing nitrate issues, augment Seville's water supply and make both communities more resilient to future droughts.

To proactively and sustainability manage their new system, residents also wanted to have more of a say than is afforded by the county service area, which is a subsidiary district governed by the board of supervisors. Residents worked closely with a Technical Assistance provider, the county and the Tulare County LAFCo to propose the formation of a new community services district (CSD), a type of independent special district, covering both communities. After conditional approval by the Tulare County LAFCo in May 2018, residents of the proposed new district had to vote on the proposal for it to take effect. The measure passed overwhelmingly in November 2018. Soon thereafter the district was up and running, and officially assumed ownership of the two water systems from the County in June 2020 marking the first time either system had been managed directly by the communities they serve. The volunteer five-member board of the CSD is now overseeing the final phases of the construction project and looking forward to supporting further consolidation efforts in the region.

indigenous communities disproportionately lack access to safe and affordable drinking water. Consolidation is a uniquely positioned tool for addressing these ongoing injustices, which arise from many factors including residential segregation, racialized land use planning and withheld public investment. However, leveraging consolidations to this effect requires intentionally prioritizing safe, affordable, sustainable drinking water access. In practice this may look like designing and selecting consolidation alternatives that increase access (e.g., by providing new or improved water sources, installing treatment, replacing deficient infrastructure), TMF capacity and sustainability and resilience. Advancing drinking water equity through consolidation also requires ensuring that all such communities that can feasibly benefit from a consolidation are given an opportunity to join (see, for example, the Easton Community Water System Authority detailed on page 22). California's State Water Board has designed a drinking water system outreach tool specifically for this purpose (see tool kit).

PRIORITIZING SAFE DRINKING WATER ACCESS: THE MANDATORY CONSOLIDATION OF PRATT MUTUAL WATER COMPANY WITH THE CITY OF TULARE

The case of Matheny Tract provides an important example of how historical legacies and ongoing discrimination in housing and land-use planning directly inform water access, and how consolidation can be part of the solution. In 2015 California passed SB 88, which allows the SWRCB to mandate consolidations in cases where a disadvantaged community lacks access to safe drinking water. The SWRCB used these powers for the first time to consolidate Pratt Mutual Water Company (MWC) with the City of Tulare. Pratt MWC served the community of Matheny Tract, a low-income, primarily Latino residential population of approximately 1,200 people immediately adjacent to, but outside of, Tulare city limits. The Pratt MWC water system infrastructure was deteriorating. When the system began exceeding safe arsenic levels in 2010, board members and residents used a state grant to begin working with local Technical Assistance providers to pursue consolidation with the city. As part of an ongoing effort to annex an industrial park directly north of Matheny Tract, the city initially agreed to connect the Pratt MWC system to the city but later changed its mind when city leadership changed. This led to litigation involving not just Pratt MWC and the city, but also Tulare County and a resident group, the Matheny Tract Committee. After providing the parties with six months to negotiate a solution on their own (as required by SB 88), the SWRCB stepped in to mandate consolidation. In June 2016, more than six years after the system had gone out of compliance, Matheny Tract was finally connected to the city water system in an acquisition-style consolidation via an Extraterritorial Service Agreement, bringing safe, affordable drinking water to Matheny Tract residents.

LOOKING FORWARD

As described throughout this guide, consolidation can be pursued in many ways. While the potential benefits and reasons for consolidating may be similar across the different approaches, each also offers advantages and disadvantages as well as potential tradeoffs. These differences merit careful consideration and discussion. Depending on the priorities of local stakeholders, a different combination of structure and governance may be desirable. For example, if the motivating goal is to obtain a new, quality water source for residents without safe water, an umbrella organization approach might be effective, whereas if the motivating factor for consolidation is to address a shortage of staff and board members, that same approach is likely infeasible. Nonetheless, rather than exclusively focusing on one or a few top priorities, a good consolidation project will also seek to maximize potential benefits for the community and region to the extent possible, now and in the future. The nine considerations presented in this guide provide a framework for both prioritizing and maximizing benefits when supplemented with community specific data and documented critical needs.

Many additional resources are currently under development to support local stakeholders in this work. The US Environmental Protection Agency has developed new water system partnership resources and toolkits (see also the Further Reading and Resources section below) and a forthcoming tool will help California stakeholders estimate costs for physical consolidation projects (see tool kit). Still, additional resources are needed. Non-consolidation collaborative solutions, such as water system partnerships, offer many similar benefits, but many water systems lack an understanding of these options. As such, California would benefit from additional resources on this topic like those offered by the University of North Carolina (see adjacent column). Resources are also needed to specifically understand and support consolidation among Tribal water systems, as well as to facilitate mutually desirable collaborations between Tribal and non-Tribal water systems.

Finally, consolidation is not always a feasible option. For example, the 2021 Drinking Water Needs Assessment estimated that physical consolidation may only be feasible for approximately 40 percent of the studied struggling and at-risk systems. In other cases, neighboring systems may be unwilling to collaborate. Beyond consolidations and partnerships, additional *in situ* solutions and support including Technical Assistance, new technologies and innovative management approaches continue to be necessary to advance safe, sustainable local water access for all Californians.

FURTHER READING AND RESOURCES

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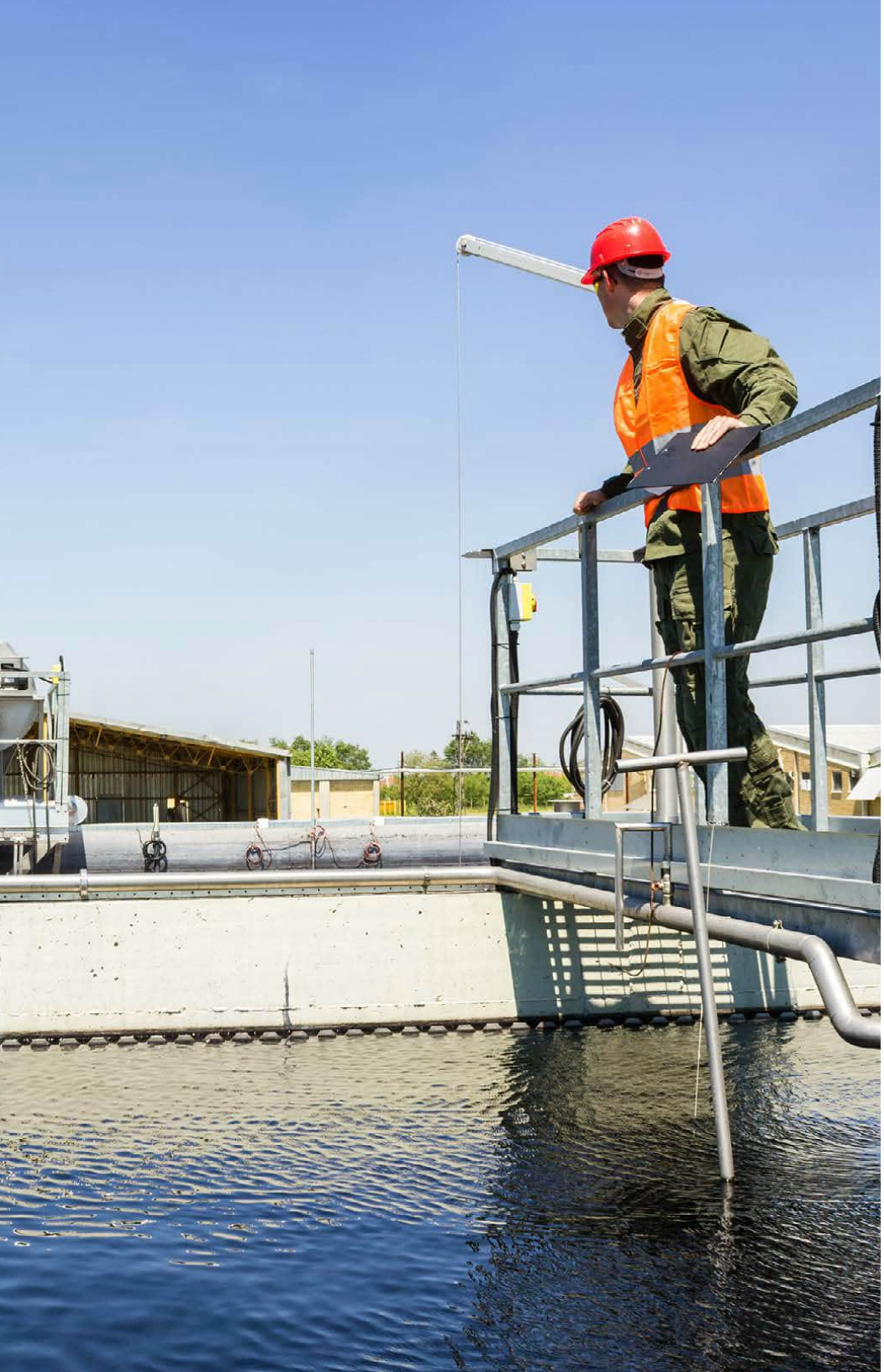

APPENDIX A. WATER SYSTEM ENTITY STATUTORY REVIEW

The following tables provide an overview of key attributes and regulations of twenty different drinking water providing entities found in California and regulated under California law relevant to consolidations. Systems not regulated by the state of California (e.g., Tribal water systems) and ancillary systems without a clear governing body (e.g., state, federal and private facilities) are not included. The tables are not comprehensive and are not legal advice. Blank cells do not necessarily mean that there are no applicable stipulations on that subject but that rather we found no explicit requirements in our review of select California Code. Moreover, in practice, water providers may operate in a manner that deviates from the pertinent laws. All the information in these tables is derived from the identified enabling act (see pages 1 and 2) unless otherwise noted in a footnote in the column header or individual cell. In the former case the alternative/additional source applies for the entire column.

TABLE A1

General Information

Water Provider	Governance Category	Description	Services Authorized to Provide	Enabling Act
City	General Purpose Government	Voluntarily formed general purpose local government providing essential service functions.	A broad range of services that promote the public good within city limits	Cal. Government Code §§ 34000-45346; Cal. Const., art. XI.
County Service Area	General Purpose Government	A county provides direct water service as if it were a city, usually to unincorporated areas.	Public facilities or services that promotes public peace, health, safety, or welfare.	Cal. Government Code §§ 25210-25217.4
County Waterworks District	General Purpose Government	A subdivision of a county created to finance either the construction or operation of a water utility.	Supply or sell water, operate sewage treatment plants, purify water, desalinate water, construct dams.	Cal. Water Code §§ 55000-55991
Maintenance District	General Purpose Government	A subdivision of a county created to maintain improvements, typically street lighting.	Cover costs, repairs, replacement, or fuel for an improvement, including sewers.	Cal. Streets & Highways Code §§ 5820-5856
California Water District	Independent Special District	A special purpose government agency created to furnish water for beneficial uses.	Produce, store, transmit, and distribute water for irrigation, industrial, domestic, or residential use.	Cal. Water Code §§ 34000-38501
Community Services District	Independent Special District	A special purpose government agency created uniquely to provide services over a designated area.	Authorized to perform 32 specific services which promote public peace, health, safety, or welfare, including providing drinking water.	Cal. Government Code §§ 61000 - 61250
County Water District	Independent Special District	A special purpose government created within a single county related to either the direct provider of water to consumers or as a coordinator of water rights.	Furnish or store water, operate water works, sell water, set water rates. May also provide sanitation service or generate hydroelectric power.	Cal. Water Code §§ 30000-33901
Irrigation District	Independent Special District	A special purpose government agency created to furnish water for beneficial uses.	Furnish water, put water to beneficial use, provide fire protection, and salvage or recycle water. May also engage in wastewater service, hydroelectric generation, and flood control.	Cal. Water Code §§ 20500-29978
Municipal Utility District	Independent Special District	A special purpose government created to combine multiple water utilities into a single utility.	Supply residents with water, light, power, heat, communication services, transportation, solid waste disposal, or wastewater treatment.	Cal. Public Utilities Code §§ 11501-14403.5
Municipal Water District	Independent Special District	A special purpose government agency created to provide water aimed at an urbanized area.	Acquire, control, distribute, store, spread, treat, purify, recycle, or recapture any water including stormwater and sewage. May also generate hydroelectric power, engage in wastewater service, and perform fire protection.	Cal. Water Code §§ 71000-73001

Water Provider	Governance Category	Description	Services Authorized to Provide	Enabling Act
Public Utility District	Independent Special District	A special purpose government agency created to establish or operate a revenue-producing utility for unincorporated areas.	Provide residents with power, heat, transportation, sewage service, solid waste service, or water.	Cal. Public Utilities Code §§ 15501-18055
Resource Conservation District	Independent Special District	A special purpose government created for the control of runoff, the prevention or control of soil erosion, the development and distribution of water, and the improvement of land capabilities.	Control run-off, prevent erosion, manage distribution of water.	Cal. Public Resources Code §§ 9151-9155
Sanitary District	Independent Special District	A special purpose government created to treat sewer water, solid waste, wastewater, stormwater, or engage in water recycling.	Collect and treat sewage, stormwater, and wastewater, and recycle water. Drinking water only with express permission.	Cal. Health and Safety Code §§ 6400-6982
Water Conservation District	Independent Special District	A special purpose government created to construct and maintain water conservation infrastructure.	Survey water availability, conserve water, construct dams, protect from floods.	Cal. Water Code §§ 74000-76501
Special Act District	Independent Special District	A special purpose government agency created by the California Legislature.	Varies by specific district, according to enabling act	Varies by specific district
Joint Powers Authority	Joint Powers Authority	Two or more governmental agencies, jointly exercise their authority towards a specific purpose, creating a specialized governing body representative of members.	Varies by specific entity	Cal. Government Code §§ 6500-6536
Investor-Owned Utility	Investor-Owned Utility	A for-profit corporation, often but not always publicly traded, where shareholders are investors.	Public commodities such as water, sewer, electricity as described in specific charter	Cal. Public Utilities Code §§ 2701-2715
Mutual Water Company	Private Non-Profit cooperative	A corporation or association organized to deliver water to stockholders and members at cost.	Provide water to landowners through a co-operative.	Cal. Public Utilities Code §§ 2725-2729
Homeowners' Association	Private Non-profit cooperative	Private association of homeowners in a subdivision or planned community that oversee management including sometimes services	Varies by specific association	Cal. Civil Code section §§ 4000-6150
Mobile Home Park	Private, varies	Tract of land where two or more lots are currently or were previously rented/leased to accommodate manufactured homes, mobile homes, or recreational vehicles.	--	Cal. Health and Safety Code §§ 18200-18700;

Note: Cells containing "--" have no information available.

TABLE A2

Powers and Authorities

Type of Water Provider	Power of Eminent Domain	Ability to Compel Service Connection	Obligation to Provide Service	Ability to Establish Improvement Districts	Ability to Provide Fire Protection
City	Yes	Yes, though limited to $10/acre	--	--	--
County Service Area	Yes	Yes	Able to establish zones of differentiated service	Able to establish zones of differential service which have distinct assessments	Only if authorized by LAFCO
County Waterworks District	--	--	--	Able to establish zones of differential service which have distinct assessments	Yes
Maintenance District	--	--	--	Able to establish zones of differential service which have distinct assessments	--
California Water District	Yes	Yes	No	Yes	No (with specific exceptions)
Community Services District	Yes	--	No	Able to establish zones of differential service which have distinct assessments	Only if authorized by LAFCO
County Water District	Yes	Yes	No	Yes	Yes
Irrigation District	Yes	Yes	--	Yes	Yes
Municipal Utility District	Yes	Yes, but only for irrigation	No. If territory to be excluded lies within an incorporated city, the city can also propose exclusion.	--	--
Municipal Water District	--	Yes, but capped at $10/acre	No, but if a portion of an incorporated city is excluded the district must exclude the entire city	Yes	Yes

Type of Water Provider	Power of Eminent Domain	Ability to Compel Service Connection	Obligation to Provide Service	Ability to Establish Improvement Districts	Ability to Provide Fire Protection
Public Utility District	Yes	Yes, but only for water and with a $10/acre cap	Able to exclude any territory which the district does not benefit	No (except Lake Tahoe District)	Yes
Resource Conservation District	--	--	--	--	--
Sanitary District	--	--	--	Yes	--
Water Conservation District	--	--	No	Yes	--
Special Act District	Variable	Variable	Variable	Variable	Variable
Joint Powers Authority	Depends on membership	--	--	--	Yes
Investor-Owned Utility	No	--	--	--	--
Mutual Water Company	Yes	--	--	--	--
Homeowners' Association	No	No	No	--	--
Mobile Home Park	No	--	--	--	Local city, county, or district can supersede mobile home park's ability to provide fire protection if available water is insufficient to supply hydrants

Note: Cells containing "--" have no information available.

TABLE A3

Provisions for Formation, Alteration, Dissolution, or Collaboration

Type of Water Provider	Means of Initiating Formation	Provisions for Mergers	Provisions for Service Area Boundary Changes[1]	Provisions for Dissolution or Sale of Assets	Stipulations for Collaboration with Other Entities
City	Incorporating a new city initiated by resolution of a public agency, by petition of registered voters or by petition of landowners requires. LAFCO and voter approval needed. Existing cities can create water utility by city council resolution with public hearing.	--	Requires a city council resolution. LAFCo permission needed for changes and out of boundary service. May have additional limitations built into their enabling acts.	Can sell all or any portion of system to a municipal water district by 4/5 majority city council vote.	Can easily collaborate with other cities, with costs to be pro-rated by water use. City council resolution required for all participating cities.
County Service Area	Either by petition of 25% of registered voters, or by landholders of 25% of land, or by county board of supervisors motion. Any incorporated area must also have separate city council approval. Board of supervisors can veto. Ballot measure with majority prevailing, or, if every landowner agrees in writing, passes automatically.	--	LAFCo permission needed for changes and out of boundary service.	Requires LAFCO permission to cease providing water if another public agency is picking up service.	Any collaboration with other entities should be through a Joint Powers Agreement.
County Waterworks District	Petition by 25% of landowners, including at least 15% of resident landowners. Landowners must specify services they are seeking to provide.	--	LAFCo permission needed for changes and out of boundary service. Possible to add any unincorporated or incorporated area into district.	--	--
Maintenance District	By county board of supervisors motion.	--	Can extend with Board of Supervisors vote. If area is within incorporated city, city governing board must also consent. LAFCo permission needed for changes and out of boundary service.	--	Authorized to collaborate with other entities.

1 Cal. Government Code §§ 56133

Type of Water Provider	Means of Initiating Formation	Provisions for Mergers	Provisions for Service Area Boundary Changes[1]	Provisions for Dissolution or Sale of Assets	Stipulations for Collaboration with Other Entities
California Water District	Petition by landowners of a majority of the proposed territory. Ballot measure with simple majority of voters prevailing.	--	LAFCo permission needed for changes and out of boundary service.	--	Can contract with other agencies or private enterprise to fulfill its mission.
Community Services District	Initiated by either 25% of registered voters petition, or the relevant city council or county board of supervisors by resolution and hearing. Ballot measure, with simple majority prevailing.	--	LAFCo permission needed for changes and out of boundary service.	Requires LAFCo permission to cease providing water if another public agency is picking up service.	--
County Water District	10% of registered voters in proposed district petition. Must include at least 10% of voters in each incorporated area within proposed district. County board of supervisors holds hearing and may dismiss petition or order ballot measure. Simple majority prevails but must include a majority in each incorporated area within the district in addition to overall majority.	Unless merger into public agency is approved by the vote of the electorate, all funds derived from former district limited to use on that former district until debts paid in full or former electorate authorize other expenditures.	LAFCo permission needed for changes and out of boundary service. Any territory can be annexed, need not be contiguous.[2] Any included tract of land not substantially benefiting from district may be excluded.[3]	--	District may cooperate with the Federal government under the Federal Reclamation Act for specific purposes. Can be included in Municipal Utility Districts without dissolution.
Irrigation District	Petition by either a majority of landowners, or by 500 petitioners who are either registered voters or who collectively own 20% of the land measured by value. Board of supervisors holds two hearings. Ballot measure with simple majority of registered voters prevailing.	LAFCO can merge two irrigation districts into a single district.	LAFCo permission needed for changes and out of boundary service.	--	Can collaborate with other agencies, but only to provide water for human consumption and only through a collaboration including the federal government.

2 Cal. Water Code §§ 32400

3 Cal. Water Code §§ 32200

Type of Water Provider	Means of Initiating Formation	Provisions for Mergers	Provisions for Service Area Boundary Changes[1]	Provisions for Dissolution or Sale of Assets	Stipulations for Collaboration with Other Entities
Municipal Utility District	Petition by 10% of registered voters, or motions by 50% of the governing bodies within the proposed district. Ballot measure, requires ⅔ of votes for approval.	Can annex any other district within the Municipal Utility District's boundaries with the approval of the governing body of the annexed district.	LAFCo permission needed for changes and out of boundary service.	--	Authorized to sell surpluses or provide excess capacity to other agencies.
Municipal Water District	Petition by either 10% of registered voters in the proposed district, including at least 12% of registered voters or 10% or active voters in any incorporated area within the proposed district, or petition by 50% of the proposed district regardless of jurisdictional lines. Board of supervisors ratifies petition.	LAFCO has explicit power to annex territory away from or rearrange Municipal Water Districts.	LAFCo permission needed for changes and out of boundary service. If a Municipal Water District seeks to exclude a portion of an incorporated city, they must exclude the entire incorporated city.	--	Can contract with other agencies or private enterprise to fulfill its mission.
Public Utility District	Only possible in unincorporated areas. 15% of registered voters petition. Ballot measure with simple majority.	--	LAFCo permission needed for changes and out of boundary service. Annexed territory must be unincorporated. If non-contiguous, some additional considerations apply.	--	Can collaborate, but only for water or wastewater treatment.
Resource Conservation District	Petition by 10% of registered voters, or board of supervisors motion, or if within an incorporated area city council motion. Ballot measure with simple majority prevailing.	--	LAFCo permission needed for changes and out of boundary service.	--	Authorized to contract services to other entities.
Sanitary District	Petition by 25% of landowners in an area. Board of supervisors hearing. Simple majority of voters prevails.	A county board of supervisors can merge a sanitary district into a County Sanitation District with a simple board motion.	LAFCo permission needed for changes and out of boundary service. Any type of territory can be annexed.	--	Authorized to contract services to other entities.

Type of Water Provider	Means of Initiating Formation	Provisions for Mergers	Provisions for Service Area Boundary Changes[1]	Provisions for Dissolution or Sale of Assets	Stipulations for Collaboration with Other Entities
Water Conservation District	Petition of 500 registered voters, or 20% of registered voters, or by county board of supervisors motion. Board of supervisors hearing. Election with simple majority prevailing.	Governing board can initiate a merger, or 500 registered voters living in the district can propose a merger.	LAFCo permission needed for changes and out of boundary service.	10% of registered voters or landowners of 50% of covered land can petition for dissolution. Board of supervisors is required to approve ballot measure. 60% of registered voters must vote to dissolve.	Authorized to collaborate with other entities.
Special Act District	By act of the California Legislature.	--	Requires amendments to authorizing legislation via state legislature.	--	--
Joint Powers Authority	All participating entity governing bodies authorize exercise of joint powers by executing the agreement. Must notify California Secretary of State.	Adding a new member to a JPA simply requires the consent of all member parties and the prospective additional party.	Boundaries determined by JPA membership. Requires amending JPA to add members.	Terms of dissolution must be included in original joint powers agreement.	Collaborative by nature, generally can add parties
Investor-Owned Utility	Must apply to CPUC, including business plan, environmental impact assessment, financial conditions, owner profiles, purchase price, and any other information CPUC requires.	CPUC must approve transfer or purchase of over $5 million, even if to a public entity.	CPUC authorization needed for service area extensions	CPUC must approve transfer or purchase of over $5 million, even if to a public entity.	--
Mutual Water Company	Incorporated locally, must file paperwork with Secretary of State and LAFCo.	--	--	LAFCo approval needed for annexation into city or special district.[4]	--
Homeowners' Association	--	--	--	--	--
Mobile Home Park	--	--	--	--	--

Note: Cells containing "--" have no information available.

4 Cal. Government Code § 56430

TABLE A4

Provisions for Raising Revenue

Type of Water Provider	Rate Setting Limitation	Power to Levy Taxes or Assessments	Power to Place Liens	Power to issue General Obligation Bonds	Eligible for State Grants/Assistance for consolidation projects
City	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	Yes	Yes	Yes, though charter cities may have stipulations which conflict with state requirements creating a barrier to funding.
County Service Area	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	--	Yes	Yes, though charter counties may have stipulations which conflict with state requirements
County Waterworks District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	--	Yes	Yes, though charter counties may have stipulations which conflict with state requirements
Maintenance District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	--	Yes	Yes, though charter counties may have stipulations which conflict with state requirements
California Water District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	--	Yes	Yes
Community Services District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	Yes	Yes	Yes
County Water District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	Yes	Yes	Yes
Irrigation District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	--	Yes	Yes
Municipal Utility District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	Yes	Yes	Yes
Municipal Water District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	Yes	Yes	Yes

Type of Water Provider	Rate Setting Limitation	Power to Levy Taxes or Assessments	Power to Place Liens	Power to issue General Obligation Bonds	Eligible for State Grants/Assistance for consolidation projects
Public Utility District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	Yes	Yes	Yes
Resource Conservation District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	--	Yes	Yes
Sanitary District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	--	Yes	Yes
Water Conservation District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	--	Yes	Yes
Special Act District	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes in compliance with Prop 26	--	Yes	Yes
Joint Powers Authority	Rates must be proportional to cost of service and cannot be used for other purposes (Prop 218)	Yes if member agencies have this power	--	Yes, if JPA establishes a separate entity with this specified power	Yes, though if some members are charter cities or counties terms of charter might conflict with state requirement
Investor-Owned Utility	Rates and rate changes must be approved by CPUC.	No	--	No	Yes, with some limitations to preserve the public interest integrity of state funds.
Mutual Water Company	Water must be delivered to shareholders at cost	Yes, may levy assessments against shares to shareholders	If stipulated in articles of incorporation or bylaws[5]	No	Yes. Financial assistance may be taxable.
Homeowners' Association	--	--	--	No	Yes. Financial assistance may be taxable.
Mobile Home Park	N/A - Typically included in rent	No	--	No	Yes. Financial assistance may be taxable.

Note: Cells containing "--" have no information available.

5 Corporations Code § 14304

TABLE A5

Representation and Transparency

Type of Water Provider	Governing Body	Eligibility to Serve on Governing Board	Eligibility to Vote for Board Members	Board Meeting Requirements	Board Training Requirement[6]	Subject to Public Records Act?	Subject to Bilingual Services Act?
City	City council, though can delegate to commissioners by charter	--	Registered voter	Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
County Service Area	County board of supervisors. May appoint an advisory committee, but BOS ultimately governs.	--	Registered voter	Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
County Waterworks District	County board of supervisors, or if a subsidiary of an incorporated city, the city council	--	Registered voter	Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
Maintenance District	County board of supervisors	--	Registered voter	Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
California Water District	5 member directly elected board	Must be either a landowner, or a designee of a landowner	Landowners pro-rated by land value. If district becomes majority residential, residents may petition for direct elections with simple majority prevailing.	Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
Community Services District	5 member directly elected board, at-large or by division	Must be a registered voter in the district	Registered voter	Must meet at least every three months. Subject to Brown Act.	2-hour ethics training every 2 years and district shall provide necessary training to board members.	Yes	Yes

6 Cal. Government Code §§53234-53235.5.

Type of Water Provider	Governing Body	Eligibility to Serve on Governing Board	Eligibility to Vote for Board Members	Board Meeting Requirements	Board Training Requirement[6]	Subject to Public Records Act?	Subject to Bilingual Services Act?
County Water District	5 member directly elected board	Must be a registered voter in the district	Registered voter	Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
Irrigation District	5 member directly elected board by division	Must be a registered voter and landowner in the district	Registered voter, though some districts authorized to further restrict to landowners	Must meet first Tuesday of each month. Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
Municipal Utility District	5 member directly elected board by wards.	Must be a registered voter in the district	Registered voter	--	2-hour ethics training every 2 years	Yes	Yes
Municipal Water District	5 member directly elected board	Must be a registered voter in the district	Registered voter	Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
Public Utility District	Board of an odd number by division of approximately 5000 residents. Default of 3	Must be a registered voter in the district	Registered voter	Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
Resource Conservation District	5, 7, or 9 member board either directly elected or appointed by board of supervisors or, if wholly within an incorporated city, by city council	Must be a registered voter in the district	Registered voter	--	2-hour ethics training every 2 years	Yes	Yes
Sanitary District	5 member directly elected board	Must be a registered voter in the district	Registered voter	Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes
Water Conservation District	3, 5, or 7 member directly elected board by division.	Must be a registered voter in the district	Registered voter	Must meet first Tuesday in March, June, September and December. Subject to Brown Act.	2-hour ethics training every 2 years	Yes	Yes

Type of Water Provider	Governing Body	Eligibility to Serve on Governing Board	Eligibility to Vote for Board Members	Board Meeting Requirements	Board Training Requirement[6]	Subject to Public Records Act?	Subject to Bilingual Services Act?
Special Act District	Variable	Variable	Variable	Variable	2-hour ethics training every 2 years	Yes	Yes
Joint Powers Authority	Joint powers agreement will spell out terms of governance. May cross-over with other elected board such as city councils.	Determined by joint power agreement	Determined by joint power agreement	Subject to Brown Act.	None	Yes	Yes
Investor-Owned Utility	Governed by US corporation codes	--	Shareholders, i.e., investors	May be closed to general public.	--	No	No
Mutual Water Company	Varies, established in MWC by-laws	Shareholders i.e., property owners	Shareholders i.e., property owners	Four-day notice required. Shareholders/tenants/ local electeds must be allowed to attend with 24 hour written notice. May be closed to general public.[7]	2-hour ethics training every 6 years[8]	No	No
Homeowners' Association	--	--	--	--	--	No	No
Mobile Home Park	N/A	N/A	N/A	N/A	N/A	No	No

Note: Cells containing "--" have no information available.

7 Corporations Code §§ 14305-14307

8 Health and Safety Code § 116755

UCLA Luskin Center for Innovation
innovation.luskin.ucla.edu

Mandatory Consolidation: Community and Program Info

Overview

California's Division of Drinking Water has encouraged and supported voluntary consolidations of public water systems for many years, with an emphasis on small, disadvantaged communities. The technical, managerial, and financial capacity required to operate a water system that can source, treat, and distribute safe drinking water is high. When a public water system in California fails to, or is at-risk of failing to consistently provide safe drinking water, the State Water Board has the authority to mandate certain water systems to consolidate with, or receive and extension of service from, another public water system (see Senate Bill 88 and Senate Bill 403, sections 116680-116684 of the California Health and Safety Code). A mandatory consolidation can be physical or managerial. Mandatory extension of service to domestic wells is authorized only when disadvantaged community is substantially reliant on domestic wells that consistently fail to provide an adequate supply of safe drinking water, and when agreed to by the well owner.

The changes to the Health and Safety Code give the Division of Drinking Water authority to mandate such consolidations or extension of service following a series of specific actions. The State Water Board's Division of Drinking Water will issue letters to water systems to consolidate with, or seek an extension of service, from a public water system. The recipients of such letters have up to six months from the date the letter is issued to voluntarily consolidate with, or receive extension of service from, a public water system. All letters to public water systems, consolidation orders, petitions, responses, and administrative indices are available to the public upon request.

- SAFER Program
- Human Right to Water

Questions

Use this map directory to contact a SAFER engineer in your community.

Consolidation Projects

Completed Projects

Active Mandatory Consolidation Projects

Active Consolidation Projects, parties agreed to proceed voluntarily

Discontinued Projects

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(Page last updated 04/07/2025)

Drinking Water Resources

California Laboratory Intake Portal (CLIP)
Contaminants in Drinking Water
Consolidation and Extension of Service
COVID-19 Drinking Water
Cyanobacteria/Cyanotoxins in Drinking Water
Consumer Confidence Reports (CCRs)

Drinking Water Branch Districts
Drinking Water Supply Service Area Lookup Tool
Drinking Water Watch Database
Electronic Annual Reports (EAR)
Environmental Laboratory Accreditation Program (ELAP)

Funding for Public Water Systems
Information for Public Water Systems
Operator Certification - Drinking Water
Permits
PFAS: Per- and Polyfluoroalkyl Substances
Public Water System Monitoring Schedules
Public Safety Power Shutoff and Wildfire Info

Regulations and Statutes
Residential Water Treatment Devices
Safe Drinking Water Plan for California
SAFER Drinking Water
Water Quality Data
Water Recycling

Water is a precious resource in California, and maintaining its quality is of utmost importance to safeguard the health of the public and the environment.

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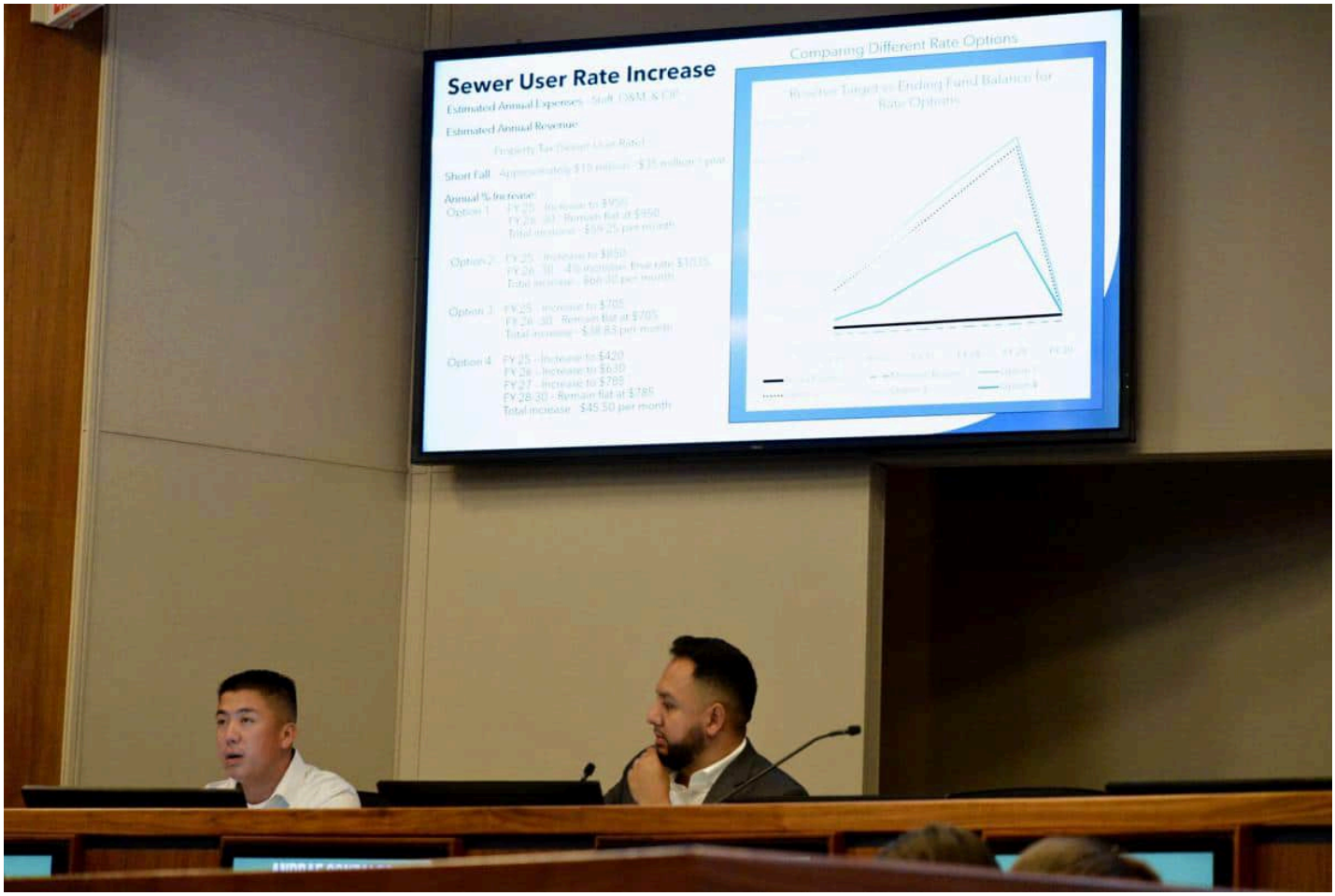
https://www.bakersfield.com/news/city-moves-forward-with-proposed-sewer-water-rate-increases/article_e1ae7652-f4fc-4db8-aedb-86f8fd503589.html

City moves forward with proposed sewer, water rate increases

By PETER SEGALL psegall@bakersfield.com
Mar 27, 2025



Bakersfield City Councilmen Eric Arias, left, and Andrae Gonzales during a meeting Wednesday night when increases to the city's water and sewer rates were approved.

Peter Segall / The Californian

Notices will be sent to thousands of Bakersfield residents next month informing them of the process by which they can protest a massive increase in water and sewer rates proposed by the city.

Faced with significant costs to update water and sewer infrastructure, city officials have proposed increasing water rates by 50% over five years and sewer rates by nearly 300%.

If approved, the rate changes would go into effect July 1.

The increase would impact roughly 166,000 people, or 50,000 households, said city spokesman Joe Conroy, and 106,200 parcels will be sent notices regarding the sewer increase.

Water rate notices are expected to go out April 25 and sewer notices April 11.

The city's water system serves about 40% of Bakersfield's population, with the remainder served by CalWater or smaller water providers.

After extensive debate Wednesday evening, the Bakersfield City Council voted to send notices to customers regarding the rate increase as required under Proposition 218. Proposition 218 is a 1996 law that requires local governments to receive voter approval for tax increases and says that a public hearing must be held within 45 of notices being issued.

If more than 50% of voters object to a rate increase, it can't be adopted.

Following motions approved Wednesday, protest hearings on the water rates will be held at the council's meeting at 5:15 p.m. May 28, and June 11 for the sewer rates.

Written protests can be submitted to the City Clerk's Office during regular business hours through the dates of the hearings.

The rate increases had been recommended by the city's Water Board, consisting of councilmembers Manpreet Kaur, Bob Smith and Andrae Gonzales, at a meeting earlier this month.

The council spent more than an hour debating each item Wednesday, and ultimately voted to move ahead with rate increases.

The decisions weren't unanimous. Ward 1 Councilman Eric Arias was the only member to vote against sending notices for the water increase and both he and Ward 2 Councilman Andrae Gonzales voted against sending notices for the sewer increase.

Ward 4's Ken Weir and Ward 7's Manpreet Kaur were both absent.

Ward 5 Councilman Larry Koman put forward a motion that would have returned the water rate proposal to a consultant for reevaluation, a process city staff said would take at least six months.

That motion failed to pass with only Koman and Arias voting in favor.

Council members and staff repeatedly said the decision to raise rates was not easy, but noted Bakersfield ratepayers pay significantly less than other comparable cities.

Furthermore, a series of state-mandated water quality and conservation measures will require the city to make significant upgrades to its infrastructure in coming years.

City staff developed a 10-year master plan to bring the city into compliance, said Kristina Budak, director of water resources, adding that the proposed increase would keep the city's financial reserves healthy.

"This allows us to stay above our target reserve," Budak said. "(It) ensures that we have a healthy fund moving forward to address any concerns or issues that are not identified in our 10-year plan."

City Manager Christian Clegg said there is a structural imbalance.

"We're spending more than we're bringing in every year," Clegg said. "And in the next two years, we will spend all of our savings down. And by fiscal year (2028), we won't have enough money to pay for operations."

Council members acknowledged the impact on residents, but also said if the city waited, the cost of improvements would rise.

"The other consideration is it only gets more expensive the longer that we wait," Gonzales said. "So the capital expenditures only, it doesn't get less expensive, it gets more expensive to actually construct some of these projects, and, again, we can defer it, but we will be paying more in the future."

But if the city moves ahead with its sewer rate increase, it's going to be too late for Kern County to hold its own Proposition 218 hearings by July 1 for the 600 or so county residents impacted by the change.

That means without approval from its residents for a rate increase, Kern County will have to make up the difference out of its own funds for a year.

"I can't put that fee on the county people because I would also have to do my own Proposition 218 (hearings) and allow them the voice to protest out of that fee as well," said Joshua Champlin, director of Kern County Public Works.

Speaking to The Californian, Champlin said he wouldn't be able to get that done before July 1, meaning the increase on the county side wouldn't be reflected until the next fiscal year.

About 600 customers in an area of unincorporated Kern County receive city sewer services under an agreement between the two governments.

"It says in the agreement that the county shall pay the current city rate for all of its users. So it doesn't, it doesn't say there's any allowance for this in our agreement," Champlin said. "It doesn't say we can pay less if our people don't pay it. It just says the county shall pay them at the same rate that the city charges their people."

The issue has come up before but in lower amounts, Champlin said, but because of the size of the increase he estimated the county would have to make up more than $400,000 in costs.

Champlin commented on the increase at Wednesday's meeting, where he asked the council to put off the item so it could be discussed further between the city and county.

But the city is on the same deadline to get the increase on its own tax rolls before July 1, the start of the fiscal year.

In voting against sending out the notices, Arias said there were large cuts being planned at the federal level that will impact families in the coming year, and that the timing of the increase troubled him.

"We have to do everything that we can at the local level to help folks literally survive and fight for the next day," Arias said. "It’s very clear that we need to update the sewer plant. I just don’t know that now is the time."

MORE INFORMATION

LOIS HENRY: Bakersfield water and sewer rates could be going up – way up

Residents balk at proposed sewer rate increase

City officials say sewer rate protest letters must follow state guidelines

City recommends rescinding sewer increase proposal

City looks to educate public on need for upgrades after pause on sewer rates

Council members say sewer rate proposal moved too fast

December 18, 2024

Sent via email

Kern Subbasin
Kristin Pittack, Kern Plan Manager
Kaitlyn Palys, INTERA Water Resources Scientist

Re: Recommendations for the Kern Subbasin Regarding the Mitigation Program

Dear Kern Subbasin,

The undersigned groups have been engaged in the Sustainable Groundwater Management Act (SGMA) process because we work with community partners who depend on groundwater for their drinking water supplies. Many residents have already experienced dry or contaminated wells due to a lack of groundwater management in California. Impacted communities have not been adequately included in decision-making about their precious water resources, and their needs are not prioritized in management decisions.

Given that the Department of Water Resources released drinking water guidance and will release subsidence and interconnected surface water best management practices documents soon, **we urge the Subbasin to address the critical overdraft conditions proactively**. The Subbasin must 1) revise sustainability management criteria to be consistent and protective of all beneficial users, in particular drinking water users, disadvantaged communities, indigenous peoples and tribes, small farmers, and socially disadvantaged farmers; 2) expand the representative monitoring networks for all sustainability indicators; 3) incorporate a comprehensive climate change analysis in all aspects of management; and 4) implement projects and management actions, namely demand management.

The Subbasin must prioritize demand management strategies such as setting pumping limits, reducing agricultural acreage, implementing efficient irrigation techniques, adopting drought-resistant crops, practicing deficit irrigation, enforcing water use restrictions, and implementing tiered water pricing. **If the Subbasin implements demand management strategies now, the Subbasin would minimize mitigation impacts and costs and put the Subbasin on track to sustainability.**

We are encouraged by the Kern Subbasin's (Subbasin) progress on the Mitigation Program, in particular the mitigation track for domestic wells. To support the Subbasin's sustainability goals, we provide the following comments and recommendations.

1. **Raise adequate funds for the mitigation program.**

The Subbasin must prioritize mitigating drinking water needs above business or industrial needs. Currently, the Subbasin plans to raise under $5 million in its first year to address mitigation needs. It is unclear whether the Subbasin would have enough resources to address dry and contaminated wells or what would happen should more funds be needed due to a drought. We recommend that the Subbasin raise adequate funds that address mitigation needs as water levels decline in the future. The Subbasin should consider funding mitigation programs as an operational cost and include ongoing costs such as administration and monitoring in the annual budget.

2. **Revise definition of small water systems to reflect state regulations. Raise adequate funds to mitigate impacts to small water systems.**

The Subbasin states that it could cause impacts to water systems and then defines small water systems eligible to receive support as under 300 service connections. This definition is inconsistent with the State Water Board's definition of a Small Water System, which defines a Small Water System as a system serving under 3,000 connections. The mitigation program should be expanded to support water systems with connections under 3,000.

The State Water Board identified Kern County as one of the top counties in the State with failing or at-risk water systems. The Subbasin needs to recognize the dire situation water systems are in and provide funding for improvement projects needed as a result of Subbasin groundwater management decisions. While there is state and federal funding available to address impacts to some drinking water systems, the statewide need outweighs available funding. **It is unacceptable for the Subbasin to provide inadequate support to water systems impacted by the Subbasin's groundwater management actions.**

The current mitigation program only provides $50,000 in technical assistance funding for small water systems. While this is a step in the right direction, it fails to address undesirable results and impacts to beneficial users – namely Community Water Systems. Technical assistance represents a small percentage of total project or needs costs, and we recommend that the Subbasin also cover funding for capital repairs for small water systems. We recognize that the Kaweah Subbasin's mitigation program has similar requirements, but we want to emphasize a major difference: **the Kaweah Subbasin has made a lot of progress in addressing the Department of Water Resources' and State Water Boards' identified deficiencies, while the Kern Subbasin has not adequately addressed the agencies' deficiencies.**

3. **Coordinate with Management Zones.**

Under the Nitrate Control Program, Management Zones are responsible for nitrate contamination and are not limited by post-2015 impacts like the Subbasin. Because both the Subbasin and Management Zones are responsible for impacts to groundwater quality, it would be important to clarify roles and responsibilities. We recommend that the Subbasin coordinate with Management Zones to ensure the responsible party funds and implements mitigation efforts appropriately and efficiently.

4. **Ensure community representation on the Evaluation Committee.**

We want to ensure that the Subbasin processes mitigation claims in a transparent manner, and we are concerned that the Evaluation Committee will pose unnecessary barriers to finding long term solutions for residents. We recommend, at a minimum, that disadvantaged community representatives and drinking water advocates sit on this committee and that this committee hold public meetings. We also recommend that the Evaluation Committee discuss claims disputes in public meetings to ensure a transparent process.

We welcome the opportunity to discuss our comments with the Subbasin. Thank you for your time and consideration.

Sincerely,

Tien Tran
Senior Policy Advocate
Community Water Center

Mac Glackin
Administrative and Program Associate
Clean Water Action

Nataly Escobedo Garcia, PhD
Policy Coordinator
Leadership Counsel for Justice and Accountability

Nayamin Martinez
Executive Director
Central California Environmental Justice Network (CCEJN)

SECTION V

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Articles

Digging into Detectability: Uncovering How Temperature Influences Detection Probability of the Fossorial Temblor Legless Lizard

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Abstract

Knowledge of species distributions is critical for conservation, but surveying for rare, understudied species presents many challenges. A two-phase occupancy study can increase knowledge gained from early occupancy studies of a species by quickly using data from the first survey period to revise the study design for a second period. The Temblor legless lizard *Anniella alexanderae* is a recently described fossorial species found in the southwestern San Joaquin Valley, California, and its status is currently under review by state and federal wildlife agencies. As a fossorial species that is rarely surface active, Temblor legless lizards might be unavailable for detection at certain times of year or under inhospitable conditions (e.g., hot, dry weather), indicating the importance of accounting for false-negative surveys when determining its distribution. We used a multiscale occupancy model to disentangle detection probability, availability for detection, and occupancy for Temblor legless lizards. Focusing our effort from mid-February to mid-April when temperatures are mild and soil moisture is expected to be higher near the surface, we surveyed a total of 89 sites in 2022 ($n = 60$) and 2023 ($n = 68$) and detected Temblor legless lizards at 12 sites, including 5 new localities. Detection probability was positively related to temperature during our late winter-early spring survey period, and availability for detection was consistently high with minimal fluctuation within each year. Nevertheless, repeated surveys with nondetection can increase confidence that this fossorial lizard does not occur at a site. Temblor legless lizards were more likely to occur at sites near ephemeral streams and in areas without high clay soil content, but more investigation could help to discern drivers of occurrence. Our study provides valuable information for optimizing surveys for Temblor legless lizards and suggests promising directions for future research on this species' ecology.

Keywords: conservation; multiscale occupancy model; population ecology; rare species monitoring; species status assessment

Received: August 2023; Accepted: June 2024; Published Online Early: June 2024; Published: June 2024

Citation: Rose JP, Camp SM, Pascetto ZN, Johnson CB, Lei SH, Napolitano GR, Schoenig EJ, Macias DA, Jordan AC, Halstead BJ. 2024. Digging into detectability: uncovering how temperature influences detection probability of the fossorial Temblor legless lizard. *Journal of Fish and Wildlife Management* 15(1):237–250; e1944-687X. https://doi.org/10.3996/JFWM-23-039

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Introduction

Conserving biodiversity requires accurate information on the distributions of species. For rare species, one or a few surveys might be insufficient to detect its presence at a site. Occupancy models were developed to account for such "false-negative" results by estimating detection probability based on replicated surveys (MacKenzie et al. 2002; Tyre et al. 2003). The nondetection problem is exacerbated if species are often unavailable for detection, such as highly mobile animals or fossorial animals that spend the majority of their time underground. Multiscale occupancy models disentangle species' availability for detection from the probability of detecting the species given it occurs at the site and is available to be detected (Nichols et al. 2008; Mordecai et al. 2011). For example, many terrestrial salamanders spend most of the year underground and might only be available for detection at the surface when temperatures and humidity are suitable (Halstead et al. 2022). If availability is not explicitly modeled, estimates of occupancy from traditional single-scale models can be biased low (DiRenzo et al. 2022). When availability for detection is much lower than 1, occupancy surveys for rare species can benefit from a hierarchical design that allows for the separation of detection probability and availability.

Designing an occupancy study for rare or understudied species is challenging. The optimal number of sites and replicate surveys depends on expected detection and occupancy probabilities (MacKenzie and Royle 2005). Choosing the sample of sites presents another dilemma. Inference into environmental covariates of species' occupancy is strongest with a random sampling design, but a random sample could lead to selection of few occupied sites and poor estimates of occupancy (Pacifici et al. 2016). By contrast, only surveying sites expected a priori to have a high occupancy probability can bias estimates of occupancy and detection probability (MacKenzie and Royle 2005) and reduce the likelihood of documenting new localities. For species of conservation concern, acquiring information on occupancy can be valuable to inform time-sensitive species status reviews. A promising method for rare species is the two-phase occupancy design developed by Pacifici et al. (2012). In a two-phase occupancy study, an initial sample of sites is selected at random, an occupancy model is fit to those data, occupancy probability is predicted at a wider pool of sites, and a second sample is selected with the probability of inclusion based on that predicted occupancy probability (Pacifici et al. 2012). By immediately incorporating information learned during the first phase of surveys, the chances of documenting new localities are increased, providing timely data to inform conservation decisions.

Occupancy sampling could provide valuable information on the ecology of North American legless lizards (genus *Anniella*). In 2013, the California legless lizard *Anniella pulchra* was split into five species based on genetic and morphological evidence (Papenfuss and Parham 2013). Little is known about the distribution, ecology, and activity of the recently described Temblor legless lizard *A. alexanderae* (Figure 1) beyond its occurrence at a few localities in the western San Joaquin Valley of California (Parham et al. 2019). Because of its small putative range and potential impacts from large-scale agriculture and fossil fuel extraction, the species status is currently under review by the California Department of Fish and Wildlife (CDFW; California Fish and Game Commission 2022) and the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 2021). Ascertaining the range of the Temblor legless lizard, its prevalence, and the probability of detecting them at occupied sites are all critical for determining whether it warrants conservation protections. Legless lizards are fossorial predators of invertebrates that spend most of their time underground in loose, sandy soils (Miller 1944; Stebbins 2003; Papenfuss and Parham 2013) and therefore could be unavailable for detection if surveys are conducted during conditions that are unsuitable for activity near the surface. Given the paucity of information on the distribution of the Temblor legless lizard and its fossorial habits, combining a two-phase sampling design with a multiscale occupancy model is a promising approach to learn about its activity, distribution, and ecology.

In this study, we conducted occupancy surveys for Temblor legless lizards in the western San Joaquin Valley following a two-phase design. We then used a multiscale occupancy model to quantify availability near the soil surface and detection probability of this fossorial species. We addressed three objectives: 1) quantify how environmental conditions influence the probability of detecting Temblor legless lizards, 2) document new localities for the species, and 3) obtain preliminary estimates of factors influencing the species' occurrence. Our results shed light on the ecology of this recently described species and point to future directions for research to answer conservation and management questions.

Methods

Study site

We conducted our study in the western San Joaquin Valley, in Fresno and Kern counties, California (Figure 2), which is characterized by hot, dry summers and mild winters during which most precipitation occurs. Dominant land uses in our study region include ranchland for grazing cattle, agriculture, and fossil fuel extraction. Vegetation communities include annual grassland (primarily nonnative grasses in grazed areas) and alkali desert scrub (California Department of Forestry and Fire Protection 2015). We defined our study area using a 10-km buffer around the hypothesized range of the Temblor legless lizard (Parham et al. 2019) to expand sampling beyond known localities for the species without expending effort in areas separated by clear geographic barriers. We focused our surveys on public lands owned and managed by the U.S. Bureau of Land Management (BLM) or the CDFW because most privately owned land in this region is challenging to access. Sites ranged in elevation from 98 to 589 m and in latitude from 35.17°N to 36.26°N.

Two-phase occupancy design

We used a two-phase occupancy design (Pacifici et al. 2012) to select sites to survey. In the first phase, we used

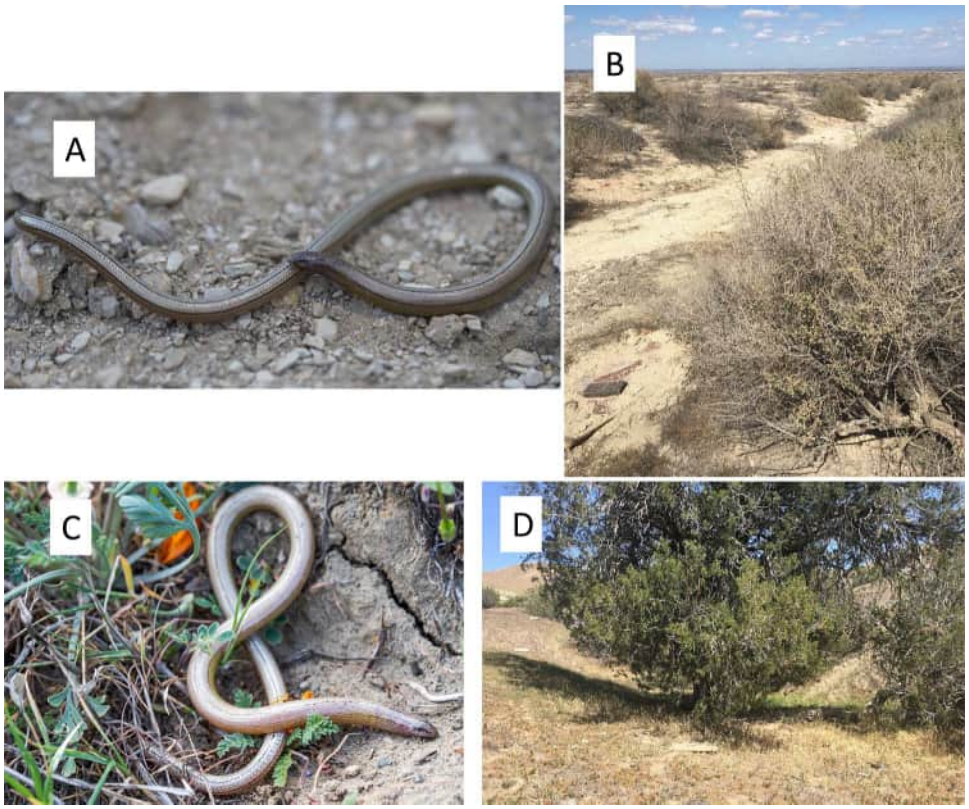

Figure 1. Temblor legless lizards *Anniella alexanderae* and occupied habitat. (**A**) Temblor legless lizard in Kern County, California, in 2023. (**B**) Occupied habitat in Kern County, California. (**C**) Temblor legless lizard in Fresno County, California, in 2022. (**D**) Occupied habitat in Fresno County, California. Photo credits: Steven Blaine, U.S. Geological Survey (**A**); Chelsea Johnson, U.S. Geological Survey (**B**); Samuel Lei, U.S. Geological Survey (**C**); and Chelsea Johnson, U.S. Geological Survey (**D**). All photos in Public Domain.

a generalized random tessellation stratified (GRTS) sampling design (Stevens and Olsen 2004) to pick a spatially balanced random sample of sites on accessible public lands. We overlaid a 200 m × 200 m square grid onto BLM and CDFW lands within the study area and numbered each grid cell. We removed from our sampling pool parcels of public lands that were inholdings in private land that the management agency could not access. We calculated the percentage of sand in the upper 50 cm of soil for each grid cell using the Gridded Soil Survey Geographic data for California (Soil Survey Staff 2018). Because *Anniella* are associated with loose, sandy soil suitable for burrowing (Miller 1944; Kuhnz et al. 2005), we dropped cells with <30% sand. We also used vegetation data from the CALFIRE Fire and Resource Assessment Program (California Department of Forestry and Fire Protection 2015) to mask out cells with clearly unsuitable land cover, such as agriculture or urban areas; only cells with >50% combined cover of annual grassland or alkali desert scrub were included in the pool of potential sites based on previously documented association with Temblor legless lizard occurrences (Parham et al. 2019). We selected a sample of 58 random cells using a GRTS design and stratified the sample by landowner and parcel to ensure that nine cells fell within CDFW Ecological Reserves (ERs; four at the Pleasant Valley ER in Fresno County and five at the Lokern ER in Kern County) and 49 within BLM lands, which collectively made up most of the total area available to survey. Two additional cells were manually selected for sampling in 2022 because they were previously occupied by Temblor legless lizards, and these "reference sites" were likely to provide information on detection probability and availability (Halstead et al. 2022). One reference site was in the Pleasant Valley ER and the other was a private ranch in Kern County (Parham et al. 2019). As part of the GRTS selection, we also selected 60 "oversample" sites as backups in case any of the first-choice sites were inaccessible. If a first-choice site was not accessible, we chose the next accessible over-sample site in the sequence to maintain spatial balance in the GRTS design (Stevens and Olsen 2004). Study sites were concentrated at the northern and southern ends of the hypothesized range of the Temblor legless lizard because few accessible parcels of public land exist in the center of the range (Figure 2).

Anniella are commonly sampled using artificial cover objects (i.e., cover boards) made from plywood or cardboard (Papenfuss and Parham 2013). In September and October 2021, we set 25 cover boards at each site. We made 13 cover boards from 23/32-in-thick (1.8-cm-thick) plywood sheathing measuring 2 ft × 2 ft (0.6 m × 0.6 m) and made 12 cover boards by folding flat a double-wall corrugated cardboard box (S-4731; ULINE, Pleasant Prairie, WI) lengthwise such that it measured 18 in × 36 in (45.7 cm × 91.4 cm), gluing the two halves together, and applying wood sealant to the top surface to retain

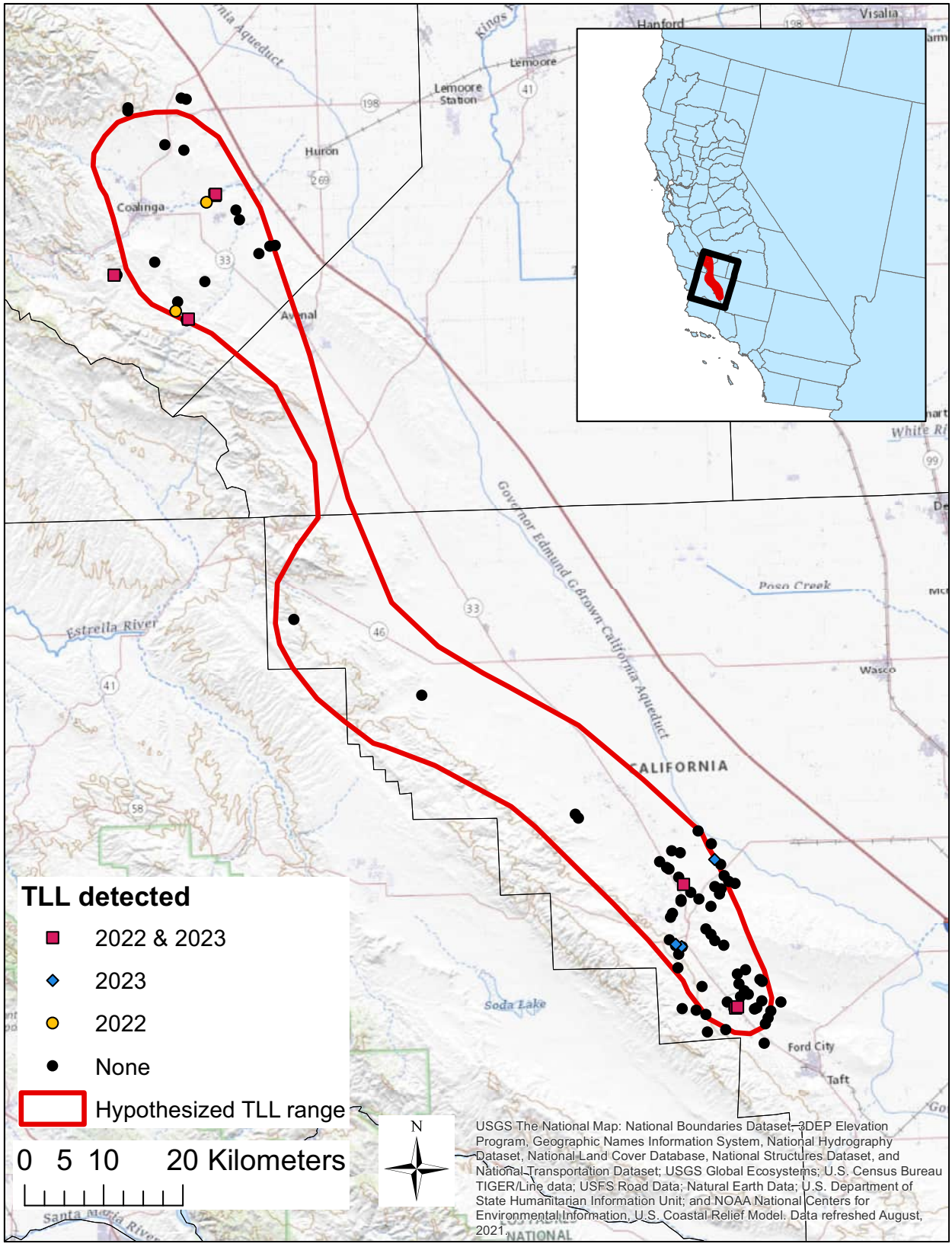

Figure 2. Location of the study sites surveyed for Temblor legless lizards (TLL) *Anniella alexanderae* within the San Joaquin Valley, California, in 2022 and 2023. The hypothesized range of Temblor legless lizard is from Parham et al. (2019). The inset depicts the study region within California.

moisture under the cardboard. On BLM lands where grazing occurred, we covered cardboard cover boards with fiberglass mineral-surfaced roofing material to discourage disturbance by cattle. Within each selected cell, we set cover boards in the habitat that appeared most likely to be used by Temblor legless lizards based on the presence of vegetation and loose soil for burrowing, and cover board arrays varied in shape depending on the habitat. If the habitat was homogeneous, we set boards in a square grid covering approximately 20 m × 20 m. If a wash or patchily distributed shrubs occurred in a cell, we positioned cover boards around those features as we expected Temblor legless lizards to prefer these features (Miller 1944; Kuhnz et al. 2005). We recorded spatial coordinates of the center and corners of each cover board array using a handheld Global Positioning System (Etrex 10; Garmin Ltd., Olathe, KS) in Universal Transverse Mercator North American Datum 1983. We placed one iButton Hygrochron (DS-1923-F5#; Maxim Integrated, San Jose, CA) under the central cover board at each site to record temperature and relative humidity hourly. iButtons measured temperature to the nearest 0.5°C and relative humidity on a percentage basis (0–100) to the nearest 0.64%. We then surveyed these cover boards for Temblor legless lizards in winter and spring 2022 (see Field data collection below).

After preliminary occupancy modeling based on survey results from 2022, we dropped the 20 sites with the lowest predicted probability of occupancy from our model. The predicted probability of occupancy was based on both ecological covariates and the number of surveys conducted at the site (more surveys with nondetection results in lower predicted probability of occupancy). We selected 20 new sites for 2023 using the GRTS algorithm with the probability of selection weighted by the predicted occupancy probability from the output of the phase 1 model (Pacifici et al. 2012). Predicted occupancy probability ranged from 0.11 to 0.29 based on distance to the nearest ephemeral stream (i.e., wash) in the National Hydrography Dataset Plus version 2.0 (U.S. Geological Survey 2019) and soil composition from the Gridded Soil Survey Geographic data for California (Soil Survey Staff 2018). We then manually selected 10 additional nonrandom sites to sample based on an expected high probability of Temblor legless lizard occupancy from local biologists' expertise and review of stream courses and satellite imagery. In September 2022, we set 25 cover boards (13 plywood and 12 cardboard) at these 30 new sites, following the same procedure described above.

Field data collection

In 2022, we surveyed cover boards for Temblor legless lizards across 60 sites from 15 February to 15 April. In 2023, we surveyed 68 sites from 8 February to 12 April, along with 4 additional surveys on 23 May 2023. We surveyed sites a variable number of times by design (see Occupancy modeling below). We conducted all surveys between 0830 and 2030 hours because we expected Temblor legless lizards to be diurnally active during the winter and early spring. We recorded substrate temperature (to the nearest degree Celsius) at the time of surveying using a handheld thermometer (Model 9842; Taylor Precision Products, Oak Brook, IL) that we placed on the soil surface under the central cover board. We also collected data on the microhabitat surrounding each cover board (grass, bare ground, tree, shrub, or litter). We categorized soil texture (i.e., particle size) by hand into 1 of 12 categories following a protocol for field characterization of soil texture by feel (Thien 1979), which, when used by trained technicians in the field, can produce classifications comparable to laboratory analysis (Salley et al. 2018). Each category is a qualitative measure of the percent composition of sand, silt, and clay that is defined by the U.S. Department of Agriculture Soil Textural Triangle (Soil Survey Staff 1951).

We used fingers or a 3-tine hand cultivator to search the underlying substrate for legless lizards. We recorded the Universal Transverse Mercator coordinates, cover board type, and microhabitat where each Temblor legless lizard was found. We measured snout-to-vent length and total length of captured individuals to the nearest millimeter using a meter stick. We measured the mass of individuals to the nearest gram using micro-line spring scales (PESOLA, Switzerland). We identified individuals as Temblor legless lizards based on the distinctive light gray ventral coloration unique to this species (Papenfuss and Parham 2013). We took photographs of dorsal and ventral patterns to share with T. Papenfuss (author of the species description for Temblor legless lizards) for confirmation of species identity; we confirmed that all photographed *Anniella* were Temblor legless lizards. The species description states that genetic analysis is not required to distinguish Temblor legless lizards from other *Anniella*; morphological characters are sufficient (Papenfuss and Parham 2013; Parham et al. 2019). After sampling, we released all Temblor legless lizards under the board under which we had found them.

To assist CDFW in its status review of Temblor legless lizards, we collected tail tips from up to five Temblor legless lizards per site in 2023 for genetic analysis by the CDFW Wildlife Health Lab (Rancho Cordova, CA). We obtained tissue by cutting approximately 5–6 mm of the tail tip with sterilized surgical scissors. CDFW geneticists sequenced two previously defined genetic markers for differentiating species in the genus *Anniella* (Parham and Papenfuss 2009): a mitochondrial DNA sequence (NADH dehydrogenase subunit 2 and five adjacent tRNAs) and a nuclear gene (brain-derived neurotrophic factor precursor). All 16 genetic samples were confirmed as belonging to *A. alexanderae* based on neighbor joining methods (M. Buchalski, unpublished data); these sequences grouped with clade "B" in Parham and Papenfuss (2009), which was later described as *A. alexanderae* in Papenfuss and Parham (2013).

We collected iButtons on the last survey date for each site and downloaded data covering the time period that the iButton was deployed in the field. Of 60 sites with iButtons deployed in 2022, we recovered data from 57. Of 68 iButtons deployed in 2023, we recovered data from 54, whereas the remaining iButtons were lost or rendered inoperable due to flooding. For sites with missing iButton data, we used Bayesian imputation (Bonner and Schwarz 2006) to impute missing temperature and

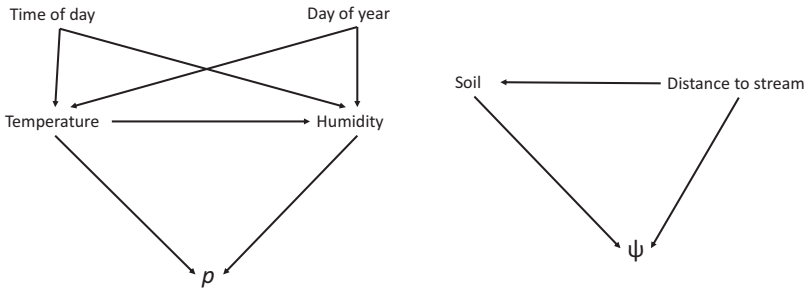

Figure 3. Hypothesized causal models for detection probability (p) submodel (left) and occupancy probability (ψ) submodel (right) of the Temblor legless lizard *Anniella alexanderae* from the study that we conducted within the San Joaquin Valley, California, from 2022 to 2023. The direction of the arrow indicates the direction of causality. Causal models can be used to identify which covariates must be included in a model to estimate direct and indirect effects of a covariate on a response variable. Temperature and humidity are the substrate temperature and relative humidity under cover boards, respectively. Soil represents soil texture and the relative proportion of sand, silt, and clay.

relative humidity data. For temperature, we defined priors for missing data using a mean equal to the temperature collected under a cover board with a handheld thermometer at the time of checking and a standard deviation calculated using iButton temperatures collected at nearby sites at the same date and time. For relative humidity, we defined priors for missing data using the mean and standard deviation of relative humidity recorded from nearby sites at the same date and time.

Occupancy modeling

In a multiscale occupancy design, surveys are organized hierarchically into the following three levels (DiRenzo et al. 2022): 1) primary periods (a window of time that includes multiple secondary occasions separated by intervals without surveys), 2) secondary occasions (in this study, a week during which sites were surveyed), and 3) tertiary surveys (in this study, a single check of all cover boards at a site). Sites (i) are considered closed to changes in occupancy within a primary period. We treated all of our surveys in 2022 and 2023 as occurring in a single primary period and assumed no change in occupancy status (z_i) during our study (equation 1). Sites are closed to changes in occupancy between secondary occasions (j), but availability of animals for detection at a site ($w_{i,j}$) can change between secondary occasions (equation 2). Each secondary occasion is composed of one or more tertiary surveys, k, during which the focal species is detected ($y_{i,j,k} = 1$) or not ($y_{i,j,k} = 0$; equation 3).

$$z_i \sim Bernoulli(\psi_i) \quad (1)$$

$$w_{i,j} \sim Bernoulli(\theta_{i,j} \times z_i) \quad (2)$$

$$y_{i,j,k} \sim Bernoulli(p_{i,j,k} \times w_{i,j}) \quad (3)$$

We included covariates in the linear predictors for p and ψ to estimate how survey and site conditions might influence detection and occupancy probability, respectively. We drew directed acyclic graphs representing hypothesized causal relationships (Pearl 1995; McElreath 2020) for covariate effects on p and ψ to evaluate confounding among covariates and response variables (Figure 3). Under the assumptions of these causal models, we can estimate the effects of our covariates without conditioning on any other variables, such as the effect of time of day or day of the year on p. For p, we tested for effects of substrate temperature ($st_{i,j,k}$) and relative humidity ($rh_{i,j,k}$) under the cover board at the time of the tertiary survey (equation 4).

$$\text{logit}(p_{i,j,k}) = \alpha_p + \beta_{temp} \times st_{i,j,k} + \beta_{rh} \times rh_{i,j,k} \quad (4)$$

We also tested for the relationship between ψ and the distance to the nearest ephemeral stream ($stream.dist_i$, as defined by the National Hydrography Dataset Plus version 2.0) and soil containing high clay content ($clay_i$; equation 5) based on our soil texture classification ($clay_i = 1$ if the texture class name contained clay and $clay_i = 0$ otherwise).

$$\text{logit}(\psi_i) = \mu_\psi + \beta_{st.dist} \times stream.dist_i + \beta_{clay} \times clay_i \quad (5)$$

We did not include covariates on θ (availability for detection) because this parameter was difficult to precisely estimate with our data. Instead, we estimated a mean availability (λ_θ) and included a varying intercept for availability each week (η_j) as a random effect (equations 6 and 7).

$$\text{logit}(\theta_j) = \lambda_\theta + \eta_j \quad (6)$$

$$\eta_j \sim N(0, \ \sigma_\theta) \quad (7)$$

Although we selected the majority of sites using GRTS, our inclusion of nonrandom sites ($n = 12$) in our sample ($n = 89$) could bias estimates of ψ. We fit the following two occupancy models to evaluate the importance of distinguishing random and nonrandom (manually selected) sites: 1) a model with a single parameter for ψ and 2) a

model with two parameters, one for random sites and one for manually selected sites. Given the nonrandom selection of some sites, we focus on finite sample occupancy (the number of occupied sites within our sample) and do not generalize to occupancy probability throughout the study region.

Sites were spatially clustered in some areas because of limited accessibility to public lands. We tested if spatial clustering of sites influenced occupancy probability by modeling spatial covariance with distance between sites using a Gaussian process (Johnson et al. 2013). We found no support for covariance in occupancy varying as a function of distance; the posterior distribution for the effect of distance was nearly equal to the prior distribution. Given this lack of evidence of spatial covariance, we used a nonspatial occupancy model for inference.

In 2022, we did not strictly follow a hierarchical sampling design for a multiscale occupancy model as we refined our survey protocol. We sampled 60 sites on a minimum of three secondary occasions (i.e., distinct weeks) each. We performed three tertiary surveys (i.e., cover board checks) at 42 sites and four or more tertiary surveys at 18 sites (Table S1, *Supplemental Material*). We did not perform more than one tertiary survey per secondary occasion at most sites in 2022, but at our reference site in the Pleasant Valley ER and selected sites at which Temblor legless lizards were detected, we performed more than one tertiary survey per secondary occasion to obtain additional information on detection probability and availability (Table S1, *Supplemental Material*).

In 2023, we sampled all sites following a multiscale occupancy design. We sampled each site on at least two secondary occasions with two tertiary surveys within each secondary occasion to model availability and detection probability (Table S1, *Supplemental Material*). We separated secondary occasions by 3 to 4 weeks (mean = 25 d, range = 11–39 d), and we separated tertiary surveys by 1–3 d (mean = 1.75 d). Two sites that we sampled in 2022 could not be sampled in 2023 because winter flooding washed out cover boards, resulting in a total of 68 sites sampled in 2023. Of 68 sites, we sampled 35 on two secondary occasions (four total surveys), we sampled 33 sites on a third secondary occasion, with either one (n = 17 sites) or two (n = 16) tertiary surveys during the third secondary occasion. Finally, we surveyed three sites once more during a fourth secondary occasion in late May 2023 during a visit to retrieve iButtons.

We fit a Bayesian implementation of a multiscale occupancy model with Markov chain Monte Carlo sampling using JAGS version 4.3.0 (Plummer 2003) accessed through R version 4.2.3 (R Core Team 2023) using the "runjags" package (Denwood 2016). We based our model on the multiscale model used by Halstead et al. (2022) and adapted it to the survey design used for Temblor legless lizards. We fit models on four chains for 250,000 sampling iterations after discarding the initial 10,000 iterations as burn-in. We thinned the resulting chains by a factor of 10, resulting in a final posterior sample of 100,000 iterations for inference. We evaluated model convergence and mixing of chains by visually inspecting trace plots and calculating the potential scale reduction factor (Brooks and Gelman 1998); all parameters had potential scale reduction factor values of $<$1.01, indicating convergence. We ran a posterior predictive check based on comparing the expected number of detections to observed data and replicate data generated by the model (Kéry and Schaub 2012). The Bayesian P value was 0.615, indicating that there was not a lack of fit to the observed data. Unless otherwise noted, we summarized parameter estimates with the mean and 95% equal-tailed credible interval of the posterior distribution. Archived data are available on ScienceBase (Rose et al. 2024; https://doi.org/10.5066/P9R7UIV7), and model code to reproduce analyses are available on GitLab (Rose and Halstead 2024; https://doi.org/10.5066/P95O3WW2; Data S1, *Supplemental Material*).

Finally, we used posterior distributions of ψ, p, and θ from the multiscale occupancy model to estimate the number of secondary occasions (i.e., distinct weeks during which we checked cover boards) with sequential negative tertiary surveys (i.e., nondetections during a cover board check; n^*) necessary for a 95% probability that a species is truly absent from a site ($\psi^* = 0.05$) following the methods of Halstead et al. (2022) (equation 8). We calculated n^* with the number of tertiary surveys per secondary occasion (q), set to 1, 2, or 3. Estimates of n^* depended on prior values for occupancy (ψ') and detection probability (p'), which varied as a function of covariates that affected each parameter. To obtain conservative estimates of n^*, we fixed θ at the fifth percentile of its posterior distribution ($\theta = 0.60$).

$$n^* = \frac{\log\left[\frac{\psi^*(\psi - 1)}{\psi(\psi^* - 1)}\right]}{\log\left[\theta(1-p)^q - \theta + 1\right]} \quad (8)$$

Results

We conducted a total of 239 cover board surveys in 2022 and 324 surveys in 2023 (Table 1). We observed Temblor legless lizards at 9 sites out of 60 sampled in 2022, with a total of 31 detections (unique site and date combination). Of these nine sites, the first detection occurred during the first tertiary survey at five sites, and we did not detect Temblor legless lizards until the third tertiary survey at four sites. We observed Temblor legless lizards at 10 sites out of 68 sampled in 2023, with a total of 23 detections. Of the 10 sites with observations in 2023, 2 were first sampled in 2023, 1 was sampled on three tertiary surveys in 2022 without detecting Temblor legless lizards, and the remaining 7 also had Temblor legless lizard detections in 2022. We did not detect Temblor legless lizards in 2023 at two sites where the species was observed in 2022. One site in the Pleasant Valley ER was flooded by Los Gatos Creek during heavy rains, and the habitat was highly disturbed. The other site in the Kreyenhagen Hills was not disturbed between years. Of the 10 known occupied sites in 2023, the first detection occurred during the first tertiary survey at four sites, during the second tertiary survey at one site, during the third tertiary survey at four sites, and during the fourth

Table 1. Dates of sampling and number of sites, tertiary surveys, detections of Temblor legless lizards *Anniella alexanderae*, and occupied sites by year in the San Joaquin Valley, California, in 2022 and 2023.

Year	Start date	End date	Sites	Dates	Surveys	Detections	Occupied sites
2022	15/2/2022	15/4/2022	60	38	239	31	9
2023	7/2/2023	23/5/2023*	68	40	324	23	10

[a] Most surveys in 2023 were completed by 12 April, four additional surveys took place on 23 May 2023.

tertiary survey at one site. Notably, at a new locality for the species southwest of Coalinga, California, in both 2022 and 2023, we only detected a single Temblor legless lizard during the first of six tertiary surveys each year.

Combining the results over both years, we documented Temblor legless lizards at 12 out of 89 sites. Of these 12 occupied sites, we manually selected 4 for inclusion in the study based on the apparent suitability of the habitat, 1 site in the Pleasant Valley ER was previously known to be occupied by Temblor legless lizards, and 7 were random sites selected by the GRTS algorithm. We observed a total of 74 Temblor legless lizards under cover boards, with 41 observations under cardboard cover boards and 33 under plywood. We found most Temblor legless lizards at sites with soil characterized as loamy sand ($n = 43$), followed by sand ($n = 16$), loam ($n = 7$), silty clay ($n = 5$), and sandy loam ($n = 3$). Temblor legless lizards occurred at elevations ranging from 127 to 427 m, covering most of the range of elevation at surveyed sites (98 to 589 m). All sites at which we observed Temblor legless lizards had loose or friable soils. We observed most Temblor legless lizards under cover boards placed under shrubs or trees ($n = 57$), followed by grass ($n = 13$) and no vegetation ($n = 4$). We observed Temblor legless lizards under cover boards placed beneath screwbean mesquite *Prosopis pubescens*, California juniper *Juniperus californica*, saltcedar *Tamarix ramosissima*, and saltbush *Atriplex* sp. Daily mean temperature under cover boards fluctuated by day and week, with an overall positive trend from early February to mid-April in both years (Figure S1, *Supplemental Material*). Daily mean relative humidity under cover boards declined overall during the sampling period in 2022, with temporary increases following rainfall (Figure S1, *Supplemental Material*). In 2023, the relative humidity was higher on average and remained consistently high from early February to early April, only showing a clear decline at two sites where iButtons remained in the field until late May (Figure S1, *Supplemental Material*).

The occupancy model with one ψ parameter produced similar posterior estimates as the model with separate ψ parameters for random and manually selected sites (Table 2). Therefore, we focus on results from the model with one ψ parameter for all sites but do not extrapolate occupancy beyond our finite sample of sites. Detection probability was positively related to substrate temperature at the time the cover board was checked ($\Pr[\beta_{temp,p} > 0] = 0.997$). The relationship between detection probability and substrate temperature was more uncertain for temperatures below 10°C and above 20°C, because fewer data points were available outside the range of 10–20°C (Figure 4). There was weak support for an effect of relative humidity under the cover board at the time it was checked on p ($\Pr[\beta_{rh,p} > 0] = 0.796$). There was high uncertainty in the relationship between p and humidity for relative humidity of <60%, with most observations occurring at higher humidity values (Figure 4). The probability of detecting a Temblor legless lizard during a single survey at average temperature and humidity, given that they occupied the site and were available for detection at the time of the survey, was 0.514 (95% credible interval = 0.344–0.696). The mean availability of Temblor legless lizards for detection was high (mean = 0.771, 0.569–0.958), with little variation in availability among secondary periods (Figure S2, *Supplemental Material*). The product of θ and p (comparable to p in a single-scale occupancy model) for a single survey under average conditions was 0.392 (0.274–0.520).

There was a negative relationship between ψ and the distance to the nearest ephemeral stream (−0.872; −1.903 to −0.048); sites closer to ephemeral streams were more likely to be occupied ($\Pr[\beta_{st.dist,\psi} < 0] = 0.982$; Figure 5). Sites without high clay content in the soil were more likely to be occupied than sites classified to have high clay content ($\Pr[\beta_{clay,\psi} < 0] = 0.995$; Figure 5). Only 1 of 12 known occupied sites had high clay content in the soil, with texture classified as silty clay. Of the 89 sites surveyed in 2022 and 2023, the model estimated that a median of 13 sites (12–17) were occupied by Temblor legless lizards.

The number of sequential negative surveys (n^*) required to have high confidence that a site was truly unoccupied by Temblor legless lizards depended on the substrate temperature at the time of the survey, soil texture, and the distance that the site was located from an ephemeral stream (Figure 6). Sites closer to ephemeral streams required more surveys because their baseline occupancy probability was higher. Likewise, sites with low clay content soils required more surveys with nondetection to have high confidence that the site was unoccupied. More surveys were required to have high confidence that a site was unoccupied if the substrate temperature at the time of the survey was low (<15°C) because p was lower at colder temperatures (Figure 6).

Discussion

Our study provided the first quantitative estimates of detection probability for any *Anniella* species and identified substrate temperature as a strong predictor of the probability of observing Temblor legless lizards where they occur. Support for relative humidity under cover boards as a predictor of detection probability was weak, but humidity was consistently high during our sampling

Table 2. Parameters, priors, and posterior summaries from two occupancy models fit to survey data for Temblor legless lizards *Anniella alexanderae* collected in the San Joaquin Valley, California, in 2022 and 2023.

Model	Parameter	Description	Prior[c]	Mean	SD	2.50%[d]	97.50%[e]
One ψ[a]	p	Detection probability	*Beta(1,1)*	0.514	0.090	0.344	0.696
	$\beta_{temp,p}$	Slope of relationship between temperature and p	*N(0,1)*	1.102	0.441	0.290	2.017
	$\beta_{rh,p}$	Slope of relationship between humidity and p	*N(0,1)*	0.318	0.384	−0.398	1.110
	$\sigma_{p,t}$	SD of temporal random effect on p	*Exp(1)*	0.502	0.371	0.022	1.384
	θ	Probability of being available for detection	*Beta(1,1)*	0.771	0.101	0.569	0.958
	$\sigma_{\theta,t}$	SD of temporal random effect on θ	*Exp(1)*	0.532	0.512	0.013	1.863
	ψ	Occupancy probability	*Beta(1,1)*	0.206	0.063	0.097	0.343
	$\beta_{clay,\psi}$	Slope of relationship between clay soil and ψ	*N(0,1)*	−1.539	0.618	−2.797	−0.372
	$\beta_{st.dist,\psi}$	Slope of relationship between distance to stream and ψ	*N(0,1)*	−0.872	0.477	−1.903	−0.048
Two ψ[b]	p	Detection probability	*Beta(1,1)*	0.513	0.090	0.345	0.692
	$\beta_{temp,p}$	Slope of relationship between temperature and p	*N(0,1)*	1.102	0.440	0.288	2.012
	$\beta_{rh,p}$	Slope of relationship between humidity and p	*N(0,1)*	0.317	0.385	−0.402	1.110
	$\sigma_{p,t}$	SD of temporal random effect on p	*Exp(1)*	0.483	0.365	0.018	1.352
	θ	Probability of being available for detection	*Beta(1,1)*	0.769	0.102	0.565	0.957
	$\sigma_{\theta,t}$	SD of temporal random effect on θ	*Exp(1)*	0.530	0.505	0.015	1.872
	ψ_{ran}	Occupancy probability at random sites	*Beta(1,1)*	0.186	0.063	0.081	0.325
	ψ_{sel}	Occupancy probability at manually selected sites	*Beta(1,1)*	0.397	0.158	0.124	0.724
	$\beta_{clay,\psi}$	Slope of relationship between clay soil and ψ	*N(0,1)*	−1.601	0.622	−2.861	−0.424
	$\beta_{st.dist,\psi}$	Slope of relationship between distance to stream and ψ	*N(0,1)*	−0.847	0.479	−1.885	−0.018

SD = standard deviation.
[a] The "One ψ" model included a single ψ parameter for occupancy probability at all sites.
[b] The "Two ψ" model had separate ψ parameters for randomly selected sites (ψ_{ran}, $n = 77$) and manually selected sites (ψ_{sel}, $n = 12$).
[c] *Beta(alpha,beta)* is a beta distribution with shape parameters, *N(mean,SD)* is a normal distribution with mean and standard deviation, and *Exp(rate)* is an exponential distribution with a rate parameter.
[d] 2.50% is the 2.5th percentile of the posterior distribution.
[e] 97.5% is the 97.5th percentile of the posterior distribution.

period from mid-February to mid-April, particularly in 2023, which had high winter rainfall. We expect that detection probability decreases at lower levels of humidity under cover boards (as a proxy of soil moisture) later in the spring and in summer, given the importance of soil moisture for *Anniella* (Miller 1944). Likewise, although we found a positive relationship between detection probability and temperature during the winter and early spring, our survey period ended before temperatures increased to the extreme heat that predominates in the region from June to September. It is likely that detection probability exhibits a unimodal relationship with temperature, with p decreasing at high temperatures later in the year based on the temperature preferences of *Anniella* (Bury and Balgooyen 1976; Miller 1944). Continuing surveys into the late spring and summer could help elucidate how high temperatures affect detection of Temblor legless lizards and when the species is not available for detection near the surface. It is likely that the species is available for detection later than mid-April when we ended most surveys; we observed a Temblor legless lizard on 23 May 2023 when daytime high temperatures were above 30°C and humidity under the cover board was approximately 50%. The detectability of Temblor legless lizards earlier in the winter also remains unknown, and nighttime low temperatures could influence activity near the surface (Miller 1944).

Based on the influence of substrate temperature on detection probability, the relationship between occupancy and distance to ephemeral streams, and estimated availability from our multiscale occupancy model, we calculated the number of sequential negative surveys needed to have high confidence that a site is unoccupied by Temblor legless lizards. It is clear from these calculations and the raw detection data that a few negative surveys are not sufficient to conclude that this species is absent from a site. In addition to prior belief about detection probability and occupancy, the estimated number of negative surveys presented above is also highly dependent on the availability of Temblor legless lizards for detection near the surface, which was generally high during our late-winter to early-spring survey period. If the probability that Temblor legless lizards were available for detection was lower (as expected in the hot, dry summer), then a larger number of negative surveys would be required to have high confidence that the species was absent from a site. We note that our estimates of detection probability are potentially dependent on the number of cover boards that we used at each site. Increasing the number of cover boards used to sample each site would likely increase detection probability, which could be valuable for determining occupancy of Temblor legless lizards. Our results also show that surveys over multiple years might be needed to document the presence of Temblor legless lizards, particularly during droughts when conditions at the surface are unsuitable.

We sought to strike a balance between primarily sampling sites selected at random while not wasting effort at locations that were clearly unsuitable for Temblor legless lizards. The inclusion of reference sites in 2022 and manually selected sites that appeared suitable in 2023 provided benefits in terms of data on detection

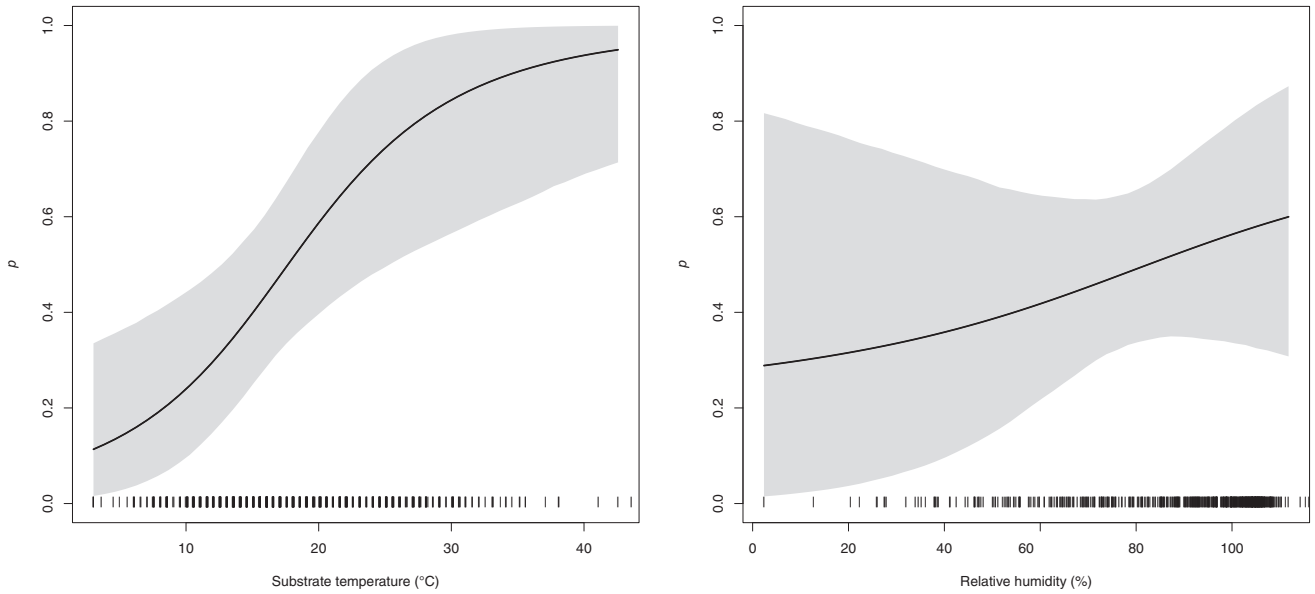

Figure 4. Relationship between detection probability (p) and substrate temperature (°C; left) and relative humidity (%; right) for the Temblor legless lizard *Anniella alexanderae* based on cover board surveys in the San Joaquin Valley, California, in 2022 and 2023. Substrate temperature and relative humidity were the temperature and relative humidity, respectively, recorded within 30 min of the time that we checked the cover board on that date. Lines represent mean predicted relationships, and shaded areas represent 95% equal-tailed credible intervals.

probability and two new localities for the species. The cost for including these reference sites in our model is that our estimate of occupancy probability was potentially biased, although relationships between ψ and covariates were unchanged when random and manually selected sites were modeled with separate ψ parameters. Still, given the potential bias in ψ, we refrained from making predictions about occupancy probability throughout the study area. We used a two-phase sampling design to increase our chances of finding Temblor legless lizards at new locations in 2023, but the three sites with new observations in 2023 were either selected in the first phase and sampled in

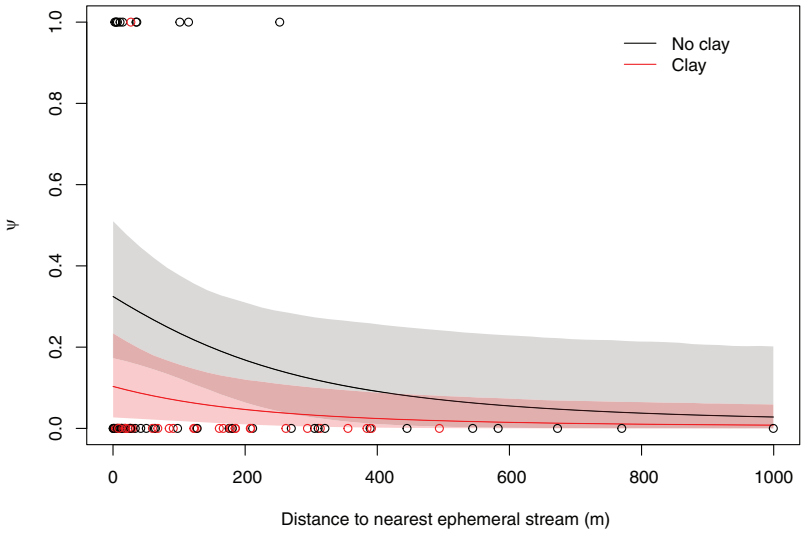

Figure 5. Relationship between distance to the nearest ephemeral stream (in meters) and occupancy probability (ψ) for Temblor legless lizards *Anniella alexanderae* based on cover board surveys in the San Joaquin Valley, California, in 2022 and 2023. The red line, circles, and shading represent sites with high clay content in the soil (Clay). The black line, circles, and gray shading represent sites with soil that did not have high clay content based on soil textural analysis (No clay). Circles at the top of the y axis represent sites at which Temblor legless lizards were detected, and circles at the bottom of the y axis represent sites at which Temblor legless lizards were not detected. Lines represent mean predicted relationships, and the shaded area represents 95% equal-tailed credible intervals.

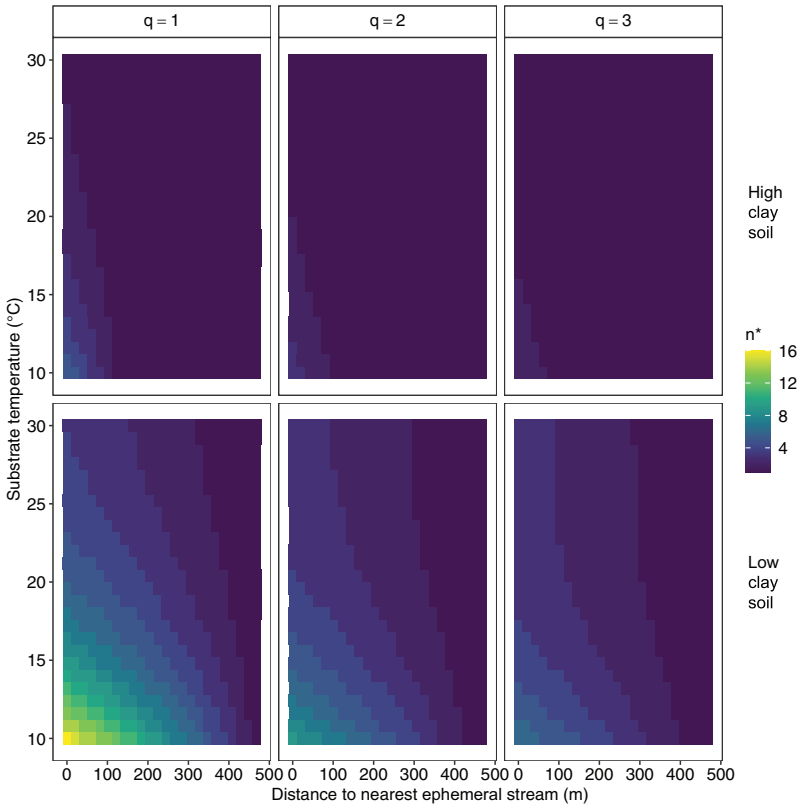

Figure 6. The estimated number of secondary occasions (n^*) with nondetection of Temblor legless lizards *Anniella alexanderae* needed to have 95% confidence that a site was unoccupied based on occupancy modeling of the study from 2022 to 2023 in the San Joaquin Valley, California. The top row represents sites with high clay content in the soil (lower mean expected occupancy probability, ψ), and the bottom row represents sites with low clay content in the soil (higher mean expected occupancy probability, ψ). The three columns represent the number of tertiary surveys per secondary occasion (q). Yellow represents a higher number of secondary occasions with surveys needed, and blue/purple represent a lower number of secondary occasions with surveys needed to have high confidence that a site was unoccupied. The x axis represents varying distance from the nearest ephemeral stream, with higher expected occupancy probability (ψ) closer to streams. The y axis represents the surface temperatures at the time of the survey, with higher detection probability (p) when the soil surface was warmer. For calculating a conservative estimate of n^*, we fixed availability (θ) to the 0.05 quantile of the posterior estimate ($\theta = 0.60$). We restricted the figure to substrate temperatures between 10°C and 30°C because we conducted few surveys at substrate temperatures outside of this range, and the relationship between temperature and p is uncertain beyond this temperature range.

2022 without detecting the species (one site) or manually selected to sample in 2023 (two sites).

Our ability to make strong inferences about ecological factors influencing occupancy of Temblor legless lizards was constrained by the low number of known occupied sites (12 out of 89), but we found some evidence for soil texture and distance to ephemeral streams affecting occupancy probability. The proximity of Temblor legless lizard occurrences to washes fits with knowledge of the ecology of other *Anniella* species (Miller 1944; Papenfuss and Parham 2013). Alluvial fans and washes are associated with loose, friable soils suitable for burrowing by *Anniella*, and the soils of these ephemeral drainages can retain greater moisture than surrounding habitats (Balding and Cunningham 1974; Bull 1977). Given the species' fossorial nature and its method for burrowing, it is unsurprising that we found support for lower occupancy in sites with soils that had high clay content. Previous studies of *Anniella* emphasized the affinity for sandy soils (Miller 1944; Kuhnz et al. 2005; Papenfuss and Parham 2013). Therefore, we screened out areas with low sand content in the soil from the pool of potential sites, and within our pool of sites, most were classified as a type of sand or loam. Still, within a given site, there was microgeographic variation in soil texture and composition. A future study characterizing soil texture, composition, moisture, and temperature at a finer scale with multiple samples per site could lend further insight into habitat selection and activity of Temblor legless lizards.

Surrounding land use could influence the occurrence of Temblor legless lizards, although we observed the species at sites actively grazed by cattle, within 100 m of fossil fuel extraction, and within 500 m of agricultural fields. The scale at which land use affects *Anniella* occupancy is unknown, but given the small home ranges of individuals (mean = 71 m^2 for *A. pulchra*; Kuhnz 2000), populations might persist in undisturbed habitat adjacent to human land uses as long as the patch size is sufficient to support a viable population. Increased access to privately owned lands could facilitate sampling a larger portion of the

species' putative range, particularly the central two-thirds in Kings County and northern Kern County. Further refinement of our sampling design could be necessary to increase the likelihood of documenting the species at new localities and acquire a better understanding of the abiotic and biotic conditions affecting its occurrence at macro- and microgeographic scales.

Much remains to be learned about the ecology and conservation status of Temblor legless lizards. Nondetection of Temblor legless lizards during one or a few surveys cannot be conclusively interpreted to indicate the absence of this species from a site. At many sites, we did not observe Temblor legless lizards until we had conducted three or more surveys, and at one site we only observed a single individual at the first survey out of six. Furthermore, we demonstrated that Temblor legless lizards are far less likely to be detected when substrate temperatures are low (<15°C), and our results provide guidance for optimizing survey protocols during the winter and spring. Our findings also expand the species' range beyond that hypothesized by Parham et al. (2019) into the foothills of the Diablo Range in southwestern Fresno County. It is likely that more localities outside the hypothesized range could be found by sampling habitat further outside this range polygon, which could help elucidate boundaries between the range of Temblor legless lizards and other *Anniella* species. One question for managers considering the status of the Temblor legless lizard is whether it is truly rare or whether the low occupancy rate in this study reflects the difficulty in identifying suitable habitat for this small fossorial species from landscape-scale data available as geographic information system layers. Our results indicate that answering this question could be facilitated by increased spatial and temporal coverage of sampling and better characterization of habitat features that influence the occurrence of Temblor legless lizards.

Supplemental Material

Please note: The *Journal of Fish and Wildlife Management* is not responsible for the content or functionality of any supplemental material. Queries should be directed to the corresponding author for the article.

Reference S1. Parham JF, Koo MS, Simison WB, Perkins A, Papenfuss TJ, Tennant EN. 2019. Conservation assessment of the California legless lizard (*Anniella*). Sacramento, CA: Prepared for the California Department of Fish and Wildlife.

Data S1. Site data and survey data for Temblor legless lizard *Anniella alexanderae* surveys in 2022 and 2023 in western San Joaquin Valley, California, are available at the U.S. Geological Survey ScienceBase (Rose et al. 2024; https://doi.org/10.5066/P9R7UIV7). File "TLL_site_data.csv" contains data for each site sampled, with one row per site. File "TLL_survey_data.csv" contains data for each individual survey for Temblor legless lizards in 2022 and 2023. The code to reproduce the analyses is available on the U.S. Geological Survey GitLab (Rose and Halstead; https://doi.org/10.5066/P95O3WW2).

Table S1. The number of surveys per secondary occasion (Sec) at each site that we sampled for Temblor legless lizards *Anniella alexanderae* in 2022 and 2023 in western San Joaquin Valley, California. A value of "NA" indicates that the site was not sampled in that year.

Figure S1. Daily mean temperature (°C; **A** and **C**) and relative humidity (%; **B** and **D**) under cover boards at each site that we sampled for Temblor legless lizards *Anniella alexanderae* in 2022 (top row) and 2023 (bottom row) in western San Joaquin Valley, California. Thick black lines represent the daily mean averaged across all sites, and thin lines in color represent daily means for individual sites.

Figure S2. Posterior estimates of Temblor legless lizard *Anniella alexanderae* availability (θ) by week of the field season for 2022 (black) and 2023 (red) in western San Joaquin Valley, California, based on occupancy models fit to survey data. Points represent means of the posterior distribution, thick lines represent 50% equal-tailed credible intervals, and thin lines represent 95% equal-tailed credible intervals. For 2022, week 1 began on 15 February 2022 and week 9 began on 13 April 2022. In 2023, week 1 began on 7 February 2023, week 10 began on 10 April 2023, and week 11 was 23 May 2023.

Acknowledgments

We thank C. Irons and K. Smith for assisting with cover board deployment, L. Parker and L. Stewart for administrative support, and E. Tennant, J. Battistoni, M. Westphal, S. Bullock, D. Meade, and J. Dart for coordinating access to sites. We thank the CDFW, U.S. BLM, and B. Grant for allowing our research on their lands. We thank M. Koo for sharing the range polygon for the Temblor legless lizard and T. Papenfuss and J. Parham for providing advice on sampling for Temblor legless lizards. We thank M. Martinez for reviewing an earlier draft of this manuscript and three anonymous reviewers and the Associate Editor for comments that improved this paper. This work was supported by the U.S. Fish and Wildlife Service and the U.S. Geological Survey Ecosystems Mission Area. We performed all work under CDFW Scientific Collecting Permit SC-10779.

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FGC - 670.1 (3/94)

A PETITION TO THE STATE OF CALIFORNIA
FISH AND GAME COMMISSION

For action pursuant to Section 670.1, Title 14, California Code of Regulations (CCR) and Sections 2072 and 2073 of the Fish and Game Code relating to listing and delisting endangered and threatened species of plants and animals.

I. SPECIES BEING PETITIONED:

Common Name: Temblor legless lizard

Scientific Name: Anniella alexanderae

II. RECOMMENDED ACTION:

(Check appropriate categories)

a. List __X_

As Endangered _X

As Threatened _X

b. Change Status

from _____

to _____

Or Delist ___

III. AUTHOR OF PETITION:

Name: Shaye Wolf

Address: Center for Biological Diversity

1212 Broadway, Suite 800, Oakland, CA 94612

Phone Number: (415) 385-5746

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signature: Shaye Wolf

Date: November 18, 2021

BEFORE THE CALIFORNIA FISH AND GAME COMMISSION

PETITION TO LIST THE TEMBLOR LEGLESS LIZARD (*Anniella alexanderae*) AS AN ENDANGERED OR THREATENED SPECIES UNDER THE CALIFORNIA ENDANGERED SPECIES ACT (CESA)

CENTER FOR BIOLOGICAL DIVERSITY
NOVEMBER 18, 2021

Notice of Petition

For action pursuant to Section 670.1, Title 14, California Code of Regulations (CCR) and Division 3, Chapter 1.5, Article 2 of the California Fish and Game Code (Sections 2070 *et seq*.) relating to listing and delisting endangered and threatened species of plants and animals.

I. SPECIES BEING PETITIONED:

Species Name: Temblor legless lizard (*Anniella alexanderae*)

II. RECOMMENDED ACTION: Listing as Endangered or Threatened

The Center for Biological Diversity submits this petition to list the Temblor legless lizard (*Anniella alexanderae*) as Endangered or Threatened pursuant to the California Endangered Species Act (California Fish and Game Code §§ 2050 et seq., "CESA").

This petition demonstrates that the Temblor legless lizard is eligible for and warrants listing under CESA based on the factors specified in the statute and implementing regulations. Specifically, the Temblor legless lizard meets the definition of an "endangered species" since it is a "native species or subspecies of a … reptile…which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease." Cal. Fish & Game Code § 2062. Alternatively, we request that the California Fish and Game Commission consider listing of the Temblor legless lizard as a "threatened species" which is "a native species or subspecies of a … reptile that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts . . . ." Cal. Fish & Game Code § 2067.

III. AUTHOR OF PETITION:

Shaye Wolf, Ph.D.
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Oakland, CA 94612
(415) 385-5746
swolf@biologicaldiversity.org

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signature:  Date: November 18, 2021

Table of Contents

Executive Summary

The Center for Biological Diversity submits this petition to list the Temblor legless lizard (*Anniella alexanderae*) as Endangered or Threatened pursuant to the California Endangered Species Act (California Fish and Game Code §§ 2050 et seq., "CESA").

Following Section 670.1, Title 14, California Code of Regulations, petitioners present scientific information regarding life history, population trend, range, distribution, abundance, kind of habitat necessary for survival, factors affecting the ability to survive and reproduce, degree and immediacy of threat, impact of existing management efforts, suggestions for future management, availability of sources and information, and a detailed distribution map.

First identified in 1852, the California legless lizard, genus *Anniella*, is found only in California and Baja California, Mexico. Originally considered to consist of two distinct species, *A. pulchra* and *A. geronimensis*, Papenfuss and Parham (2013) formally split *A. pulchra* into five distinct species in 2013 based on genetic and morphological differences, including the species *Anniella alexanderae*, the Temblor legless lizard.

The Temblor legless lizard is a unique and rare reptile that is only found in a few locations in the San Joaquin Valley in central California. It can be distinguished from a snake due to its eyelids and detachable tail which is used to escape predators. The lizard's preferred habitat is sandy alkali desert scrub with plenty of loose soil and leaf litter for burrowing and hunting. Legless lizards are the only sand swimming specialists in California.

The Temblor legless lizard is restricted to an exceedingly small range estimated at only 1,720 square kilometers along the east side of the Temblor Mountains, from the western edge of Kern County north to western Fresno County. It is currently known to exist at only four sites, three of which are on private land.

The lizard is immediately threatened by extensive oil and gas development in its restricted range. Three of the four sites where the lizard has been detected are within oil field boundaries and surrounded by extensive oil and gas development. In total, 31 oil fields overlap the lizard's range, and more than 98% of its range is already open or potentially available to oil and gas development. The International Union for Conservation of Nature (IUCN) recently concluded that oil and gas development could propel the Temblor legless lizard to Critically Endangered status or extinction in the near future.

Oil and gas development threatens the Temblor legless lizard by destroying and fragmenting its habitat; compacting soil, altering soil moisture, and removing native plants; spilling oil and produced water; noise and light pollution; and worsening climate change. Oil and produced water spills are rampant in the Temblor legless lizard's restricted range, including at least 20 "surface expression" spills since 2019, two of which are currently active.

State and local agencies continue to approve thousands of new oil and gas permits each year in California, a substantial portion of which are in the 31 oil fields overlapping the species' habitat. Kern County, where the majority of remaining Temblor legless lizard habitat is located, is attempting to streamline oil and gas permitting to make future approvals for projects faster and

hidden from public scrutiny. In 2019 the Bureau of Land Management (BLM) opened up oil and gas drilling and fracking on more than one million acres of public lands and mineral estate in Central California, including a significant portion of the Temblor legless lizard's restricted range. In 2020, the BLM approved the first oil and gas lease sales of federal public lands in California in eight years, covering 4,000 acres in Kern County, including one large parcel at the southern end of the Temblor legless lizard's range.

The Temblor legless lizard is also threatened by urban development, industrial solar development, invasive grasses and non-native wild pigs, and rising temperatures and changes in moisture caused by climate change. No existing regulatory mechanism are currently in place at the national, state or local levels that adequately address the threats facing *A. alexanderae.*

The Temblor legless lizard is currently listed as Species of Special Concern in California. It is designated as vulnerable by the IUCN, and as a G1 and S1 critically imperiled species at the global and state level by NatureServe. In 2019 experts on the species recommended listing the Temblor legless lizard under the California and federal Endangered Species Act.

This petition demonstrates that the Temblor legless lizard is eligible for and warrants listing under CESA based on the factors specified in the statute and implementing regulations. Under CESA, a "threatened species" is "a native species or subspecies… that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts…" Cal. Fish & Game Code § 2067. An "endangered species" is "in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease." Cal. Fish & Game § 2062.

The Temblor legless lizard faces serious and immediate threats, particularly from oil and gas development, that jeopardize its continued existence in all or a significant portion of its range in California. It consequently meets the definition of an endangered species.

The Temblor Legless Lizard Warrants Listing as Endangered or Threatened under the California Endangered Species Act (CESA)

I. Introduction

This petition summarizes the available scientific information regarding the taxonomy and natural history of the Temblor legless lizard (*Anniella alexanderae*), its range, distribution, abundance, and population trends in California, threats affecting its ability to survive and reproduce, and discusses the limitations of existing management measures in protecting the species. As demonstrated below, the Temblor legless lizard meets the criteria for protection as "endangered" or "threatened" under the California Endangered Species Act (CESA) and would benefit greatly from such protection.

II. Life History

A. Taxonomy

The Temblor legless lizard *Anniella alexanderae* is recognized as its own species. The Temblor legless lizard is in the genus *Anniella* which consists of six fossorial, wormlike lizard species endemic to California and Baja California Norte, Mexico (Papenfuss and Parham 2013, p. 1; Parham et al. 2019, p. 5, Figure 1). *Anniella* was discovered to science in 1852 by Dr. J.A. Gray (Miller 1944, p. 273) and originally described as two species: one that ranges throughout most of California (*A. pulchra*) and another that occurs in Baja California (*A. geronimensis*). The California legless lizard *Anniella pulchra* was already listed as a Species of Special Concern in California (Jennings and Hayes 1994, p. 111) when it was split into five distinct species in 2013 based on genetic and morphological data: *Anniella alexanderae* (Temblor legless lizard), *Anniella campi* (Southern Sierra legless lizard), *Anniella grinnelli* (Bakersfield legless lizard), *Anniella pulchra* (Northern California legless lizard), and *Anniella stebbinsi* (Southern California legless lizard) (Papenfuss and Parham 2013, p. 2). *Anniella alexanderae* was named in honor of naturalist Annie Alexander (1867-1950) who made critical contributions to the study of California's vertebrate biodiversity (Papenfuss and Parham 2013, pp. 9-10).

The California Natural Resources Agency's October 2021 Special Animals List recognizes *Anniella alexanderae* as a distinct species (CNDDB 2021a, pp. 43, 86). In reference to *Anniella alexanderae* (Temblor legless lizard), the Special Animals list explains that "[l]egless lizards (Anniella spp.) in California were traditionally considered one species, but are now considered five species (Papenfuss and Parham, 2013)" (CNDDB 2021a, p. 86). The Special Animals List further clarifies that *Anniella alexanderae* retains the California Species of Special Concern (SSC) status (CNDDB 2021a, p. 86).

B. Genetic Differentiation

A range-wide genetic survey of *Anniella* by Parham and Papenfuss (2009) revealed five major genetic lineages of *A. pulchra*, recognized as distinct genetic clades using both mitochondrial and nuclear DNA markers. The level of genetic divergence among these clades corresponds to species level differences found in other lizard genera (Papenfuss and Parham 2013, p. 3). Parham and Papenfuss (2009, p. 174) estimated that lineage B (corresponding to *A. alexanderae*)

diverged from other *Anniella* between 3 and 7 million years ago, at a time when a marine embayment would have separated many of the San Joaquin *Anniella* populations.

Papenfuss and Parham (2013) split *A. pulchra* into five distinct species, including *A. alexanderae*, corresponding to the five genetic clades detected by Parham and Papenfuss (2009), where *A. alexanderae* represents Lineage B. Importantly these species can be distinguished by their distinct morphological characteristics, including coloration and vertebral counts (Papenfuss and Parham 2013, p. 3).

Parham et al. (2019) expanded upon the genetic analysis of Parham and Papenfuss (2009) by more than tripling the number of samples for mitochondrial and nuclear DNA analysis and expanding the number of nuclear markers from one to six. Both mitochondrial and nuclear DNA analyses support the classification of *A. alexanderae* as a distinct species (Parham et al. 2019, pp. 17-19).

C. Species Description

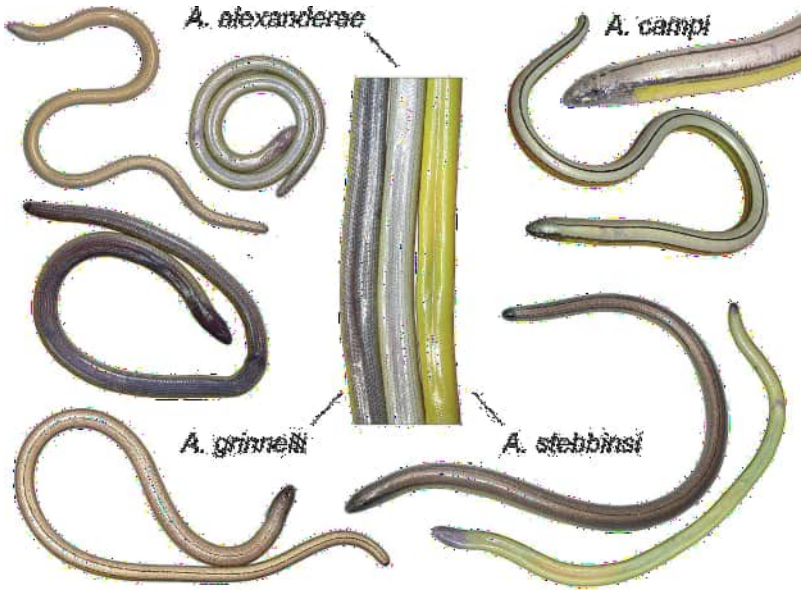
Anniella alexanderae is a small, slender lizard with no legs, a shovel-shaped snout, smooth shiny scales, and a blunt tail (Miller 1944, pp. 276-280). *A. alexanderae* is differentiated physically from snakes by the presence of eyelids and a detachable tail used to foil predators (Miller 1944, p. 277; California Herps 2021). The lizard has no external ear openings and senses vibrations through the sand (Thomson et al. 2016, p. 186). It is approximately 4 to 7 inches long from snout to vent, excluding the tail (Jennings and Hayes 1994, p. 108). Legless lizards are the only sand swimming specialists in California (Evelyn and Sweet 2018, p. 6).

A. alexanderae can be identified by its unique morphological characteristics (Parham et al. 2019, p. 23). While there are limited differences in scalation among *Anniella* species (Papenfuss and Parham 2013, p. 3)*, A. alexanderae* can be differentiated from others by ventral and dorsum coloration, vertebral counts, and scale counts (Parham et al. 2019, p. 23). *A. alexanderae* has a higher dorsal scale and vertebral count (see Table 1 and Figure 1) and a unique light grey ventral coloring from the lower jaw to the end of the tail (Papenfuss and Parham 2013, p. 7-8). The dorsum is a pale olive with orange sides. There is a mid-dorsal black stripe present from the parietals to the tip of the tail, and lateral black stripes from the eye to the top of the tail (Papenfuss and Parham 2013, pp. 5, 7).

Table 1. Dorsal scale and trunk vertebral count (based on x-ray images) for the *Anniella* pulchra complex. Summary of data from *Hunt 1984 are from clearly designated groups in that study that do not include more than one species. Source: Papenfuss and Parham 2013, based on tables from pp. 5, 8.

***Anniella* spp**	**Dorsal Scale Count**	**Trunk Vertebral Count**
A. pulchra	198 – 250*	74 – 78
A. stebbinsi	188 – 249*	
A. alexanderae	257	81 – 83
A. campi	244	75 – 78
A. grinnelli	239	79 – 83
A. stebbinsi	215	73 – 77

Figure 1. Four new species of *Anniella* and their diagnostic characteristics. Source: Papenfuss and Parham 2013, p. 6.



D. Biology

Since the taxonomic identification of *A. alexanderae* is relatively new, the available biological information primarily refers to what was originally known as *A. pulchra*.

Reproduction, Growth and Lifespan

California legless lizards are live-bearing species that breed from early spring through July and have anywhere between one and four fully developed live-born young between September and November (Miller 1944, pp. 274, 276, 288), after a gestation period of approximately four months (Jennings and Hayes 1994, p. 110). Female lizards may not produce new young every year, but more research is needed to determine how frequently or infrequently this occurs (Jennings and Hayes 1994, p. 110). Males reach sexual maturity around two years old and 90 mm snout-to-vent length, and females reach sexual maturity at three years old and 121 mm snout-to-vent length (Jennings and Hayes 1994, p. 110).

Anniella species, like most reptiles, shed their skin periodically. Under laboratory conditions this lizard sheds every three to five weeks, from February to November, with little to no shedding during the winter months depending on the activity of the lizard (Miller 1944, p. 277). The shedding process can take just a couple of days but is dependent on the moisture level in the substrate (Miller 1944, p. 277).

Due to the Temblor legless lizard's burrowing nature, it is difficult to study lifespan in the wild, although sexually mature adults have been kept alive in a lab for almost six years (Jennings and Hayes 1994, p. 110).

Burrowing Behavior and Movement

Temblor legless lizards are fossorial lizards that build burrows in soil with a high proportion of sand (Jennings and Hayes 1994, p. 108). They "swim" through dry, loose sand with lateral undulations (Stebbins and McGinnis 2012, p. 333). They are rarely active on the surface although they use the soil/litter interface for feeding and mating (Thomson et al. 2016, p. 188). They are sensitive to noise and light pollution (Miller 1944, p. 285) which can affect their hunting (Thomson et al. 2016, pp. 189, 190). The legless lizard's body surface is covered with smooth, highly polished scales which reduce friction with the surface, and smooth fine sand is needed for undulatory body movements (Miller 1944, p. 278). These lizards have been found at varying soil depths, from a few centimeters to 50 centimeters (Thomson et al. 2016, p. 188), but they usually reside in depths from one to four inches (Miller 1944, p. 289).

They are not known to move or emigrate far and have a high site fidelity, so populations are localized (Miller 1944, p. 288; Jennings and Hayes 1994, p. 110). As noted by Parham and Papenfuss (2009, p. 170), "[b]ecause of its habitat specificity and overall lack of motility, [the California legless lizard] is not apt to disperse and the isolation of populations should be a common phenomenon."

Temperature Requirements

Temperature regulates the key aspects of reptile life history such as sex determination and incubation (Mitchell and Janzen 2010, p. 129-140). Legless lizards prefer temperatures between 59 to 77°F (15 to 25°C), do not bask in direct light, are rarely found above ground, and lie just beneath the surface of the substrate for feeding and mating (Miller 1944, p. 284, 288). They are most active during the morning and evening (Miller 1944, p. 284). If the substrate temperatures remain above 70°F (21°C) for extended periods, they may also be observed on the surface at night (Jennings and Hayes 1994, p. 110). Their ability to withstand cooler temperatures while staying active is consistent with fossorial lizards that do not bask directly in the sun (Jennings and Hayes 1994, p. 110). They are inactive at temperatures below 55°F (13°C), and temperatures in a laboratory setting above 104°F (40°C) are lethal to *Anniella* species (Miller 1944, pp. 284, 288). The Temblor legless lizard is thought to hibernate during the winter months when the weather is cooler (Jennings and Hayes 1994, p. 110).

Diet and Foraging Behavior

The diet of the Temblor legless lizard consists of beetle larvae, termites, and spiders (Miller 1944, p. 274). The legless lizard will hide under leaf litter, loose sand, or at the base of shrubs to ambush their prey (Miller 1944, p. 288). While their eyes are functional, they appear to be nearsighted with a keen sense of mechanical disturbances and their olfactory senses are well developed (Miller 1944, p. 280). The lizard senses vibrations through the ground, using this sense to follow their prey from below and come up ahead to catch it (Miller 1944, p. 280). After capturing their prey, they go back down into their burrow to eat, swallowing sand along the way (Miller 1944, p. 274).

Predators

Documented predators of *A. alexanderae* and other legless lizards include ring-necked snakes, common kingsnakes, deer mice, long-tailed weasels, domestic cats, California thrashers, American robins, and loggerhead shrikes (Miller 1944, p. 277). Along with the ability to conceal itself in the substrate to attack prey and hide from predators, the legless lizard can also detach its tail as a defense mechanism; the tail will writhe on the ground for several minutes to distract a potential predator so the lizard can escape (California Herps 2021). Regrowth of the tail can take up to one year (Miller 1944, p. 277).

III. Habitat Necessary for Survival

The Temblor legless lizard is a microhabitat specialist due to its specific requirements for burrowing (Thomson et al. 2016, p. 188). Legless lizards are restricted to habitats that include loose soil or other substrate (e.g., sand or leaf litter), with moderate plant cover, that allow for their fossorial ecology (Jennings and Hayes 1994, pp. 110-111, Parham and Papenfuss 2009, p. 169). The Temblor legless lizard is limited to predominately sandy alkali desert scrub habitat along the base of the eastern side of the Temblor Mountain range, from northwestern Kern County to southwestern Fresno County, Central California (Parham et al. 2019, pp. 10, 12, 21). See Figure 2 for typical habitat.

Legless lizards have specific requirements for soil moisture and soil density that are essential to their survival (Miller 1944, pp. 288-289; Jennings and Hayes 1994, p. 111). Soil moisture is critical for conserving energy at high temperatures and allowing shedding to occur (Jennings and Hayes 1994, p. 111). If the sand is too dry, recently shed skin could stick to the new skin and the head may not shed at all, which makes the use of the eyes and feeding difficult, sometimes leading to starvation (Miller 1944, p. 277). If the soil has too much clay or adobe, the legless lizard cannot penetrate deep enough for survival (Miller 1944, p. 288) and the clay content can plug their nostrils, resulting in death due to suffocation (Evelyn and Sweet 2018, p. 6-7). Dry sand overlying damp sand provides optimal conditions where the lizards can move freely from one to the other (Miller 1944, p. 289). Loose, sandy soils also help in the construction of their burrows (Jennings and Hayes 1994, p. 108).

Anthropogenic activities that alter soil structure, soil moisture or plant composition can degrade the lizard's habitat and could cause local extinctions (Thomson et al. 2016, p. 189). The lizard cannot survive in developed or other areas where loose soil for burrowing has been removed or altered, such as by plowing or bulldozing (Jennings and Hayes 1994, p. 111). Oil and gas development, urbanization, conversion to cropland, large-scale industrial solar projects, and invasive species can alter soil moisture, friability, compaction, and plant cover in the lizard's habitat.

Figure 2. Habitat of *A. alexanderae*, Kern County. Photo by Theodore Papenfuss.

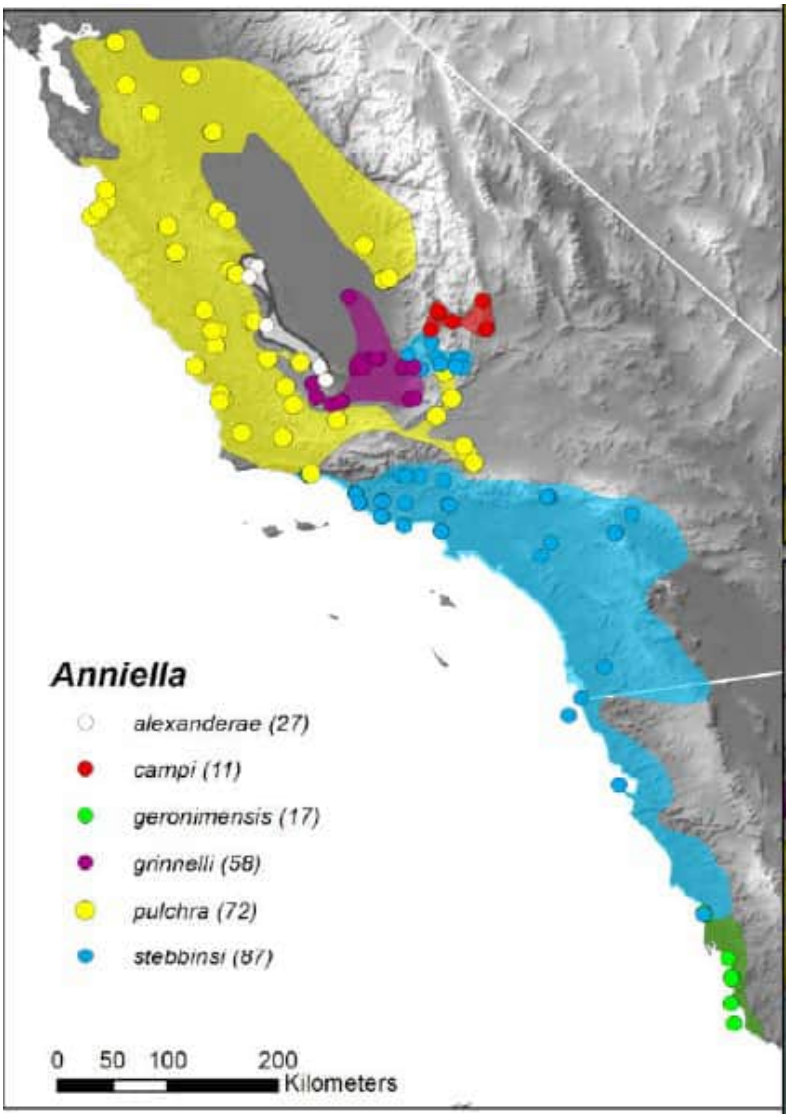
IV. Range

The known range of the Temblor legless lizard is a narrow strip less than 200 kilometers long on the east side of the Temblor Mountain Range from the western edge of Kern County to western

Fresno County, California, between the mountains and State Highway 33/Interstate Highway 5 (Parham et al. 2019, p. 10, Figure 2B). See Figure 3 for a range map. Parham et al. (2019, p. 14) estimated the total range of the species to be only 1,719.54 km^2. Parham et al. (2019, p. 14) noted that the Temblor legless lizard's elevation range is more limited than the majority of the other legless lizard species.

Ecological niche modeling predicted a larger swath of the northern San Joaquin Valley east of Highway 33 as suitable range for the Temblor legless lizard (Parham et al. 2019, p. 16), but detailed searches, including multi-year use of cover boards, have not found *Anniella* in this region east of Highway 33 (Papenfuss and Parham 2013, p. 8). Most of that land has now been developed and is highly modified (Parham et al. 2019, pp. 16, 21, 22).

Figure 3. Map showing current range for all six *Anniella* species in Southern California through Baja California, with survey sites represented by circles. The range for *A. alexanderae* is shown in white, with survey sites represented by white circles. Source: Parham et al. 2019, Figure 2.



V. Distribution

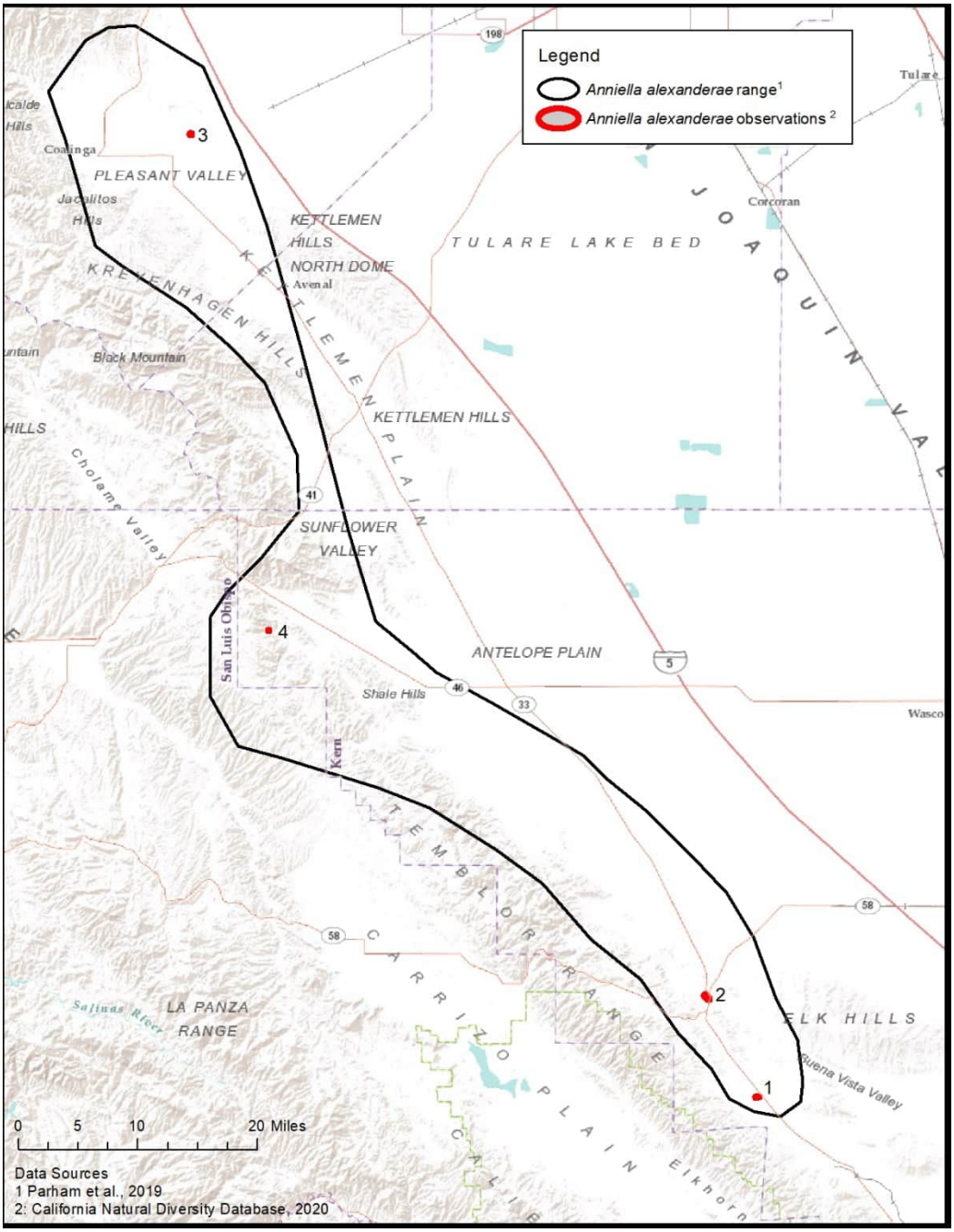
Information on Temblor legless lizard distribution comes largely from surveys based on placing cover boards made from cardboard or plywood on sandy soil (Papenfuss and Parham 2013, p. 8; Parham et al. 2019, p. 7). Cover boards are typically placed in the field in the summer or fall, covered with soil, and checked in the spring when *Anniella* are most active (Parham et al. 2019, p. 7). The boards are flipped over and the soil under the boards is lightly raked to check for lizards (Parham et al. 2019, p. 7). Importantly, researchers note that it often takes three to four years with a cover board in place before a legless lizard is detected (Theodore Papenfuss, personal communication).

As noted above, *A. alexanderae* was split into its own species in 2013 based on genetic and morphological data (Papenfuss and Parham 2013). Papenfuss and Parham (2013, p. 8) reported *A. alexanderae* from a single area at the southeast base of the Temblor Range between McKittrick and Taft west of Hwy 33, comprised of two sites separated by continuous suitable habitat.

Parham et al. (2019, p. 7, Appendix A, B) expanded the known range of *A. alexanderae* based on surveys conducted over four years, covering ~60 survey sites, where a site can have multiple separate locations with cover boards in place. Specifically, Parham et al. (2019, p. 14) reported Temblor legless lizards in four different sites in seven unique localities ranging in elevation from 168 to 466 meters. See Figure 4 for distribution map showing lizard detection sites. Lizard detection site 1 is northwest of the city of Taft, CA, with three localities within one kilometer of each other, within the Midway-Sunset oil field. Lizard detection site 2 is near the town of McKittrick within the McKittrick oil field boundary. Lizard detection site 3 is within the 1,200-acre California Department of Fish and Wildlife (CDFW)-managed Pleasant Valley Ecological Reserve (Parham et al. 2019, p. 22), east of Coalinga within the boundaries of the Pleasant Valley oil field. The Pleasant Valley Ecological Reserve was designated in 2000 to protect grasslands and saltbush scrub habitats for sensitive animal species and is surrounded by oil fields, cattle grazing, and agriculture (CDFW 2021a). Lizard detection site 4 is located within a 5-acre parcel on the Palo Prieto Conservation Bank, in the foothills of the Temblor Mountain Range (CNDDB 2021b). The Palo Prieto Conservation Bank, an easement with five separate parcels of land totaling just over 5,000 acres, was established in 2006 to preserve San Joaquin kit fox habitat, as well as other sensitive species found in the area (PPCB 2020a). The conservation land is also used for cattle grazing.

Overall, three of the four detection sites (sites 1, 2, and 3) containing six of the seven localities are within oil field boundaries, with the exception of the Palo Prieto Conservation Bank. Three of the four detection sites (sites 1, 2, and 4) containing six of the seven localities are located on private land, with the exception of the Pleasant Valley Ecological Reserve.

Figure 4. Range of the Temblor legless lizard and the four sites where it has been found.



Importantly, the Temblor legless lizard is found in limited habitat patches at all the detection sites. For example, at site 3 in the 1,200-acre Pleasant Valley Ecological Reserve, suitable habitat for the legless lizard encompasses only about one acre in an upland area with sandy soil (Theodore Papenfuss, personal communication). The majority of reserve lands have hard-packed soils or are located in stream valleys subjected to periodic large floods which can drown lizards, and which are not suitable habitat (Theodore Papenfuss, personal communication). At site 4

within the Palo Prieto Conservation Bank, suitable habitat consists of approximately three to four acres (Theodore Papenfuss, personal communication). Most of the conservation bank land is rolling grassy hills without loose soil and does not provide suitable habitat (Theodore Papenfuss, personal communication).

Moreover, all known lizard detection sites are on private land with the exception of a single site on the CDFW Pleasant Valley Ecological Reserve. Parham et al. (2019, p. 22, Table 1) estimated that only 0.5% of the lizard's range (9 km^2, 18 parcels) is on CDFW lands, with another 5% of the range (91 km^2) on BLM lands.

Temblor legless lizards have high-site fidelity, at least over the short term (Jennings and Hayes 1998, p. 110). Collection results via coverboards indicate localized populations, and in all probability the lizards are not distributed over their entire range (Miller 1944, p. 288).

VI. Abundance

The Temblor legless lizard is considered to be rare based on its limited range within which it has only been found at seven localities in four sites (Papenfuss et al. 2013, p. 14; Parham et al. 2019, pp. 11, 14). Due to its fossorial and cryptic nature, population size estimates are not readily available (Thomson et al. 2016, pp. 189-190).

VII. Population Trend

Trends in habitat availability serve as a proxy for population trends. Based on the extensive habitat loss and fragmentation within the lizard's range, the Temblor legless lizard population has almost certainly declined. As detailed below, the majority the species' habitat has been destroyed, fragmented and degraded by oil and gas development, urbanization, and other threats and is no longer suitable (Thomson et al. 2016, p. 189). Ecological niche modeling predicted that the lizard's range included a larger swath of the northern San Joaquin Valley, most of which has been developed (Parham et al. 2019, pp. 5, 16, 22). Detailed searches have yet to find the lizard in suitable habitat on the valley floor east of Highway 33 (Papenfuss and Parham 2013, p. 8). This indicates that extirpation from human development may be a cause of their limited range and populations (Parham et al. 2019, p. 22).

The Temblor legless lizard is currently listed as Species of Special Concern in California (Thomson et al. 2016, pp. 186-191). Experts on the species have recommended a California Endangered Species Act listing for *A. alexanderae* largely based on the loss of habitat that provides a proxy for population decline (Parham et al. 2019, p. 24). A key recommendation of the *2019 Conservation Assessment of the California Legless Lizard (Anniella)* prepared for the California Department of Fish and Wildlife is:

> It would be prudent to consider the possibility of a Federal or State listing for *A. alexanderae*. The State of California already considers this species to be critically imperiled (G1 S1), but more protection may be warranted. The discovery of new sites for this species provide additional hope for its conservation, but currently all but one known site for this species is on private land (Parham et al. 2019, p. 24).

The Temblor legless lizard is further designated as vulnerable by the International Union for Conservation of Nature (IUCN) and is on the IUCN Red List due to its narrow range and imminent threats (Hammerson 2019, p. 1-3). The IUCN recently concluded that oil and gas development could propel the Temblor legless lizard to Critically Endangered status or extinction in the near future (Hammerson 2019, p. 2, 6). NatureServe classifies the Temblor legless lizard as a G1 and S1 critically imperiled global and state ranking status, respectively (NatureServe 2021). NatureServe defines its G1 and S1 categories as "critically imperiled – at very high risk of extinction due to extreme rarity (often five or fewer populations), very steep declines, or other factors" and "factor(s) such as very steep declines making it especially vulnerable to extirpation from the state" (NatureServe 2021).

VIII. Factors Affecting Ability to Survive and Reproduce

Oil and gas development, urbanization, and associated habitat destruction, fragmentation, and degradation are the primary threats to the Temblor legless lizard (Thomson et al. 2016, pp. 188-189; Hammerson 2019, p. 6). The Temblor legless lizard is also threatened by industrial solar development, invasive grasses and non-native wild pigs, and rising temperatures and changes in moisture caused by climate change.

A. Oil and Gas Development

Oil and gas development is the primary threat to the Temblor legless lizard. Three of the four sites where the lizard has been detected are within oil field boundaries and surrounded by extensive oil and gas development. In total, 31 oil fields overlap the Temblor legless lizard's narrow range.[1] More than 98% of the lizard's restricted range is already open or potentially available to oil and gas development. The IUCN recently concluded that oil and gas development could propel the Temblor legless lizard to Critically Endangered status or extinction in the near future (Hammerson 2019, pp. 2, 6). Oil and gas development threatens the Temblor Key legless lizard through habitat loss and fragmentation; soil compaction, removal of the duff and litter layer the lizard requires, loss of native plant life, and changes in soil moisture; oil spills and produced water spills; noise and light pollution; human disturbance; and climate change.

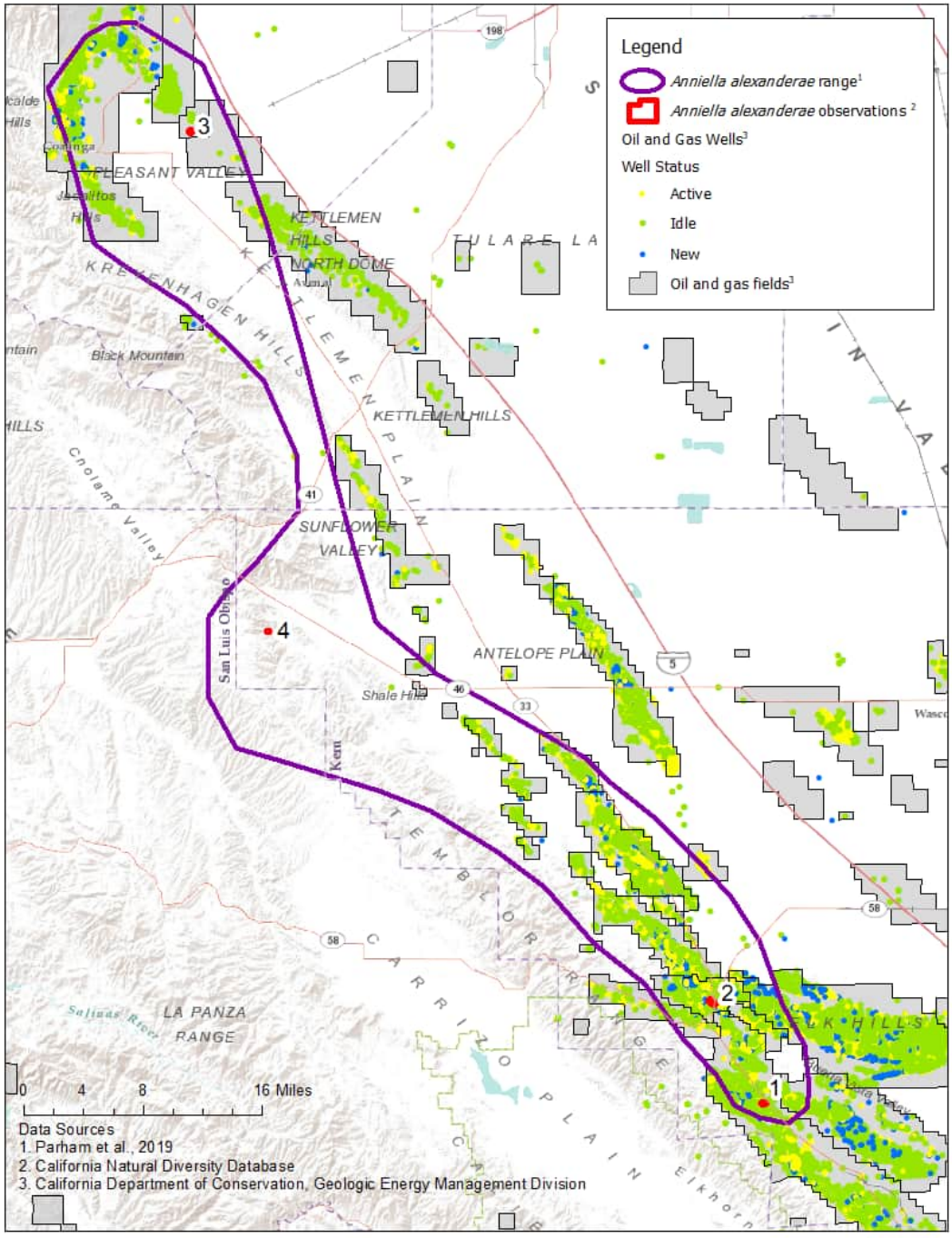
<u>Oil and gas development is extensive in the Temblor legless lizard's limited range</u>

Oil and gas development is extensive and continues to expand in the Temblor legless lizard's restricted range. State and local agencies continue to approve thousands of new oil and gas permits each year, a substantial portion of which are in the 31 oil fields overlapping the species' habitat. Areas already open to oil and gas development and potentially available to oil and gas

[1] These 31 oil fields are Antelope Hills, North Antelope Hills, Antelope Plains Gas (ABD), Asphalto, Belgian Anticline, Blackwells Corner, Buena Vista, Cal Canal Gas, Carneros Creek, Chico-Martinez, Coalinga, Coalinga East Extension, Cymric, Elk Hills, Guijarral Hills, Jacalitos, Kettleman North Dome, Kreyenhagen (ABD), McDonald Anticline, McKittrick, Midway-Sunset, Monument Junction, North Belridge, Pleasant Valley, Pyramid Hills, Railroad Gap, Shale Flats Gas (ABD), Shale Point Gas (ABD), South Belridge, Temblor East (ABD), and Temblor Ranch.

development comprise 98.3% of the lizard's range, including private lands, areas open for leasing, and existing leases (see Figures 5, 6). Moreover, Kern County, where the majority of remaining Temblor legless lizard habitat is located, is attempting to streamline oil and gas permitting to make future approvals for projects faster and hidden from public scrutiny. In 2019 the Bureau of Land Management (BLM) opened up oil and gas drilling and fracking on more than one million acres of public lands and mineral estate in Central California, including a significant portion of the Temblor legless lizard's restricted range.

Figure 5. Active oil and gas development in the Temblor legless lizard range.

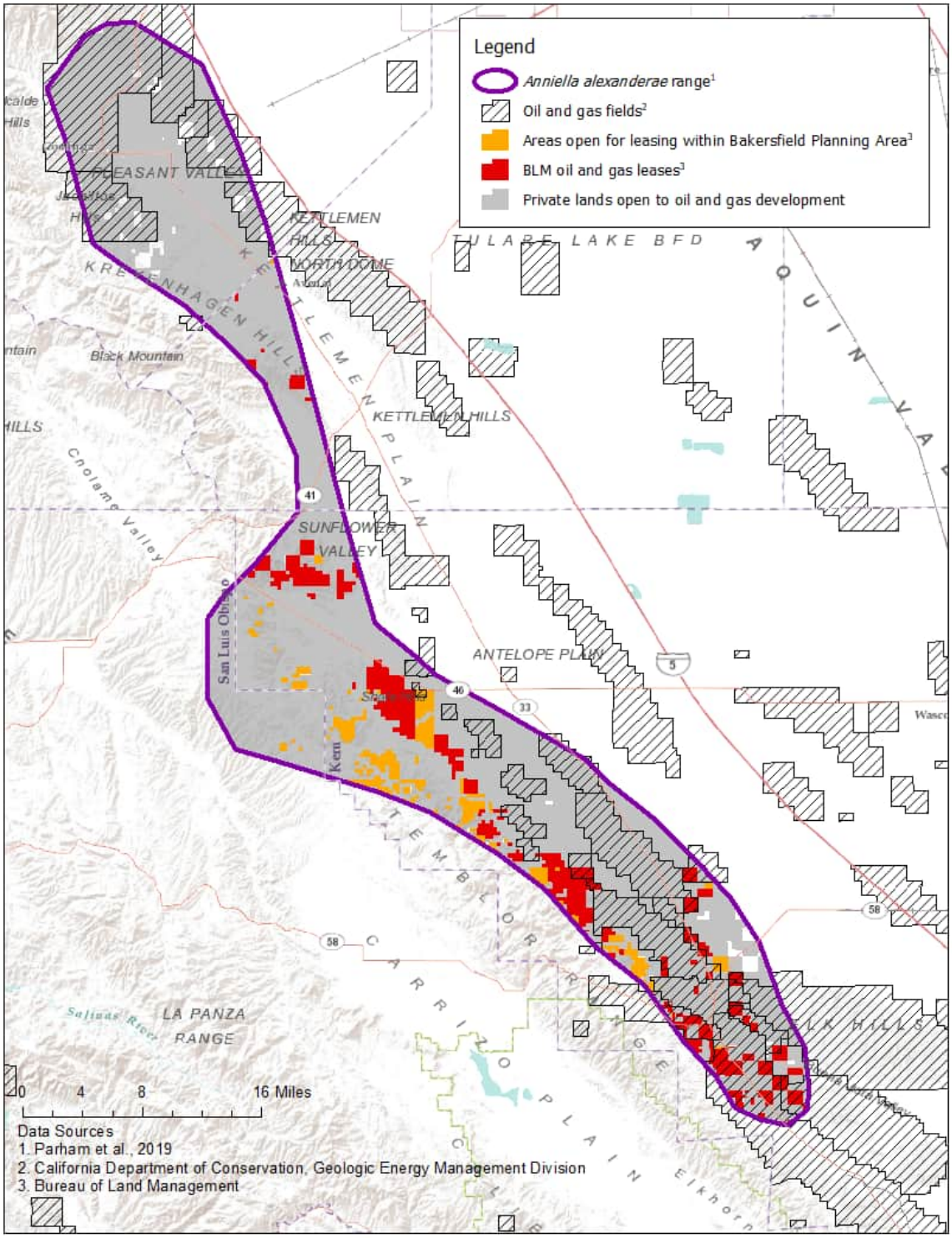


The state oil regulator, California Geologic Energy Management Division (CalGEM), under Governor Newsom has approved more than 9,700 new permits for oil and gas development in California since 2019 (Consumer Watchdog and FracTracker Alliance 2021), including more than 5,000 permits for new drilling (Center for Biological Diversity 2021). Midway-Sunset, the location of lizard detection site 1, is the largest oil field in Kern County with the largest remaining volume of crude oil and heavy drilling activity. Midway-Sunset has more than 25,000 active and idle wells (CalGEM 2021a), and CalGEM has issued at least 870 new drilling permits in this oil field since 2019 (Center for Biological Diversity 2021). McKittrick, the location of lizard detection site 2, has nearly 2,000 active and idle wells (CalGEM 2021a) with at least 314 new drilling permits issued since 2019 (Center for Biological Diversity 2021). Lizard detection site 3 is located on the Pleasant Valley Ecological Reserve (Pleasant Valley ER, p. 2), but is surrounded by the Pleasant Valley oil field and adjacent to the Coalinga and Guijarral Hills oil fields. Coalinga oil field has more than 4,100 active and idle wells (CalGEM 2021a) with at least 209 new drilling permits issued since 2019 (Center for Biological Diversity 2021). The Pleasant Valley and Guijarral oil fields each have 5 active or idle wells (CalGEM 2021a). With ~1,184 permits approved for new drilling in the Midway-Sunset and McKittrick oil fields alone since 2019, where two of the four lizard detection sites are located, clearly oil and gas development is a serious and increasing threat to the lizard and its habitat.

Furthermore, in 2015 Kern County issued an ordinance that attempted to "streamline" oil and gas permitting in the county by not requiring any further environmental review or public notice for up to 72,000 wells over the next 25 years (Kern County 2015). However, in a February 2020 ruling, California's Fifth District Court of Appeals ruled that Kern County violated the California Environmental Quality Act by failing to fully evaluate and disclose the environmental damage that would occur as a result of the county's plan, including harm from water use, air pollution, and increased noise (*King and Gardiner Farms et al. v. County of Kern et al.*, 45 Cal.App.5th 814 (2020)). After the ordinance passage and before the court ruling, Kern County was issuing more than a thousand oil and gas permits each year (Kern County 2019, Table 1). In March 2021, Kern County approved a supplemental environmental impact report under a nearly identical ordinance to serve as a single environmental review for more than 40,000 new oil and gas projects over the coming decades (Kern County 2021a). This environmental impact report fails to adequately disclose, evaluate, and mitigate harms to the imperiled Temblor legless lizard and is being challenged in court (*Committee for a Better Arvin et al. v. County of Kern et al.,* 2021). This ordinance, if adopted, would jeopardize the Temblor legless lizard and its habitat through foreseeable increases in habitat loss and fragmentation, traffic, oil spills, chemical spills, and other disturbances resulting from oil and gas development.

Recently proposed oil and gas development on federal lands further jeopardizes the Temblor legless lizard. In November 2019, the Bureau of Land Management (BLM) under the Trump administration issued an environmental analysis, being challenged in court (*Center for Biological Diversity v. U.S. Bureau of Land Management*, No. 2:20-CV-00371 DSF, 2020), for the Bakersfield Resource Management Plan to allow oil and gas drilling and fracking on more than one million acres of public lands and mineral estate in Central California (BLM 2019), including a significant portion of the Temblor legless lizard's remaining habitat (see Figure 6).

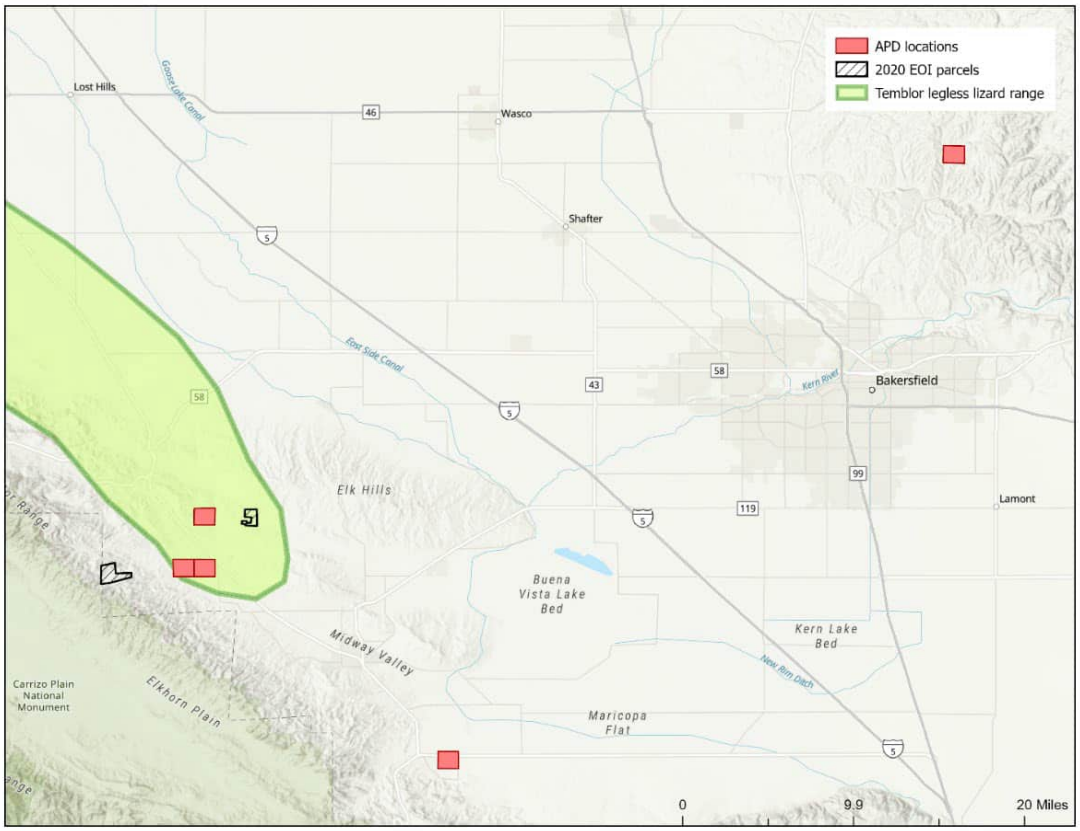
Figure 6. More than 98% of the lizard's range is available for oil and gas development. Oil and gas leases on federal lands or on lands with federal mineral rights are shown in red. Areas recently opened to leasing under the Bakersfield Resource Management Plan are shown in orange. Private lands potentially available for oil and gas development are shown in gray.



In December 2020, the BLM approved the first oil and gas lease sale of federal public lands in California in eight years, covering 4,000 acres in Kern County (BLM 2020). One of the seven parcels falls within the known habitat range of the Temblor legless lizard (see Figure 7). Yet the BLM failed to analyze the impacts of this development on the Temblor legless lizard, despite the fact that the lizard is a Species of Special Concern (*Center for Biological Diversity et al. v. U.S. Bureau of Land Management et al.,* No. 21-cv-475, 2021) and is being considered for federal listing under the U.S. Endangered Species Act (ESA) (USFWS 2021a) following an October 2020 petition from the Center for Biological Diversity (Center for Biological Diversity 2020). BLM is supposed to give special status consideration to any species listed or proposed for ESA listing as well as species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA (BLM 2020, p. 22).

BLM has since proposed to approve dozens of new drilling permits in the Midway Sunset oil field. In April 2021 BLM proposed to approve 14 Applications for Permit to Drill (APDs) submitted by Chevron to drill new wells in Midway Sunset (BLM 2021a), and in July 2021 BLM proposed to approve another 50 APDs submitted by Berry Petroleum Company (BLM 2021b). At least three APD projects fall directly within the Temblor legless lizard's known range, as shown in Figure 7. This proposed oil and gas development would jeopardize the remaining populations and habitat of this imperiled lizard in this region.

Figure 7. 2020 BLM lease sale within the habitat range of the Temblor legless lizard, shown as "2020 EOI parcel." Proposed permits to drill shown as "APD locations."



Overview of harms from oil and gas development

Oil and gas development causes severe and often permanent damage to the ecosystems where it occurs by destroying and fragmenting habitat, reducing water supplies often in water-stressed areas, causing air, noise, and light pollution, contaminating surface and ground water, and facilitating the spread of ecologically disruptive invasive species (Butt et al. 2013, Brittingham et al. 2014, Pickell et al. 2014, Souther et al. 2014, Allred et al. 2015, Harfoot et al. 2018). During the construction of well pads, roads, pipelines, compressor stations and other oil and gas infrastructure, native vegetation is cleared, and soils are bulldozed and compacted. Fossil fuel development also creates the significant risk of oil spills and chemical-laden produced water spills which can kill wildlife and cause devastating effects over large areas. Spills and leaks require large volumes of soil to be excavated and transported to hazardous waste facilities (Goldberg 2019). The "surface expression" spills caused by steam injection create gaping sinkholes in the ground and destabilize the entire area (Wilson and Younes 2020). Unlined wastewater pits allow contaminants to seep into the soil (DiGuilio et al. 2021). Remediation of the land may be infeasible once chemicals have contaminated the soil beneath such facilities. Thus, oil and gas operations can destroy vegetation and soil and permanently degrade habitat. For many species, the harms from fossil fuel development have led to mortality, changes in behavior, population declines, disruptions to community composition, and loss of ecosystem function (Endangered Species Coalition 2012).

While all oil and gas development poses a threat to the Temblor legless lizard, commonly used oil and gas extraction techniques in the lizard's range in Kern, Kings and Fresno Counties, such as steam flooding, cyclic steam injection, water flooding, and fracking, are particularly destructive, causing additional impacts. These extreme extraction techniques require pumping large volumes of toxic chemicals, steam, water, and sand at high pressures into rock formations, causing them to crack and release oil and gas. Cyclic steaming and steam flooding are heavily used in Midway-Sunset, Cymric, Coalinga, McKittrick, and South Belridge oil fields in the lizard's range (Fleming et al. 2021, p. 20, Figures 10 and 11). During steam injection for cyclic steaming and steam flooding, the operator repeatedly injects steam at very high temperature and pressure into the well to heat up the surrounding formation. Repeated steam injection creates some of the harshest conditions to which a well can be subjected. The process is known to result in a particularly high rate of well failure, can cause the ground to shift and collapse, and can cause oil and wastewater to rise to the surface ("surface expressions") which can kill wildlife and plants and destroy habitat, as detailed further below. Fracking is another commonly used extraction technique particularly in South Belridge oil field in the lizard's range (CalGEM 2021a). Fracking uses toxic chemicals and causes wide-ranging ecological harms including habitat loss and fragmentation; surface and groundwater contamination; localized air, noise and light pollution; vehicle traffic; climate change; and other cumulative impacts (Souther et al. 2014, p. 330; CCST 2015, p. 311).

Habitat loss and fragmentation

The Temblor legless lizard has already suffered significant habitat loss and fragmentation from oil and gas development (Hammerson 2019, p. 2; Parham et al. 2019, p. 5). Satellite imagery

indicates that oil and gas development has already destroyed and degraded 50% to 90% of the Temblor lizard's range (Hammerson 2019, p. 6). Fracking and cyclic steaming has led to increased habitat loss and fragmentation in Kern County by enabling oil and gas development in previously unexploited natural habitat and by increasing well densities in developed areas (CCST 2015, p. 399).

Oil and gas exploration activities and the construction and operation of well pads, roads, pipelines, compressor stations and other oil and gas infrastructure clears habitat, removes native vegetation, and disturbs and compacts soil. Numerous scientific studies demonstrate that habitat loss and fragmentation from oil and gas infrastructure negatively affects species by impeding movement and dispersal, reducing home range size, reducing patch size below what is needed for foraging and life history activities, increasing habitat isolation, altering physical characteristics such as light, moisture, and temperature, facilitating the spread of invasive species, and altering species dynamics including interactions and abundance (Brittingham 2014, pp. 11034-11043; Souther et al. 2014, p. 330; Allred et al. 2015, p. 402). Fragmentation creates "habitat islands" that can disrupt movement (MacNally and Brown 2001, p. 116) and erode genetic variation in small populations and promote inbreeding (Templeton et al. 1990, p. 13-27).

Fragmentation also increases the proportion of disturbed edge habitat to undisturbed interior habitat which can increase the likelihood of predation, parasitism, and human disturbance. For example, in the Marcellus shale, while each drilling pad and associated infrastructure results in the clearing of 8.8 acres, each drilling pad affects 30 acres after accounting for ecological edge effects (Johnson 2010). Similarly, in the Big Piney-LaBarge field in Wyoming, a study found that while the overall area of oil and gas infrastructure covered 4% of the total area, 97% of the total area fell within one-quarter mile of oil and gas infrastructure (Weller et al. 2002).

Fracking has become an increasingly important driver for enabling oil and gas production: 20% of the land area that was newly developed for oil and gas production between October 2012 and September 2014 was attributed to fracking (CCST 2015, p. 366). Kern County has experienced the majority (61% percent) of the habitat loss and fragmentation attributable to fracking-enabled production in the state, estimated at 13,400 hectares of altered natural habitat and 6,700 hectares of other altered land areas (CCST 2015, pp. 365, 399). Fracking-enabled activity exerts high local impacts on habitat in the southwestern San Joaquin Valley "where frequently stimulated fields overlap with high-quality habitat for rare species" (CCST 2015, p. 366).

In the San Joaquin Valley, high levels of habitat disturbance and fragmentation from oil and gas development prevent endemic species from persisting in those areas, including the blunt-nosed leopard lizard, San Joaquin kit fox, San Joaquin antelope squirrel, and endangered kangaroo rats (Fiehler and Cypher 2011, 2017). Most of these species were no longer detected in areas with 70% habitat disturbance or more (Fiehler and Cypher 2011, p. 21). Similarly, the USFWS Recovery Plan for the Upland Species of the San Joaquin Valley reports that blunt-nosed leopard lizard "population densities decrease as oil activity increases" and they tend to inhabit areas where little to no petroleum development occurs (USFWS 1998, p. 119).

Species like the Temblor legless lizard with limited ranges, small population size, low mobility, specialized habitat requirements, and high sensitivity to disturbance are at particular risk from habitat loss and fragmentation from oil and gas development (MacNally and Brown 2001, pp. 116-117; Brittingham et al. 2014, p. 11034). In short, the Temblor legless lizard, a cryptic lizard with localized populations, is being restricted to remnant habitat patches amidst rampant oil and gas development.

Soil compaction, loss of native plant life, changes in soil moisture

Oil and gas development compacts soils and clears native vegetation through construction, road-building, vehicle traffic, and other heavy equipment use. Oil and gas development can change soil moisture through clearing and grading of well pads that increases sediment runoff; and construction, maintenance, and/or use of culverts, pipelines, and other structures that alters water flow (Brittingham et al. 2014, p. 11038). In addition, cleared or altered areas generally allow more solar radiation to reach the ground during the day and more to re-radiate to the atmosphere at night, resulting in larger temperature and moisture gradients and higher variability near development edges compared with undisturbed areas (Wilson 2016, p. 4). Differences in air temperature, air and soil moisture, and light intensity have been estimated to extend more than 240 meters from disturbed area edges (Wilson 2016, p. 4).

The Temblor legless lizard is a micro-habitat specialist that requires loose, sandy soil for burrowing, a litter and duff layer, and specific moisture levels for its life cycle (Jennings and Hayes 1994, p. 108, Thomson et al. 2016, p. 188). It does not respond well to disturbed soil moisture levels, compacted soil (Thomson et al. 2016, p. 189) or mechanical disturbances (Miller 1944, p. 280). Oil and gas development—including construction, road-building, and heavy equipment and vehicle traffic—poses a significant threat by compacting the soil, decreasing the amount of loose substrate for the lizard to move through, removing the litter and duff layer, and altering soil moisture levels.

Noise and light pollution

Oil and gas development creates significant intermittent and chronic noise pollution due to construction, drilling, venting, flaring, fracking, truck transport, compressors, human activity, and other noise sources (CDC 2015, p. 7-30). Noise pollution from drilling, well stimulation, and compressor stations is particularly significant. CalGEM reports the noise from pumping during a frack job at 107 decibels (CDC 2015, p. 7-30) while noise from pumping during acid matrix stimulation can range between 75 to 100 decibels (CDC 2015, p. 7-37). Compressor stations can produce constant sound over 80 decibels — as loud as a busy highway. Drilling operations often continues 24 hours a day until completion, meaning that surrounding areas can be exposed to noise from drill rigs, air compressors, drill pipe connections and power generators day and night.

Oil and gas development can also lead to significant amounts of light pollution. Drilling sites are lighted at night to allow for 24-hour operation of the drill rig, and well drilling lasts an average of 23 days but can continue for more than 60 days (Kern County 2015, p. 3-41). During inevitable oil and produced water spills, oil companies will utilize strobe lights and propane cannons through the night to ward off wildlife.

Anthropogenic noise is a widespread pollutant that affects a wide array of species including reptiles (Kunc and Schmidt 2019). Research shows that noise pollution from oil and gas-related activities can cause wildlife to temporarily or permanently abandon habitat areas and can negatively impact abundance, stress levels, behavior and fitness (Bayne et al. 2008; Francis et al. 2013; Patricelli et al. 2013; Wilson 2016, pp. 2-4; Kleist et al. 2018, p. E468). Light pollution has been shown to disrupt animal foraging, breeding, and migratory behaviors; cause disorientation; disrupt natural day-night cycles of plants; lead to mortality and predation; and change community composition (CCST 2015, p. 350).

The Temblor legless lizard is particularly sensitive to noise and light (Miller 1944, p. 277, 284, 285, 288). It can sense vibrations through the ground and has a keen sense of mechanical disturbances (Miller 1944, p. 280). The lizard uses this sense to follow their prey from below and come up ahead of the prey and catch it (Miller 1944, p. 280). The chronic and intermittent vibrations and noise disturbances from oil and gas development could harm the lizard's ability to hunt (Thomson et al. 2016, p. 189, 190). Although they are mostly subsurface, legless lizards use the surface for feeding and mating (Thomson et al. 2016, p. 188) and may also use the surface on warm nights (Jennings and Hayes 1994, p. 110). Because legless lizards are sensitive to light, light pollution from oil and gas development may interrupt these surface activities.

Oil spills and produced water spills

Oil and produced water spills threaten the Temblor legless lizard including by contaminating habitat with toxic chemicals, altering soil density and moisture content, and injuring and killing lizards during spills or clean-up activities. As detailed below, oil and produced water spills are rampant in the Temblor legless lizard's restricted range, including at least 20 "surface expression" spills since 2019, two of which are currently active.

Oil and produced water spills and leaks are inherent to oil and gas production and occur with troubling frequency in California. Between January 2009 and December 2014, a total of 575 produced water spills and 31 chemical spills were reported, equivalent to 99 produced water spills per year (CCST 2015, p. 345). One acid spill ruptured beyond a secondary containment apparatus and spilled 5,500 gallons of hydrochloric acid (CCST 2015, p. 128). Kern County has the highest concentration of produced water spills (55%) and chemical spills (42%) of any county in the state (CCST 2015, p. 161). Kern County estimates that there have been 613 spills and 87 well leaks reported from 2009 through 2014 (Kern County 2015, p. 4.9-72). The number of incidents reported is likely smaller than the number of actual spills and leaks, either because they have not yet been discovered, or operators have not reported them.

Produced water spills contain a toxic mix of chemicals. One comprehensive study found that 40% of the chemicals added to fracking fluids have ecological effects, indicating that they can harm wildlife (Colborn 2012). A 2017 study of the chemicals used in routine oil and gas activities in California – including well drilling, well completion, and well rework –found that there is widespread use of toxic chemicals (Stringfellow et al. 2017). Although 70% of the disclosed chemical additives could not be fully evaluated because of insufficient reporting on chemical identity by the oil and gas industry, commonly used chemical additives in routine

activities include ecotoxic biocides and corrosion inhibitors, as well as the use of high concentrations of hydrochloric acid and hydrofluoric acid for maintenance acidizing. In total, 58 chemical additives were identified as being ecotoxic.

Steam injection causes large and frequent "surface expressions" in the Temblor lizard range, in which oil and produced water are pushed up to the surface and cause large-volume spills. These surface spills are particularly common in Cymric, McKittrick, and Midway-Sunset oil fields in the lizard's restricted range. There are currently at least two active surface spills in the legless lizard's range and 18 that have just been controlled in the past two years (CalGEM 2021b). For example, the Cymric 1Y Oil Field spill in Kern County was first reported in early May 2019 and took 5 months to clean up an estimated 1,339,926 gallons (31,903 barrels) of spilled oil and water (see Figure 8) (CDFW 2019, p. 1). The Oil and Gas Supervisor determined that the spill presented a significant threat of harm to human health and the environment (CDC 2019, p. 6). Another surface spill in the Cymric oil field, GS-5, has leaked more than 16.8 million gallons of oil and about 70 million gallons of wastewater intermittently since 2003, more than the Exxon Valdez spill (CDFW 2019; Wilson and Younes 2020), threatening wildlife and plant species in the area. Of particular concern, the frequency of reported large spills has increased since CalGEM adopted changes to state regulations in April 2019 to allow higher pressure steam injection to occur (Cal. Code Regs, tit. 14, § 1724.10.3 (Apr. 1, 2019)).

There are no meaningful disincentives for oil companies to prevent surface expressions. In fact, many become a financial windfall. Operators have "commercialize[d] surface expressions, despite warnings by staffers about environmental and human harm" (Wilson and Younes 2020). According to Wilson and Younes (2020), "[i]n the last three years alone, the crude collected from GS-5 [the Cymric GS-5 spill] has generated an estimated $11.6 million."

It is well-documented that oil and chemical spills can have catastrophic ecological impacts due to their toxic effects, the potentially large volume of spills, and the difficulty of containment and clean-up (i.e., produced water spills cannot be contained by traditional oil spill response methods). In Kern County, wildlife that live in burrows near spills are "entombed" by the spilled crude oil (Wilson and Younes 2020). Records show "dozens of dead and decaying birds and small mammals around spill sites" (Wilson and Younes 2020).

The Temblor legless lizard is a small, reclusive reptile that would not be readily visible during an oil spill. They would be entombed by fast-rising crude oil and produced water from underground. Without focused surveys it would it be unknown if any legless lizards were killed in an oil spill. The process of cleaning up an oil spill, involving removal of significant amounts of soil during a clean-up, could easily wipe out an entire legless lizard population (see Figure 8). An oil spill during the legless lizard breeding season from early spring to July (Jennings and Hayes 1994, p. 110) could also wipe out breeding populations.

Figure 8. A "cleaned-up" oil and produced water surface spill in Cymric oil field, Kern County.

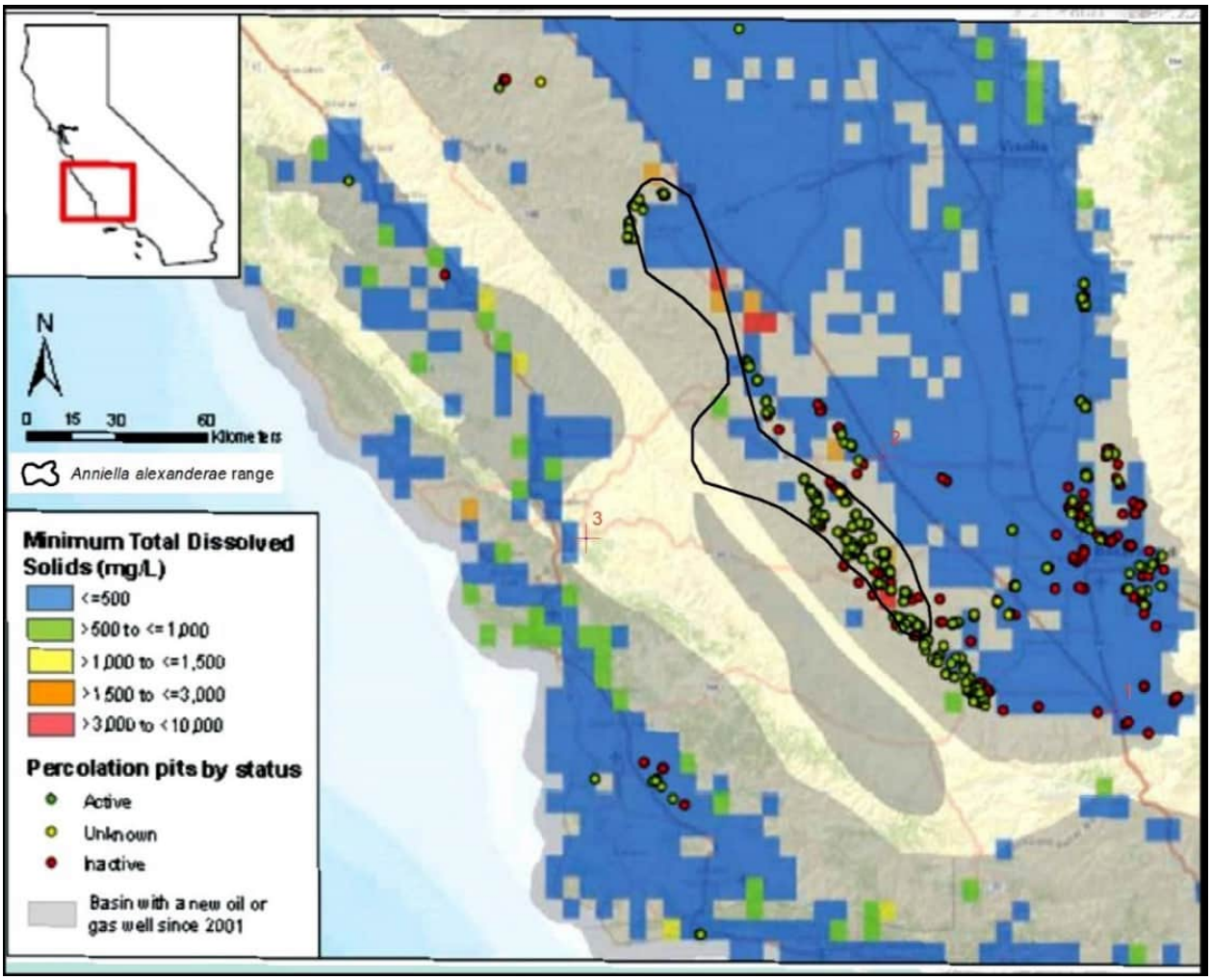
Spills could also harm habitat suitability for the Temblor legless lizard by altering soil density and moisture content. Furthermore, reptiles are sensitive to contaminants and accumulate and magnify them to levels equal or greater than those reported for mammals and birds (Crain and Guillette 1998, pp. 77-78). As detailed above, produced water contains hydraulic fracturing fluids, radioactive materials, heavy metals and other compounds such as polycyclic aromatic hydrocarbons, alkenes, alkanes and other volatile and semi-volatile organics (Pichtel 2016, p. 1). Some of these pollutants are known to be toxic or carcinogenic in the environment, while others are endocrine disruptors (Pichtel 2016, p. 2). A reptile's endocrine system controls nearly every aspect of its life and is instrumental in regulating processes such as metabolism, development, reproduction, tissue function and behavior (Norris and Lopez 2011, p. 373). Disruption of these processes can sabotage sexual development, sex ratio and metabolic compensation for environmental stress; in combination with other stressors such as habitat loss and global climate change, it can contribute to local extinctions (Cheek 2006, p. 1.) Studies have shown that endocrine disruptors can affect reptile testosterone levels, gonad size, population levels, energy levels related to reproduction and growth, hatching and developmental abnormalities, and mortality (Gibbons et al. 2000, p. 657; Zychowski and Godard-Codding 2016, p. 26; Crain and Guillette 1998, p. 77-86). Only a modest amount of information is available on the exposure of these compounds to lizards (Zychowski and Godard-Codding 2016, pp. 28, 29). While specific impacts to the Temblor legless lizards are not yet known due to its fossorial and cryptic nature and lack of focused monitoring, there is enough information to show that the survival of the Temblor legless lizard is threatened by toxic compounds and endocrine disruptors.

Wastewater disposal pits

California is the only state with significant oil production that allows oil and gas wastewater to be dumped into unlined pits (Center for Biological Diversity 2019). The use of wastewater

disposal pits as a part of wastewater management is a historic and dangerous practice in the oil and gas industry, particularly throughout the San Joaquin Valley and Kern County in particular. California rules allow three types of pits: drilling sumps, evaporation sumps, and operations sumps (Earthworks 2021, p. 11). A February 2016 report found that there were 790 active pits in California and that a vast majority of them are unlined (Earthworks 2021, p. 11). There are hundreds more that are technically "inactive" but continue to harm the environment (Earthworks 2021, p.11). Further, 60% of waste pits in California either do not have a permit or are otherwise out of compliance with state water quality standards, but nevertheless have been allowed to remain in operation (Earthworks 2021, p.11). As of April 2015, over 200 unlined pits in the Central Valley alone were operating without the necessary permits (CCST 2015, p. 110). Currently, many wastewater disposal pits are located throughout the Temblor legless lizard's range (see Figure 9).

Figure 9. Location of active percolation pits used for produced water disposal in the Temblor legless lizard's range and the location of groundwater of varying quality. Source data: CCST 2015, p. 25.



Wastewater pits can contain hazardous chemicals from hydraulic fracking treatments, as well as reaction byproducts of these chemicals (CCST 2015, p. 23). The Central Valley Regional Water Board is supposed to require that fluid in pits meets certain water quality standards for salinity, chlorides, and boron (CCST 2015, p. 344). However, there is no testing required, or thresholds specified, for other contaminants (CCST 2015, p. 344). Even wastewater that exceeds the salinity thresholds may be discharged in "unlined sumps, stream channels, or surface water if the discharger successfully demonstrates to the Regional Water Board in a public hearing that the proposed discharge will not substantially affect water quality nor cause a violation of water quality objectives" (CCST 2015, p. 110). There is "ample evidence" of groundwater contamination from waste pits in California (CCST 2015, p. 112). In the Central Valley, the Regional Water Quality Control Board ordered the closure of several waste pits in the North and South Belridge and Lost Hills oil fields because of their negative impacts on groundwater (CCST 2015, p. 112). Indeed, a new study confirms that unlined pits endanger groundwater in the San Joaquin Valley, documenting how the disposal of over 16 billion barrels of oil and gas wastewater into unlined pits over a 50-year period has introduced salts, carcinogens, and other toxins into regional aquifers (DiGuilio et al. 2021).

This is particularly concerning because a statewide science review reported that oil and gas wastewater storage and disposal ponds can cause wildlife harms and mortality, concluding that "[w]ildlife can suffer negative effects or mortality by drinking from or immersing themselves in wastewater storage or disposal ponds" (CCST 2015, p. 343). The report points out that "oil field wastewater typically contains other chemicals such as volatile organic compounds (VOCs), benzene, and naturally occurring radioactive material (NORM) that are of concern for human and environmental health" (CCST 2015, p. 344). And further that "constituents besides oil could impact the health of organisms that come in contact with the sumps, particularly if the produced water contains traces of stimulation chemicals" (CCST 2015, p. 345). The report points to documented cases in California in which endangered blunt-nosed leopard lizards, giant kangaroo rats, and San Joaquin kit foxes drowned in spills of oil-laden wastewater (CCST 2015, p. 343).

In short, wastewater pits which are common in the Temblor legless lizard's remaining habitat pose a risk through habitat destruction to create pits, soil and water contamination, and drowning of lizards in wastewater.

B. Urbanization

Encroaching urbanization has been associated with habitat destruction and reptile extinction; urbanization tends to decrease native species richness and promote diversity of exotic and/or non-native species (French et al. 2018, p. 954). Urbanization has caused imperilment of over 275 threatened and endangered species in the United States (Czech 2004, p. 10). Many lizard species are unlikely to move to new habitat if there are changes due to habitat alteration (Howland et al. 2014, p. 3), and the Temblor legless lizard is known to have limited ability to disperse, thus is likely to be extirpated by urbanization.

Parham et al. (2019, p. 22) found that all estimated range maps for the Temblor legless lizard based on ecological niche modeling predict that there is a strong likelihood of potential

extirpation from human development. The lizard's suitable habitat historically extended into the San Joaquin Valley, but much of that has been lost to development. By 1979 nearly all the San Joaquin Valley floor was urbanized or converted to cropland and less than 5% of the Valley floor remains uncultivated – with much of that uncultivated land already developed for oil and gas extraction (USFWS 1998).

C. Industrial Solar Projects

While renewable energy is urgently needed to address the climate emergency, the direct loss of habitat and sand movement from improperly sited industrial solar projects can harm the Temblor legless lizard. The legless lizard is a microhabitat specialist that needs loose soil to burrow as well as shaded areas for feeding and mating (Thomson et al. 2016, p. 188). Habitat is changed considerably with the installation of a solar power plant: the soil is often scraped bare during construction; herbicides or mowing can be used to keep vegetation down; and the panels themselves cast shadows and change the microclimate (Turney and Fthenakis 2011, p. 3265). Soil compaction and ecosystem disturbance from solar projects can take years for recovery (Turney and Fthenakis 2011, p. 3266).

There are numerous industrial solar fields across the San Joaquin Valley, with a few already located within the lizard's range (see Figure 10). Currently, there are more than 19 commercial solar projects in the permitting process and two utility scale solar projects in the approval process with the California Energy Commission in Kern County (Kern County 2021b). Cumulatively these projects could lead to habitat fragmentation and destruction of lizard habitat.

D. Climate Change

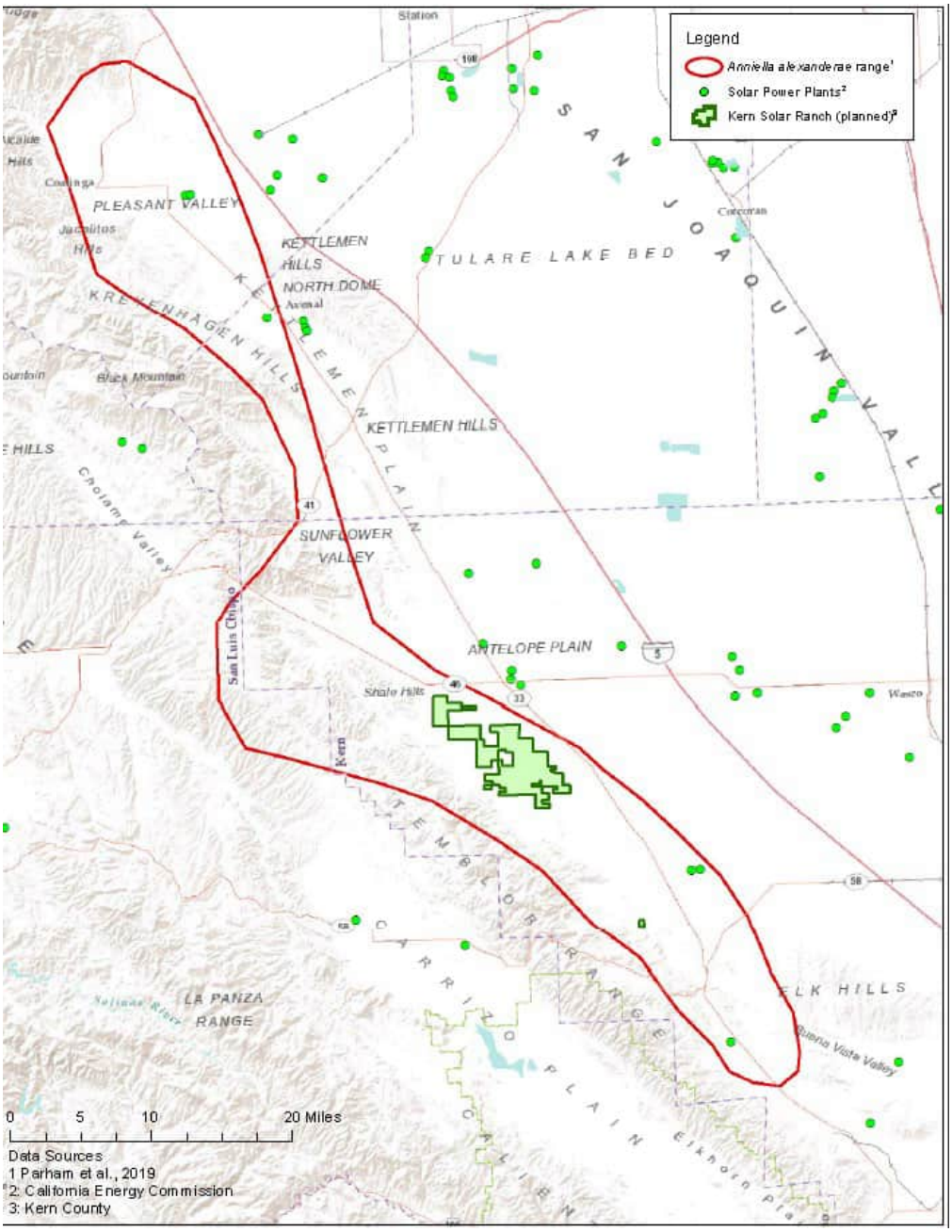
Anthropogenic climate change poses an escalating threat to the Temblor legless lizard. As reptiles, Temblor legless lizards are highly sensitive to climate change (Mitchell and Janzen 2010, p. 129-140; Tuberville et al. 2015, p. 822-834), particularly to changes in temperature and precipitation.

California is particularly vulnerable to harms of the climate crisis, identified as "one of the most 'climate-challenged' regions of North America" (Bedsworth et al. 2018, p. 13). The state is already experiencing rising temperatures, declining snowpack, more heavy precipitation events, intensifying drought, and increasing area burned by wildfire (Thorne et al. 2018, p. 4). Climate change has contributed to a series of some of the most extreme events in California's recorded history: a severe drought from 2012-2016, an almost non-existent Sierra Nevada winter snowpack in 2014-2015, increased destruction of communities by wildfires, and back-to-back years of the warmest average temperatures (Thorne et al. 2018, p. 3).

Specifically, average annual temperatures have increased in California by 2°F since the early 20th century (Frankson et al. 2017, p. 5) and are projected to rise by 8.8°F by 2100 if emissions continue at current rates (Thorne et al. 2018, p. 5). Heat waves are becoming more frequent (Thorne et al. 2018, p. 3, 15). Precipitation is becoming more variable, and heavy downpours – with their associated flooding – are projected to become more frequent, especially due to an increase in atmospheric rivers (Thorne et al. 2018, p. 24-25). Mountain snowpack is declining,

and by 2050 the average water supply from snowpack is projected to decline to two-thirds of historical levels (Thorne et al. 2018, p. 5). Rising temperatures and loss of snowpack are intensifying drought conditions which threaten water supplies (Gonzales et al. 2018, p. 1103, 1104, 1107). Kern County is expected by 2050 to have an increase in winter average temperatures by 3-4°C (5-6°F in the summer), increase by 3-5 days of heat waves, and a decline of 1-2 inches of precipitation (Advancement Project California 2019, p. 3).

Figure 10. Map of solar projects in the range of *A. alexanderae* habitat.



Temblor legless lizards require specific temperature ranges and soil moisture levels for their survival (Thomson et al. 2016, p. 189-190). Legless lizards prefer temperatures between 59 to 77°F (15 to 25°C) (Miller 1944, p. 284, 288). They are inactive at temperatures below 55°F (13°C), and temperatures in a laboratory setting above 104°F (40°C) are lethal to *Anniella* species (Miller 1944, p. 284, 288). Studies indicate that the legless lizard prefers temperatures which are lower than basking lizards and that they adapted to more activity during the morning or late afternoon when the temperatures are cooler (Bury and Balgooyen 1976, p. 152, 154). Rising temperatures and the increasing frequency of heat waves could decrease the amount of time they are actively feeding on or near the surface, negatively impacting their ability to hunt and mate, resulting in lower reproductive output.

Temperature regulates the key aspects of reptile life history, such as sex determination and incubation, and stress related to temperature rise is predicted to exacerbate population declines and lower global reptile diversity (Mitchell and Janzen 2010, p. 129-140). While it is not known at this time exactly how temperature changes from climate change will affect the Temblor legless lizard in regard to sex determination, it is known that male legless lizard's sperm matures throughout the fall and winter and the females experience ovulation from May to June (Goldberg and Miller 1985, p. 618), indicating that sexual reproduction is temperature and seasonally dependent.

A set moisture level in the sand is necessary for proper skin shedding to ensure that sloughing occurs around the face and the eyes for hunting and eating. If the sand is too dry, the shedding could stick to the new skin, which proves especially difficult for hunting if it covers the eyes and limits vision, potentially starving the lizard (Miller 1944, p. 277). The increase in extreme precipitation events, including the increase in heavy downpours and drought intensity, could change soil moisture levels or prey availability in ways that are harmful to these lizards. In addition, heavy flooding could drown lizards in low-lying habitat areas. The on-going drought in the state of California has likely already suppressed legless lizard populations (Hammerson 2019, p. 1-7).

Reptiles are vulnerable to the rapid rate of climate change because of their limited dispersal abilities (Gibbons et al. 2000, p. 660). Studies have already linked climate change to reptile range shifts (Moreno-Rueda et al. 2011; Hatten et al. 2016) and population extirpations (Whitfield et al. 2007, p. 3252-8356; Sinervo et al. 2010). If warming continues at the current rate, 20% of lizard species worldwide could be driven out of their thermal niches by 2080 and face a high risk of extinction (Sinervo et al. 2010, p. 894). Indeed geological evidence points towards historical shifts in climate having detrimental effects on ectotherm biodiversity as these species are significantly slower at shifting into new niches compared to endotherms (Rolland et al. 2018, p. 460).

In sum, because the Temblor legless lizard is a micro-habitat specialist amid a fragmented habitat range, the extreme temperatures, extended drought and increased flooding due to climate change pose escalating threats to their survival.

E. Invasive Species

While many of the factors listed above (oil and gas development, urbanization, climate change) are themselves main threats to the Temblor legless lizard, they also facilitate spread of invasive species, which can alter community and trophic interactions (French et al. 2018, p. 948). Invasive grasses and non-native wild pigs are changing the landscape and threatening the habitat and survival of the legless lizard.

In the Temblor legless lizard's range, *Bromus* grass species have taken over rangeland, leading to widespread increases in fire frequency, where native shrubs don't recover as well (Bossard et al. 2000, p. 12). *Bromus* grasses reduce soil moisture, change the root structure making the sand unsuitable for burrowing, outcompete native plants that provide high quality microhabitats and reduce the number of insects that inhabit the sand and leaf litter that the lizards feed on (Gallegos 2019, p. 3; Jennings and Hayes 1994, p. 111). Wildfires are likely to convert chaparral to grassland dominated by non-native grasses, which alter the abundance or composition of the lizard's prey (Evelyn and Sweet 2018, p. 7), leading to higher levels of predation and a change in the composition of leaf litter that the lizard needs for burrowing and survival (Howland et al. 2016, p. 2).

Oil and gas extraction facilitate the spread of invasive species via extensive earth moving activities, construction of new roads, expansion of existing roads, heavy truck traffic, and importing of materials that could lead to unintentional introductions (Brittingham et al. 2014, p. 11034). Urbanization disturbs habitats, opening niches to invasive species and leading to invasive species introductions (Czech 2004, p. 8-9). Overgrazing by domestic livestock also facilitates the spread of invasive plant species by reducing desirable grass competitiveness and increasing invasive plants (DiTomaso et al. 2010, p. 43-47). While many of these non-native grasses are now being controlled by livestock grazing, they are normally not considered good foraging plants and can get entangled in wool or lodge in the digestive tracts of some livestock (Bossard et al. 2000, p. 74). Invasive species usually have broad climatic tolerances, large geographic ranges, and other characteristics that facilitate rapid range shifts, therefore lending them to be more successful and abundant due to climate change (Hellmann et al. 2007, p. 535).

Wild pigs are another invasive species that are a threat to the Temblor legless lizard. They are not native to California, and as their numbers have increased over the years, so has the damage they inflict on habitat. Wild pigs are opportunistic omnivores that dig and overturn soil to eat not just roots and plant life, but other small animals including insects and lizards (Frederick 1998, p. 82-83). Therefore, wild pigs compete with lizards for food sources and eat legless lizards themselves. They have a moderate to high density in the Temblor Mountain range (Sweitzer et al. 2000, p. 533). For example, in the Palo Prieto Conversation Bank, one of the four identified sites inhabited by the Temblor legless lizard, wild pigs are common and root in the litter under juniper searching for grubs and lizards (Theodore Papenfuss, personal communication).

IX. Degree and Immediacy of Threat

As demonstrated in the previous sections, the threats facing *A. alexanderae* are severe and immediate. More than 98% of the lizard's remaining restricted range is already open or

potentially available to oil and gas development. Of the four sites where the lizard has been detected, three are within oil field boundaries and surrounded by extensive oil and gas development, only two have some measure of habitat protection, and all are on extremely limited habitat patches. The IUCN recently concluded that oil and gas development could propel the Temblor legless lizard to Critically Endangered status or extinction in the near future (Hammerson 2019, pp. 2, 6). The escalating climate crisis, as well as invasive grasses and wild pigs, and habitat loss and fragmentation from crop cultivation and industrial solar projects pose additional threats. The Temblor legless lizard is "in serious danger of becoming extinct throughout all, or a significant portion, of its range" or "likely to become so "in the foreseeable future." Cal. Fish & Game Code § § 2062 & 2067.

X. Inadequacy of Existing Regulatory Mechanisms

No existing regulatory mechanism are currently in place at the national, state or local levels that adequately address the threats facing *A. alexanderae.*

A. Federal Regulatory Mechanisms

Oil and Gas Development

The Federal agencies overseeing fossil fuel development and land management in the Temblor legless lizard's range have failed to protect the lizard from the threats from oil and gas development. In 2019 the BLM under the Trump administration opened oil and gas drilling and fracking on more than one million acres of public lands and mineral estate in Central California with much of the Temblor legless lizard's habitat included. In December 2020, the BLM rushed the sale of seven oil and gas leases on public lands in Kern County. Even though one of lease parcels falls within the known habitat range of the Temblor legless lizard, the BLM failed to analyze the impacts of this oil and gas development on the species.

Moreover, U.S. federal policies aggressively promote ever greater fossil fuel production and infrastructure, threatening the Temblor legless lizard with expanding oil and gas development on federal lands and mineral estate. Due to policies favoring the fossil fuel industry, the U.S. is a dominant driver in expanding global fossil production and is currently the world's largest oil and gas producer and second-largest coal producer (SEI et al. 2021, Table 4.1). The United Nations *Production Gap Report* found that governments are planning to permit the production of more than double the oil, gas, and coal by 2030 than is consistent with limiting warming to the Paris Agreement climate limit of 1.5°C (SEI et al. 2020, 2021). U.S. oil and gas production is poised to expand by the largest absolute increase globally by 2030, more than twice as much as any other country (Achakulwisut and Erickson 2021, Figure 3). A separate study found that the U.S. oil and gas industry is on track to account for 60% of the world's projected growth in oil and gas production between now and 2030 (Oil Change International 2019)—the time period over which the IPCC concluded that global carbon dioxide emissions should be roughly halved to meet the 1.5°C Paris Agreement limit (IPCC 2018, p. SPM-15). U.S. policies that promote fossil fuel production and infrastructure include enabling fracking, lifting the crude oil export ban, and providing billions in government subsidies to the fossil fuel industry (Erickson et al. 2017, Oil Change International and Greenpeace 2020, SEI et al. 2021, p. 39).

In January 2021, President Biden issued a "whole of government" directive that every federal agency "avoid the most catastrophic impacts of that crisis and to seize the opportunity that tackling climate change presents" (White House 2021). The President immediately paused oil and gas leasing on federal lands and launched a review of the fossil fuel leasing and permitting program (White House 2021). However, the Biden administration is stalling out on reigning in fossil fuel development, approving nearly 2,500 new drilling permits on public lands and waters in the first six months in office, roughly the same amount approved by the Trump administration during its first entire year in office, supporting the Line 3 and Dakota Access pipelines, and maintaining strong support for carbon capture and storage that perpetuates fossil fuel extraction (Civil Society Equity Review 2021, pp. 54-55).

Climate Change

U.S. climate policy is inadequate to meet the international Paris Agreement climate limits and avoid the worst damages of the climate crisis. The U.S. is the world's biggest cumulative emitter of greenhouse gas pollution, responsible for 25% of cumulative global CO_2 emissions since 1870 (Global Carbon Project 2021, p. 85), and is currently the world's second highest emitter on an annual basis and highest emitter on a per capita basis (Global Carbon Project 2021, pp. 19-20). Estimates of an equitable U.S. "fair share" of emissions reductions needed to meet a 1.5°C climate limit equate to cutting U.S. domestic emissions by at least 70% below 2005 levels by 2030 and reaching near zero emissions by 2040, paired with financial and technological support for large-scale emissions reductions internationally (Muttitt and Kartha 2020; U.S. Climate Action Network 2020). However, the United Nations *Emissions Gap Report* warned that the United States is vastly off-track to limit warming to 1.5°C or even 2°C and must greatly accelerate greenhouse gas emissions reductions (UNEP 2019, p. 37). The report concluded that limiting warming to 1.5°C requires countries to strengthen their climate pledges fivefold to cut emissions by at least 7.6% per year through 2030, for a total emissions reduction of 55% between 2020 and 2030 (UNEP 2019, pp. XV, XX, 26). Importantly, the report concluded that the U.S. "in particular" must ramp up climate action to meet global climate limits and its pledge under the Paris Agreement (UNEP 2019, pp. 11, 12, Table 2.2). The report warned that further delays in emissions cuts threaten the global economy, food security, and biodiversity:

> Further delaying the reductions needed to meet the goals would imply future emission reductions and removal of CO_2 from the atmosphere at such a magnitude that it would result in a serious deviation from current available pathways. This, together with necessary adaptation actions, risks seriously damaging the global economy and undermining food security and biodiversity (UNEP 2019, p. XX).

Yet as summarized by the Fourth National Climate Assessment, U.S. efforts to mitigate greenhouse gas emissions do not approach the scale needed to avoid "substantial damages to the U.S. economy, environment, and human health and well-being over the coming decades":

> Climate-related risks will continue to grow without additional action. Decisions made today determine risk exposure for current and future generations and will either broaden or limit options to reduce the negative consequences of climate

> change. While Americans are responding in ways that can bolster resilience and improve livelihoods, neither global efforts to mitigate the causes of climate change nor regional efforts to adapt to the impacts currently approach the scales needed to avoid substantial damages to the U.S. economy, environment, and human health and well-being over the coming decades (USGCRP 2018, p. 34).

Importantly, to meet a 1.5°C limit, most U.S. and global fossil fuels must remain undeveloped including an immediate halt to new fossil fuel production and infrastructure and a phase-out of existing production and infrastructure within the next several decades (IPCC 2018, Oil Change International 2019). However, rather than reducing fossil fuel extraction and use, U.S. policies aggressively promote ever greater fossil fuel production and infrastructure, as detailed above.

Threats Reduction and Habitat Protection

Federal regulatory mechanisms that could provide protections for Temblor legless lizards include an Endangered Species Act (ESA) listing, conservation actions for ESA listed species that overlap in range, and federal Habitat Conservation Plans that cover the species.

The Temblor legless lizard was petitioned for protection under the federal ESA in October 2020 (Center for Biological Diversity 2020). In June 2021, the U.S. Fish and Wildlife Service made a positive 90-day finding that the species may warrant protection under the ESA (USFWS 2021a). However, the Service must still make a 12-month finding, which is now overdue, and a final listing determination, and the species gets no federal protection until and unless it is listed.

Two proposed Habitat Conservation Plans (HCP) in the Temblor legless lizard's range do not include the Temblor legless lizard. The Block 12 Development Project (Docket No. FWS–R8–ES–2018–0116) would "develop 131 wells, including 98 oil producers and 33 steam injectors, and associated facilities on approximately 55 acres in Blocks 7, 10, and 12 of the South Belridge Oil Field" (USDOI 2020). The HCP would support an application by Aera Energy, LLC to the U.S. Fish and Wildlife Service for a 35-year Incidental Take Permit under the federal Endangered Species Act for five species: Kern mallow, blunt-nosed leopard lizard, giant kangaroo rat, San Joaquin antelope squirrel, and San Joaquin kit fox (USDOI 2020). The project overlaps the range of the Temblor legless lizard, but the HCP and EA do not include this species. Further, the HCP and EA do not meet the requirements of the ESA and the National Environmental Policy Act. Secondly, the Planning Agreement between Aera Energy, LLC, the California Department of Fish and Wildlife, the United States Fish and Wildlife Service, and the Department of Conservation regarding Aera's Southwest San Joaquin Valley HCP and Natural Community Conservation Plan (NCCP Planning Agreement No. 2810-2020-001-04) does not include the Temblor legless lizard.

While there are HCPs in Carlsbad and East Contra Costa County that include *Anniella pulchra*, none cover the Temblor legless lizard in Kern County (USFWS 2021b).

Much of the Temblor legless lizard habitat overlaps with the ranges of the blunt-nosed leopard lizard (*Gambelia sila*) and the San Joaquin kit fox (*Vulpes macrotis mutica*) (Parham et al. 2019, p. 6; PPCB 2020b, 2020c) which are both protected under the Endangered Species Act. Threats

to these two species include many of the same threats that the legless lizard is facing, such as oil and gas development, and habitat disturbance, destruction and fragmentation. Both species were listed as endangered in 1967 and 1971, respectively, with no critical habitat designated. While the Palo Prieto Conservation Bank provides some protections for the kit fox and a variety of other species, there is a lot of a variability in how these banks supply protection and what other activities are allowed on the property (Fox and Nino-Murcia 2005, p. 996-1007).

The San Joaquin kit fox been listed as endangered for over 50 years. Foxes move around frequently with numerous dens throughout the year and appear to have a home range of 12 square miles (USFWS 1998, p. 128). This gives them the opportunity to move when food is scarce or during periods of drought (USFWS 1998, p. 128). Unlike the kit fox, the Temblor legless lizard doesn't emigrate far (Miller 1944, p. 288), and if the resources needed for survival become scarce, the lizard may not be able to move to more suitable habitat. Kit foxes can also be found in virtually every soil type (USFWS 1998, p. 129) while the legless lizard must be in friable sand with shade cover for burrowing and hunting (Miller 1944, p. 288). Finally, kit foxes can survive within or adjacent to cropland, urbanization and oil and gas fields as long as they have an adequate prey base and den size (USFWS 1998, pp. 130, 134-136), whereas the Temblor legless lizard is a microhabitat specialist with very specific needs for survival (Thomson et al. 2016, p. 188). A 5-year review by the U.S. Fish and Wildlife Service states that the San Joaquin kit fox continues to face habitat loss to agriculture and urban development, has a population dynamic that fluctuates yearly, remains in isolated and highly fragmented populations, and that not all the protected habitat parcels contain the requisite contiguous acreage, vegetation and prey base to sustain kit foxes in the future (USFWS 2010a, p. 70). ESA protection for the San Joaquin kit fox is not adequate to rely on to protect the Temblor legless lizard.

The blunt-nosed leopard lizard has also been listed as endangered for over 50 years. While the Temblor legless lizard and the blunt-nosed leopard lizard share the same habitat range as well as some of the same prey and predators, they have different requirements within their habitat. The blunt-nosed leopard lizard will use several abandoned ground squirrel burrows for shelter (USFWS 1998, p. 117), moving back and forth as needed, while Temblor legless lizards construct their own burrows in the sand (Jennings and Hayes 1998, p. 108, 111). The blunt-nosed leopard lizard uses abandoned burrows and is not dependent on the smooth, fine sand that Temblor legless lizards need to burrow, move and catch prey (Miller 1944, p. 288).

In 2010 U.S. Fish and Wildlife Service updated the recovery plan for the blunt-nosed leopard lizard and found that most populations continue to have low densities and unstable populations, and that the species continues to be threatened by degradation and loss of habitat throughout most of its range (USFWS 2010b, p. 3, 21, 43). Blunt-nosed leopard lizard population densities are not yet self-sustaining and the recovery criterion of at least 5,997 acres of contiguous habitat in 5 areas has not been achieved (USFWS 2010b, p. 4-15). Management plans for the blunt-nosed leopard lizard have not been approved or implemented for all the protected areas identified in the recovery plan as important to the continued survival of the lizard (USFWS 2010b, p. 6). ESA protection for the blunt-nosed leopard lizard is not adequate to rely on for protection of the Temblor legless lizard.

While some of the habitat range and threats for the San Joaquin kit fox and the blunt-nosed leopard lizard are similar and overlap with the Temblor legless lizard, the legless lizard has more specific microhabitat needs based on sand and moisture level (Thomson et al. 2016, p. 189-190; Miller 1944, p. 277) that are not addressed by protections for the kit fox and leopard lizard. Both of the 5-year review summaries and evaluations for the San Joaquin kit fox and the blunt-nosed leopard lizard show that these species are not recovering themselves and therefore cannot be relied upon as surrogates for protection of the Temblor legless lizard. Due to their cryptic nature, Temblor legless lizard locations will be unknown without proper surveying that would come with Endangered Species Act protection.

B. State Regulatory Mechanisms

Oil and Gas Development

State agencies overseeing projects and land management in the Temblor legless lizard's range have failed to protect the lizard from the threats due to oil and gas development. As detailed above, CalGEM continues to approve thousands of new oil and gas permits each year, a substantial portion of which are in the 31 oil fields and adjacent areas overlapping the lizard's range. Kern County, where the majority of remaining Temblor legless lizard habitat is located, is attempting to streamline oil and gas permitting to make future approvals for drilling faster and hidden from public scrutiny.

In April 2021, Governor Newsom directed CalGEM to initiate regulatory action to end the issuance of new permits for fracking by January 2024 and requested that the California Air Resources Board analyze pathways to phase out oil extraction across the state by no later than 2045. While ending new permits for fracking in 2024 is an important step, other common extreme extraction methods such as cyclic steaming, steamflood, and waterflood are still permitted and will enable continued oil and gas extraction in the lizard's range. Furthermore, an oil and gas production phaseout by 2045 would still allow extensive oil and gas development across the lizard's range during the ensuing 24 years.

Climate Change

California's currently established climate goals are not consistent with the state doing its fair share to limit global temperature rise to 1.5°C under the Paris Agreement. SB32 calls for reductions in greenhouse gas emissions of 40% below 1990 levels by 2030. California Executive Order S-3-05 calls for a reduction in greenhouse emissions of 80% below 1990 levels by 2050. Executive Order B-55-18 calls for the state "to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter."

However, the landmark 2018 report from the Intergovernmental Panel on Climate Change established that to limit warming to 1.5°C, global CO_2 emissions must be cut in half by 2030 and reach near zero by 2050 (IPCC 2018, pp. 12-14, Figure 2.6). A recent analysis found that, for the U.S. to do its fair share given historical emissions and capability, it should in effect reduce its CO_2 emissions by a total of 195% below 2005 levels by 2030, with at least 70% of those emissions reductions achieved within the U.S. by 2030 and the remainder through support to

developing countries and their emissions reduction programs (U.S. Climate Action Network 2020). Because California represents the largest share of the U.S. economy, it too has an outsized responsibility to reduce its emissions, including a rapid decarbonization of its energy sector during this decade. A target compatible with limiting warming below 1.5°C would mean California strengthening its goals to reduce emissions by ~70% by 2030 through a just and equitable transition to 100% clean energy, and reaching near zero emissions by 2040.

Threats Reduction and Habitat Protection

State regulatory mechanisms that theoretically could provide protections for Temblor legless lizards include state listing as a Species of Special Concern, consideration under the California Environmental Quality Act, or any state Natural Community Conservation Plans that cover the species.

The lizard is listed as a Species of Special Concern by CDFW due a number of factors such as habitat loss and fragmentation and climate change (Thomson et al. 2016, p. 189). However, this status provides no actual legal protections. The intent of Species of Special Concern status is to focus attention, stimulate research, and achieve conservation and recovery of species before they meet requirements to be listed on a state or federal level. However, the designation offers no substantive protections.

The Natural Community Conservation Plan (NCCP) is a California Department of Fish and Wildlife program that takes a broad-based approach to planning for the protection and perpetuation of biological diversity (CDFW 2021b, p.1). East San Diego County and Bakersfield are listed as having NCCPs for other species of *Anniella*, but there are no NCCPs that cover the Temblor legless lizard (CDFW 2021c, p. 9, 46).

The environmental review process under the California Environmental Quality Act, or CEQA (California Public Resources Code §§ 21000-21177), requires state agencies, local governments and special districts to evaluate and disclose impacts from "projects" in the state. CEQA declares that it is the policy of the state to prevent “the elimination of fish or wildlife species due to man’s activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities” (California Public Resources Code, section 21001(c)). The CEQA process is triggered when discretionary activities of state agencies may have a significant effect on the environment. When the CEQA process is triggered, it requires full disclosure of the potential environmental impacts of proposed projects.

The operative document for major projects is usually the Environmental Impact Report. Under CEQA, Species of Special Concern must be considered during the environmental review process, with an analysis of the project impacts on the species if they meet the criteria of sensitivity under Section 15380 of the CEQA Guidelines. However, project impacts to legless lizards might not be analyzed if project proponents claim insignificant impacts to non-listed species, the project does not have population-level or regional effects, or the project impacts a small proportion of the legless lizard’s range.

C. Local Regulatory Mechanisms

Oil and Gas Development

As detailed above, Kern County is attempting to "streamline" oil and gas permitting in the county under an ordinance that would not require further environmental review or public notice for more than 40,000 new oil and gas projects over the coming decades. The county's environmental impact report fails to adequately disclose, evaluate, and mitigate harms to the Temblor legless lizard.

Threats Reduction and Habitat Protection

The Kern County General Plan generally states that all threatened and endangered species should be protected in accordance with state and federal laws and that the county "should work closely with state and federal agencies to assure that discretionary projects avoid or minimize impacts to fish, wildlife, and botanical resources" (Kern County 2009, p. 67). Policies under the Environmental Impact Report of the Kern County General plan support CEQA to determine the impact and necessary mitigation measure to reduce the level of impact to the special status species on an individual project level analysis basis (Kern County 2004, p. 4-4-39). The general plan also states that Species of Special Concern are an informal designation that does not provide legal protection but notes that they are recognized as sensitive (Kern County 2004, p. 4-4-21). No Anniella lizard species are recognized in the Kern County General Plan (Kern County 2004). Other protection policies are couched in qualifiers such as "when feasible" and that "discretionary projects avoid or minimize impacts to fish, wildlife and botanical resources." The Kern County general plan provides little protection for the legless lizard or its habitat.

XI. Recommended Management and Recovery Actions

The Temblor legless lizard requires immediate reductions in the key threats to its survival, particularly immediately stopping new oil and gas development in its restricted range and phasing out existing oil and gas development. The lizard also requires strong habitat protections to reduce other threats, including limiting habitat conversion by urban development, cropland conversion, and industrial solar projects; strong climate action; and limiting the spread and impacts of invasive plants and predators. Key management and recovery actions include:

1. The governor directs CalGEM to end new approvals for oil and gas extraction, fossil fuel infrastructure, and other fossil fuel projects in California, and begin a phase-out of existing oil and gas production and infrastructure in line with the 1.5°C Paris Agreement climate limit.
2. The governor acts now, not in 2024, to ban fracking and related extreme techniques that enable and amplify the damage from fossil fuel extraction.
3. The governor declares a climate emergency and takes all necessary action to set California on a path to full decarbonization of our economy (e.g. banning the sale of new fossil fuel vehicles by 2030 and requiring the generation of all electricity from carbon-free sources by 2030).

4. CDFW prepares a recovery plan for *A. alexanderae* pursuant to Cal. Fish & Game Code § 2079.1.

5. CDFW acquires additional ecological reserves to protect land where Temblor legless lizards are known to occur.

6. CDFW works with local jurisdictions within the range of *A. alexanderae* to develop NCCPs that protect from development all remaining suitable habitat on private lands.

7. The California Department of Parks and Recreation seeks to acquire habitat to expand existing state parks for protection and restoration of *A. alexanderae* habitat.

8. CDFW expands its cooperative work with relevant federal agencies (NPS, DoD, BLM, USFWS) to protect the Temblor legless lizard on federal land.

9. CDFW works with the University of California and other institutions and agencies to develop effective measures to control invasive grasses and wild pigs in *A. alexanderae* habitat.

XII. Conclusion

Anniella alexanderae, the Temblor legless lizard, is a recently described species split from other *Anniella* legless lizards. There are only four known sites where this lizard persists in a restricted range along the base of the Temblor Mountains estimated at only 1,720 km^2. Three of the four known sites are surrounded by oil and gas development, three are on private lands, and only two have some measure of habitat protection. The Temblor legless lizard possesses many of the characteristics of a species at risk of extinction. It is a habitat specialist, has a restricted and fragmented distribution within its narrow range, and faces immediate, high-magnitude threats. While the CDFW and the IUCN recognize that this species is under threat and in need of protection, existing regulatory mechanisms are inadequate to protect the lizard from oil and gas development, urban development, climate change, invasive species and other threats to its continued existence. This leaves the lizard vulnerable to local extinction with little chance of recolonization of habitat, which is compounded by the lizard's poor ability to disperse, and in jeopardy of global extinction. Based on these factors that have already resulted in considerable habitat loss and are ongoing today, experts on the species recommend listing under the California Endangered Species Act and U.S. Endangered Species Act. Based on the best available scientific information, the species qualifies for protection under the California Endangered Species Act as an endangered species, and would benefit greatly and immediately from such protection.

XIII. References

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State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION

EVALUATION OF THE PETITION FROM THE CENTER FOR BIOLOGICAL DIVERSITY TO LIST THE TEMBLOR LEGLESS LIZARD (*Anniella alexanderae*) AS THREATENED OR ENDANGERED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Prepared by
California Department of Fish and Wildlife

March 25, 2022

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EXECUTIVE SUMMARY

The Center for Biological Diversity submitted a petition (Petition) to the Fish and Game Commission (Commission) to list the Temblor legless lizard (*Anniella alexanderae*) as threatened or endangered under the California Endangered Species Act (CESA; Fish and Game Code section 2050, *et seq*.) on November 18, 2021.

The Commission referred the Petition to the Department of Fish and Wildlife (Department) in accordance with Fish and Game Code section 2073 (Cal. Reg. Notice Register 2021, No. 50-Z, p. 1694). On January 18, 2022, the Department requested a 30-day extension to the 90-day petition evaluation period. The Commission approved the request at its meeting on February 17, 2022. Pursuant to Fish and Game Code section 2073.5 and California Code of Regulations, title 14, section 670.1, the Department prepared this evaluation report (Petition Evaluation) to evaluate the scientific information contained in the Petition and other relevant information possessed or received by the Department during the evaluation period.

After reviewing the Petition and other relevant information, the Department determined the Petition meets the requirement in Fish and Game Code section 2072.3 that it include sufficient scientific information that the petitioned action may be warranted. Specifically, the Department determined the following:

- *Abundance*. The Petition describes the limited known occurrences of the Temblor legless lizard at a limited number of localities and describes the difficulty in assessing abundance of the species but characterizes it as rare based on available information. Additional information available to the Department confirms that there are very few known detections of the species and suggests low abundance.
- *Population trend.* The Department is not aware of sufficient data on population abundance over time to estimate a population trend. The Petition provides information on habitat loss over time in the estimated range of the Temblor legless lizard and uses this as a proxy for population decline throughout its estimated historical range.
- *Range*. The Petition provides sufficient information that the Temblor legless lizard has a very small range, making its continued existence especially vulnerable to threats.
- *Distribution*. The Petition provides sufficient information that the known distribution of the Temblor legless lizard is very limited, occurring at only five known sites, making its continued existence especially vulnerable to threats.
- *Life history*. The Petition provides sufficient information regarding the life history of the Temblor legless lizard including breeding and foraging patterns.

- *Kind of habitat necessary for survival*. The Petition provides sufficient information regarding the habitat necessary for survival of the Temblor legless lizard.
- *Factors affecting the ability to survive and reproduce*. The Petition provides sufficient information regarding factors affecting the ability of the Temblor legless lizard to survive and reproduce, including oil and gas development, urbanization, industrial solar projects, climate change, and invasive species that result in habitat loss, degradation, and fragmentation.
- *Degree and immediacy of threat*. The Petition provides sufficient information detailing the degree and immediacy of threats to the Temblor legless lizard, which it characterizes as high due to widespread threats throughout the limited range and distribution of the species.
- *Impact of existing management efforts*. The Petition provides sufficient information regarding the impact of existing management efforts. It describes a variety of regulatory mechanisms that could provide protection for the Temblor legless lizard but argues that they have been inadequate to date.
- *Suggestions for future management*. The Petition provides suggestions for future management actions for the Temblor legless lizard and its habitat including stopping new oil and gas development in its range and phasing out existing oil and gas development, initiating habitat protections, climate action, and reducing invasive species.
- *Availability and sources of information*. The Petition provides sufficient sources of information and has made them available to the Department along with the Petition.
- *Detailed distribution map*. The Petition provides a distribution map for the Temblor legless lizard.

In completing its Petition Evaluation, the Department has determined that while the Petition provides limited information on abundance and population trend due to few available observations of the species, the information provided on the species' small range and limited distribution, low number of detections, habitat loss, and other threats provides sufficient scientific information to indicate that the petitioned action to list the Temblor legless lizard as threatened or endangered under CESA may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

INTRODUCTION

Candidacy Evaluation

The Commission has the authority to list a native "species" or "subspecies" as threatened or endangered under CESA. (Fish & G. Code, §§ 2062, 2067, 2070.) The listing process is the same for species and subspecies. (Fish & G. Code, §§ 2070-2079.1.)

CESA sets forth a two-step process for listing a species as threatened or endangered. First, the Commission determines whether to designate a species as a candidate for listing by evaluating whether the petition provides "sufficient information to indicate that the petitioned action may be warranted." (Fish & G. Code, § 2074.2, subd. (e)(2).) If the petition is accepted for consideration, the second step requires the Department to produce, within 12 months of the Commission's acceptance of the petition, a peer reviewed report, based upon the best scientific information available to the Department, that indicates whether the petitioned action is warranted. (Fish & G. Code, § 2074.6.) Finally, the Commission, based on that report and other information in the administrative record, determines whether the petitioned action to list the species as threatened or endangered is warranted. (Fish & G. Code, § 2075.5.)

A petition to list a species under CESA must include "information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant." (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).)

Within ten days of receipt of a petition, the Commission must refer the petition to the Department for evaluation. (Fish & G. Code, § 2073.) The Commission must also publish notice of the receipt of a petition in the California Regulatory Notice Register. (Fish & G. Code, § 2073.3.) Within 90 days of receipt of the Petition (or 120 days if the Commission grants an extension), the Department must evaluate the petition on its face and in relation to other relevant information the Department possesses or receives and must submit a written evaluation report to the Commission with one of the following recommendations:

- Based upon the information contained in the petition, there is not sufficient information to indicate that the petitioned action may be warranted, and the petition should be rejected; or
- Based upon the information contained in the petition, there is sufficient information to indicate that the petitioned action may be warranted, and the petition should be accepted and considered.

(Fish & G. Code, § 2073.5, subds. (a)-(b).) The Department's candidacy recommendation to the Commission is based on an evaluation of whether the petition provides sufficient scientific information relevant to the petition components set forth in Fish and Game Code section 2072.3 and the California Code of Regulations, Title 14, Section 670.1, subdivision (d)(1).

In *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, the California Court of Appeals addressed the parameters of the Commission's determination of whether a petitioned action should be accepted for consideration pursuant to Fish and Game Code section 2074.2, subdivision (e), resulting in the species being listed as a candidate species. The court began its discussion by describing the standard for accepting a petition for consideration previously set forth in *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104:

> As we explained in *Natural Resources Defense Council*, "the term 'sufficient information' in section 2074.2 means that amount of information, when considered with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted." The phrase "may be warranted" "is appropriately characterized as a 'substantial possibility that listing could occur.'" "Substantial possibility," in turn, means something more than the one-sided "reasonable possibility" test for an environmental impact report but does not require that listing be more likely than not.

(*Center for Biological Diversity*, *supra*, 166 Cal.App.4th at pp. 609-10 [internal citations omitted].) The court acknowledged that "the Commission is the finder of fact in the first instance in evaluating the information in the record." (*Id.* at p. 611.) However, the court clarified:

> [T]he standard, at this threshold in the listing process, requires only that a substantial possibility of listing could be found by an objective, reasonable person. The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department under [Fish and Game Code] section 2074.6. (*Ibid*.)

The range of a species for the Department's petition evaluation and recommendation is the species' California range only. (*Cal. Forestry Assn. v. Cal. Fish and Game Com*. (2007) 156 Cal.App.4th 1535, 1551.) CESA defines the "species" eligible for listing to include "species or subspecies" (Fish and G. Code, §§ 2062, 2067, and 2068), and courts have held that the term "species or subspecies" includes "evolutionarily significant units." (*Central Coast Forest Assn. v.*

Fish & Game Com. (2018) 18 Cal.App.5th 1191, 1236, *citing Cal. Forestry Assn.*, *supra*, 156 Cal.App.4th at pp. 1542 and 1549.)

Temblor Legless Lizard Taxonomy

As detailed in the Petition, the Temblor legless lizard (*Anniella alexanderae*) is one of four recently described new species along with the southern Sierra legless lizard (*A. campi*), Bakersfield legless lizard (*A. grinnelli*), and the southern California legless lizard (*A. stebbinsi*). Prior to 2013, all legless lizards in California were considered to be a single species, the California legless lizard (*A. pulchra*). Five distinct genetic lineages of legless lizards were identified in 2009, with the amount of genetic divergence corresponding to species-level differences of other lizard genera (Parham and Papenfuss 2009). Further research in 2013 considered morphological characters of these five lineages and recommended splitting *Anniella* into five distinct species; *A. pulchra* was retained as a species in the northern portion of its range and ranges were estimated for the four new species in the southern portion of the former *A. pulchra* range (Papenfuss and Parham 2013).

The recent conservation assessment by Parham et al. (2019; hereafter Conservation Assessment) provided additional evidence that the Temblor legless lizard is genetically and morphologically distinct from other species of legless lizard and has expanded and refined the known range and distribution of the species. The Conservation Assessment included a more extensive survey effort across the ranges of the *Anniella* species in California and evaluated tissue samples from museum specimens for a larger total sample size compared to earlier genetic studies (228 samples compared to 69 samples in Parham and Papenfuss 2009). The study estimated new range boundaries for the five *Anniella* species in California. The Temblor legless lizard has been recognized as a species by several herpetological societies (Crother 2017), and for the purposes of this report, we refer to the Temblor legless lizard as a species.

Petition History

On November 18, 2021, the Commission received a Petition from the Center for Biological Diversity to list the Temblor legless lizard as threatened or endangered under CESA. On November 29, 2021, the Commission referred the Petition to the Department for evaluation. At its meeting on December 15, 2021, the Commission officially received the petition. On January 18, 2022, the Department requested a 30-day extension to the 90-day petition evaluation period pursuant to Fish and Game Code section 2073.5 (b). At its meeting on February 17, 2022, the Commission granted the Department's request for a 30-day extension of the period to review the Petition and prepare this Petition Evaluation.

The Department evaluated the scientific information in the Petition as well as other relevant information the Department possessed at the time of review. The Department did not receive new information from the public during the petition evaluation period pursuant to Fish and

Game Code section 2073.4.[1] Pursuant to Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1), the Department evaluated whether the Petition included sufficient scientific information regarding each of the following petition components to indicate whether the petitioned action may be warranted:

- Population trend;
- Range;
- Distribution;
- Abundance;
- Life history;
- Kind of habitat necessary for survival;
- Factors affecting the ability to survive and reproduce;
- Degree and immediacy of the threat;
- Impact of existing management efforts;
- Suggestions for future management;
- Availability and sources of information; and
- A detailed distribution map.

In addition, in a separate federal regulatory process, on October 20, 2020, the U.S. Fish and Wildlife Service (USFWS) received a petition from the Center for Biological Diversity to list the Temblor legless lizard as threatened or endangered under the federal Endangered Species Act (ESA). On June 17, 2021, the USFWS announced a 90-day finding that the petition presented substantial scientific or commercial information indicating that the petitioned action may be warranted and that USFWS plans to initiate a status review to determine if the petitioned action is warranted (USFWS 2021).

Overview of Temblor Legless Lizard

The Temblor legless lizard is a medium-sized, fossorial (burrowing), limbless lizard endemic to the southern San Joaquin Valley, California. The dorsal coloration is pale olive with a mid-dorsal black stripe. The Temblor legless lizard can be distinguished from all other *Anniella* species by a light gray ventral coloration that is continuous from the insertion of the lower jaw to the end of the tail, and by its higher dorsal scale count (Papenfuss and Parham 2013). It is further distinguished from *A. pulchra, A. stebbinsi,* and *A. campi* by its higher vertebral count.

[1] Although no information was submitted to the Department, one email expressing support for the Petition and restating information from the Petition was forwarded to the Department by the Commission. Email available from the Commission upon request.

The Conservation Assessment expanded the estimated range of the Temblor legless lizard. Previously, the species was only known to occur in one very small area to the east of the Temblor mountains along the southwestern edge of the San Joaquin Valley (Papenfuss and Parham 2013). The additional sampling expanded its range north more than 100 km for a total estimated range of 1,719 km^2 (664 $mi.^2$). Temblor legless lizard is found almost exclusively in alkali desert scrub and annual grasslands from 168–466 m elevation (551–1,529 ft.; Parham et al. 2019).

Due to the recent establishment of the Temblor legless lizard as a separate species, much of its natural history is known from research on *A. pulchra* before the species was split. Therefore, the following life history information is for legless lizards in general in California unless otherwise stated. *Anniella* species are primarily fossorial and crepuscular (active at dawn and dusk); they use the ground surface, as well as top layers of soil and leaf litter, for feeding and mating (Thomson et al. 2016). They are insectivores, eating larval insects, adult beetles, termites, and spiders. They breed between early spring and July and bear live young. There is evidence that some populations of *Anniella* are active year-round while others may have a dormant period in the winter, but it is unclear which of these patterns Temblor legless lizard follows.

Currently, the Department considers Temblor legless lizard to be a Species of Special Concern, carrying over the designation previously given to *A. pulchra* before the species was split, until further evaluation of the taxonomy and/or status of the species can be completed (CNDDB 2021). It has a NatureServe Global ranking of G1: Critically Imperiled, defined as "at very high risk of extinction due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors." In addition, the NatureServe State ranking for the Temblor legless lizard is S1: Critically Imperiled, giving the endemic species the same conservation status for the state-level scale as the global. Of the five California *Anniella* species, Temblor legless lizard has the highest imperiled ranking under the NatureServe system.

SUFFICIENCY OF SCIENTIFIC INFORMATION TO INDICATE THE PETITIONED ACTION FOR TEMBLOR LEGLESS LIZARD MAY BE WARRANTED

This Petition Evaluation addresses each component of the Petition below, pursuant to Fish and Game Code section 2072.3 and California Code of Regulations, Title 14, section 670.1, subdivision (d)(1).

Abundance

Scientific Information in the Petition

The abundance of the Temblor legless lizard is briefly discussed in Section VI, "Abundance" in the Petition on page 10. The species was described as rare, having been found at just seven

localities at four sites within its limited range. Given the difficulty in surveying this cryptic and fossorial species (Thomson et al. 2016), population size estimates are not available. Also, information on survey effort within the estimated range of the Temblor legless lizard is lacking. However, the petitioners consider the population small based on the limited distribution and few known detections.

Other Relevant Scientific Information

The Conservation Assessment and the California Natural Diversity Database (CNDDB) provide additional information regarding abundance. A total of 47 specimens have been cataloged in museums and expertly identified as Temblor legless lizard (Papenfuss and Parham 2013, Parham et al. 2019, Museum of Vertebrate Zoology 2022, California Academy of Sciences 2022, and Museum of Comparative Zoology 2022). While these detections do not quantify abundance, they provide context regarding the availability of information on Temblor legless lizard detections and suggest that the species may have low abundance. Also, the Department is aware of a fifth site where Temblor legless lizard has been observed (see Geographic Range and Distribution section). Additional genetic and morphological analysis comparable to that of Parham et al. (2019) applied to existing unvetted specimens could improve the understanding of abundance and clarify geographic range boundaries.

Conclusion

The Petition describes the limited known occurrences of the Temblor legless lizard at a limited number of localities and describes the difficulty in assessing abundance of the species but characterizes it as rare based on available information. Additional information available to the Department confirms that this species has very few known detections.

Population Trend

Scientific Information in the Petition

The Petition discusses trends in Temblor legless lizard habitat availability, which it presents as a proxy for population trends, in Section VII, "Population Trend," on pages 10 and 11.

Given the recent taxonomic division of Temblor legless lizard from *A. pulchra* and other *Anniella* species, as well as the cryptic and fossorial nature of the lizard, direct population trend information is unavailable for this species. There is, however, a well-documented record of habitat loss and fragmentation within the Temblor legless lizard's estimated range (Parham et al. 2019). As discussed below in "Kind of Habitat Necessary for Survival," the Temblor legless lizard is a habitat specialist, requiring loose soils in primarily alkali desert scrub and grassland; it is unable to utilize areas where soil has been compacted and vegetation has been disturbed.

The Petition explains that most of the area within the estimated range of the Temblor legless lizard is currently, has been, or is planned to be used for oil and gas drilling and urban or

agricultural development. As detailed throughout the Petition, these uses are not compatible with supporting habitat necessary for the Temblor legless lizard's survival. Surveys conducted within apparent habitat, identified through an ecological niche modeling effort, yielded no detections of individuals in areas of the Central Valley east of Highway 33, suggesting the lizard may already be extirpated from parts of its range due to human encroachment and development (Parham et al. 2019).

Other Relevant Scientific Information

As stated in the Abundance section above, a total of 47 specimens have been cataloged in museums and expertly identified as Temblor legless lizard (Papenfuss and Parham 2013, Parham et al. 2019, Museum of Vertebrate Zoology 2022, California Academy of Sciences 2022, and Museum of Comparative Zoology 2022). These specimens have been found at just seven localities at five sites (see Geographic Range and Distribution) and do not provide a comprehensive abundance estimate. Due to its reclusive nature and recent characterization as a distinct species, no historical population surveys of the species have occurred. The lack of available scientific information regarding abundance over time precludes the Department's ability to definitively assess the population trend at this time.

Conclusion

The Department is not aware of sufficient data on population abundance over time to estimate a population trend. The Petition provides information on habitat loss over time in the estimated range of the Temblor legless lizard and uses this as a proxy for population decline throughout its estimated or historical range. Based on information in the Petition and otherwise available to the Department, the trend of the Temblor legless lizard population over time is uncertain. However, it is reasonable to conclude that large losses of suitable habitat within the Temblor legless lizard range have likely led to population declines.

Geographic Range and Distribution

Scientific Information in the Petition

The Petition discusses the range and distribution of the Temblor legless lizard in Section IV, "Range," and Section V, "Distribution," on pages 6 through 10.

The Petition describes the range of the Temblor legless lizard as estimated in the Conservation Assessment, consisting of a small area between the Temblor Mountain Range and Interstate 5, with a total estimated area of 1,719 km^2 (664 $mi.^2$; Parham et al. 2019; Figure 1 and Figure 2). Of the five *Anniella* species in California, this is the second smallest range after *A. campi* (estimated range 1,317 km^2 [508 $mi.^2$]).

Ecological niche modeling conducted for the Conservation Assessment estimated a much larger area of modeled habitat than is included in the estimated range for the species (including

portions of the Central Valley and Coast Ranges to the east and west of the estimated range; Parham et al. 2019). During field verification, Temblor legless lizards were not detected on surveys in areas modeled as habitat that were highly developed or modified. This led the researchers to suggest that development has resulted in these areas no longer supporting the species (i.e., habitat loss), leading to range restriction and reduced distribution within the estimated historically occupied range (Parham et al. 2019). No legless lizards were found during surveys in apparently suitable habitat east of Highway 33 (Papenfuss and Parham 2013). Consequently, much of this highly developed area was not included in the estimated range for the Temblor legless lizard (Parham et al. 2019).

The Petition discusses the primary method of surveying for legless lizards to establish the known distribution for the Temblor legless lizard: coverboards are placed on sandy soil in summer or fall and are then checked in the following spring for presence, when the species is most active. Following the species split in 2013 (Papenfuss and Parham 2013), additional field work was conducted over four years to survey areas thought to be suitable and within the range of Temblor legless lizard (Parham et al. 2019). The Petition describes individuals confirmed to be Temblor legless lizards found in seven unique locations within four sites (each site includes 1–3 locations in close proximity to each other) ranging in elevation from 168 to 466 m (551 to 1,529 ft; Figure 2). These sites were located near the towns of Taft and McKittrick, as well as within the Department-managed Pleasant Valley Ecological Reserve east of Coalinga, and within a 2-ha (5-ac) parcel on the Palo Prieto Conservation Bank in the foothills of the Temblor Mountain RangeFigure 2.

Distribution of known populations is localized, as legless lizards exhibit high site fidelity and are not known to move far (Miller 1994, Jennings and Hayes 1994), as described in the subsection titled “Burrowing Behavior and Movement” on page 4 of the Petition. Parham and Papenfuss (2009) suggest that “habitat specificity and overall lack of motility” may limit dispersal, resulting in isolated populations.

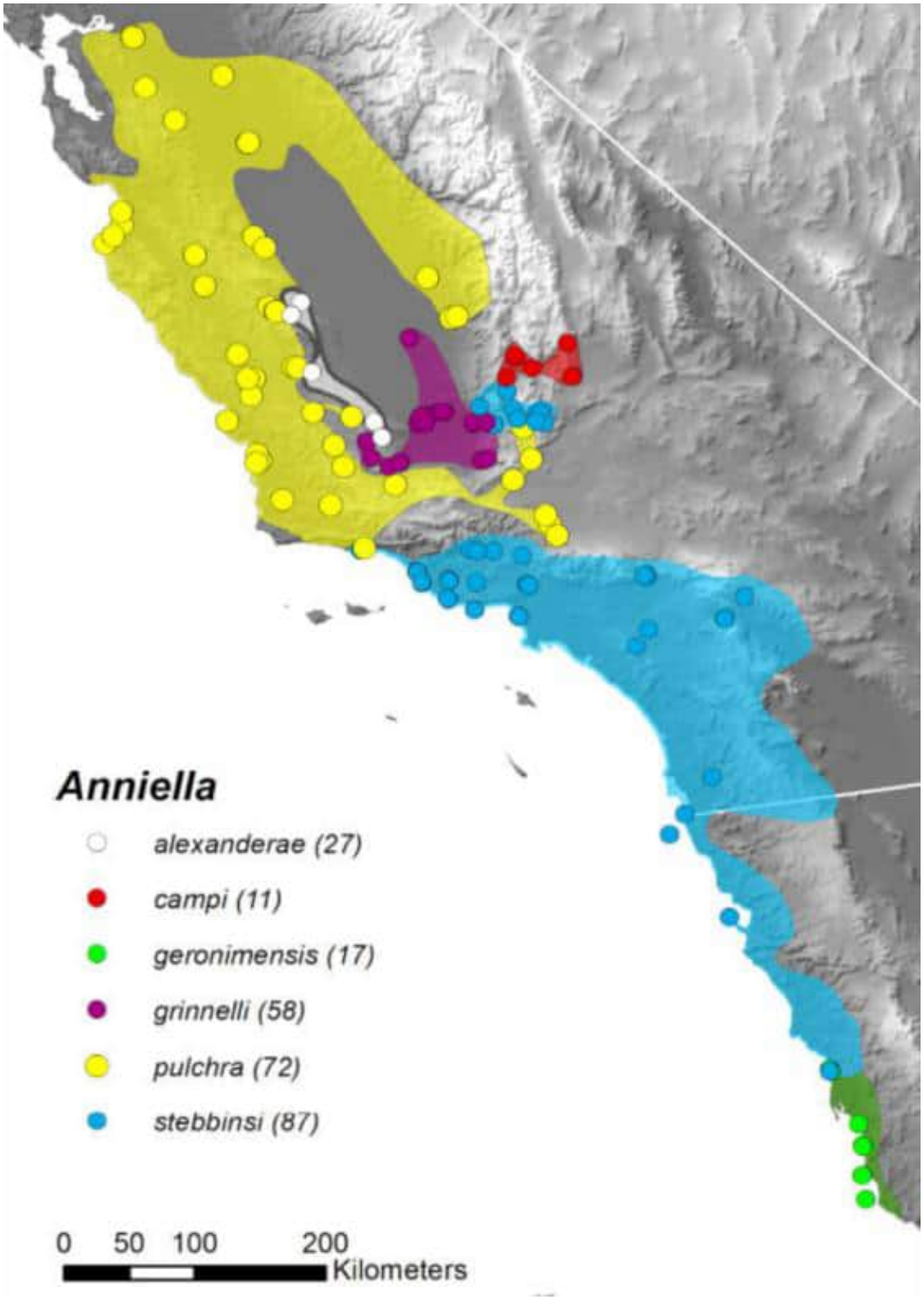

Figure 1. Estimated range map of all six *Anniella* species in California and Baja California. Temblor legless lizard (*A. alexanderae*) range is shown in white, with white circles representing Temblor legless lizard occurrences (map from Parham et al. 2019). This map was included as Figure 3 in the Petition. Note that *A. geronimensis* is a previously described species (Shaw 1940) that occurs in Baja California, Mexico and is not one of the species split from *A. pulchra*.

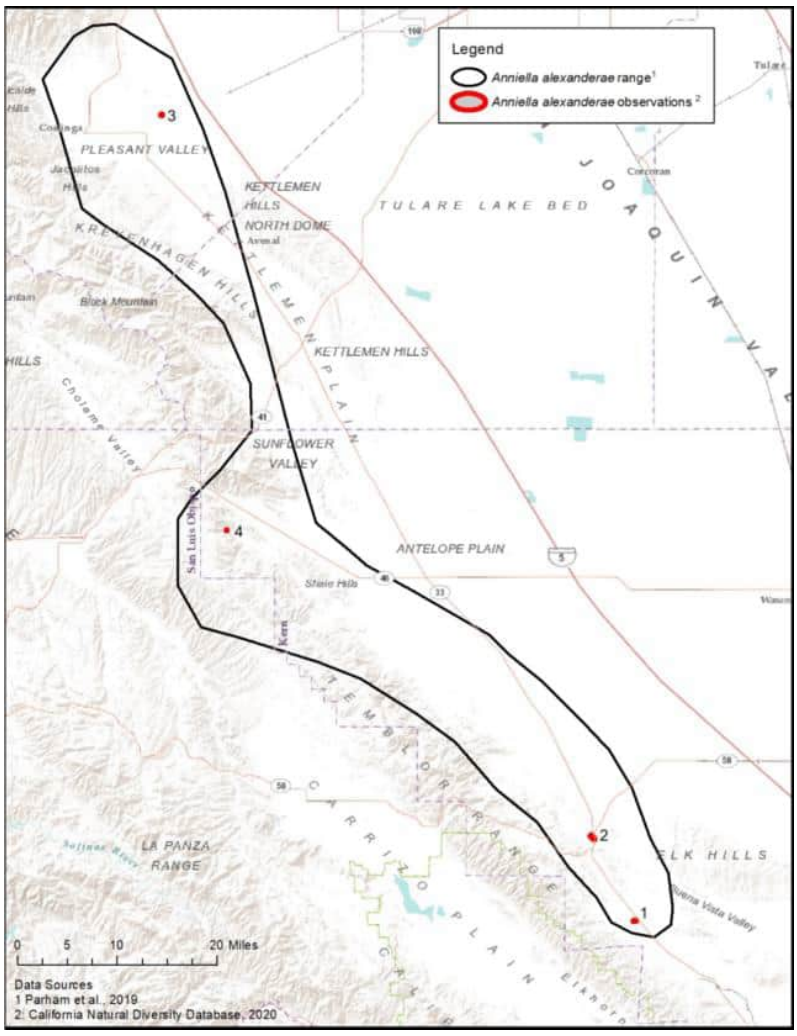

Figure 2. Map showing the estimated range and distribution of Temblor legless lizard based on surveys conducted from 2013 to 2018, as well as locations in which individuals have been found. This map was included as Figure 4 in the Petition.

Other Relevant Scientific Information

One additional occurrence of Temblor legless lizard south of Coalinga was not discussed in the Petition but is recorded in the CNDDB and was included in the recent Conservation Assessment (Parham et al. 2019). This occurrence is included in Figure 3 along with other CNDDB and museum records and other reported occurrences of *Anniella* species. Additional observations of *Anniella* that have not been identified to one of the five California *Anniella* species using the genetic and morphological methods described in Parham et al. (2019) are included in Figure 3, if within 24 km (15 mi.) of the estimated range of the Temblor legless lizard.

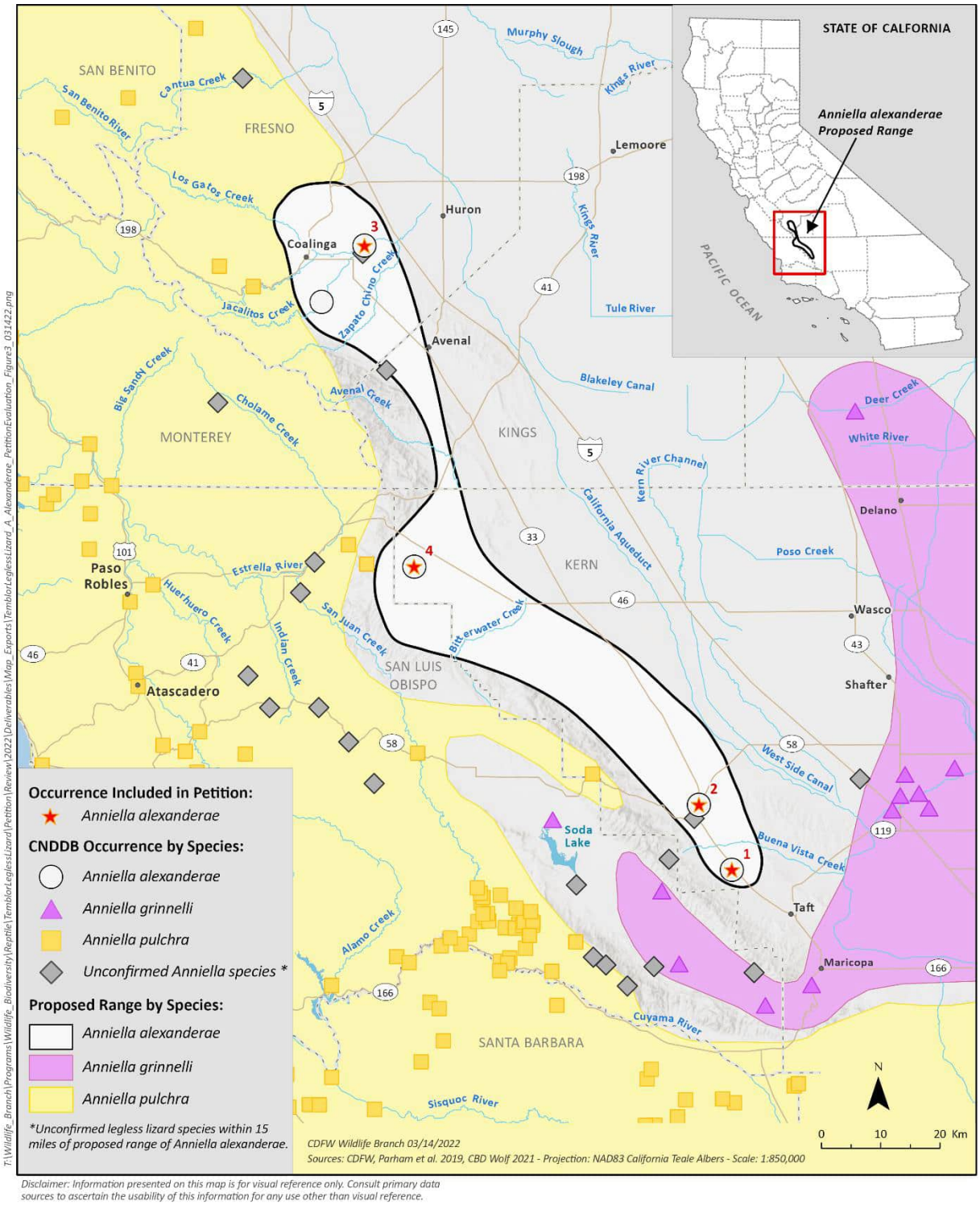

Figure 3. Map created by the Department showing *Anniella* species occurrences included in the Petition along with additional occurrences from CNDDB in and near the estimated range of the Temblor legless lizard (*Anniella alexanderae*). Unconfirmed *Anniella* species occurrences include museum records and other reported occurrences not evaluated by morphological and genetic analyses described in the 2019 Conservation Assessment (Parham et al. 2019).

Conclusion

The Petition provides sufficient information that the Temblor legless lizard has a very small range and limited distribution, making its continued existence especially vulnerable to threats it may encounter. The occurrence of unidentified *Anniella* observations in and near the estimated range and the small number of known Temblor legless lizard locations results in some uncertainty about the exact range and distribution of the species.

Detailed Distribution Map

Scientific Information in the Petition

The Petition provides a distribution map on page 9 (included here as Figure 2) indicating the estimated range of Temblor legless lizard and four sites where it has been observed.

Other Relevant Scientific Information

As described above, the Department is aware of one additional Temblor legless lizard site and several sites in the vicinity of the estimated range with unidentified legless lizards (Figure 3).

Conclusion

The Petition provides a sufficiently detailed distribution map for the Temblor legless lizard.

Life History

Scientific Information in the Petition

The Petition discusses the life history of the Temblor legless lizard in Section II, "Life History," on pages 1–5, including taxonomy, genetic differentiation, species description, and biology.

The Petition describes the taxonomic history of the Temblor legless lizard and the genetic research that contributed to the splitting of *A. pulchra* into five different *Anniella* species in California, as well as the retention of the Temblor legless lizard's status as a Species of Special Concern (CNDDB 2021).

In addition, the Petition describes the morphological characteristics of the Temblor legless lizard including general legless lizard morphology as well as characteristics used to determine species such as coloration, number of vertebrae, and scale counts (Papenfuss and Parham 2013) as illustrated in Figure 4.

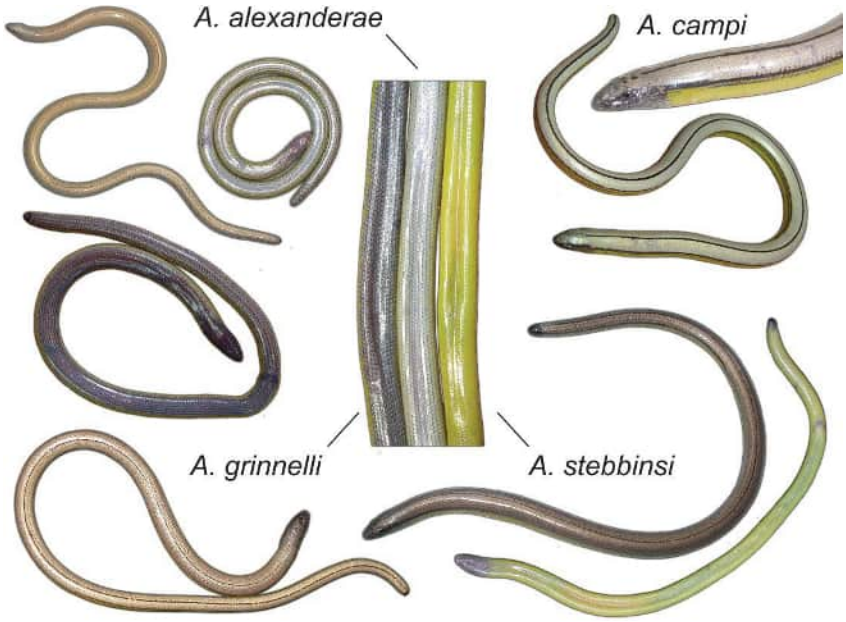

Figure 4. Diagram from Papenfuss and Parham (2013) illustrating distinguishing coloration features between *Anniella* species. This is included as Figure 1 in the Petition.

Finally, the Petition describes various aspects of the Temblor legless lizard's biology, including reproduction and lifespan, burrowing behavior and movement, temperature requirements, diet and foraging behavior, and predators. As the Temblor legless lizard is a newly recognized species, most of its life history information is inferred from research on *Anniella* species throughout California. The Petition discusses the importance of loose sandy soil for burrowing and the lizard's ability to move through the soil to access the surface for feeding and mating. It also discusses the importance of temperature to life history aspects of legless lizards. It discusses that Temblor legless lizards are mostly crepuscular and rarely move completely above ground, often lying just beneath the surface for feeding and mating but are occasionally found on the surface at night when the substrate temperatures remain above 21 °C (70 °F) for extended periods (Jennings and Hayes 1994).

Conclusion

The Petition provides sufficient information regarding the life history of the Temblor legless lizard including breeding and foraging patterns.

Kind of Habitat Necessary for Survival

Scientific Information in the Petition

The Petition discussed the necessary habitat for Temblor legless lizard in Section III of the Petition, "Habitat Necessary for Survival," on pages 5–6.

The Temblor legless lizard, like other *Anniella* species, has specific microhabitat requirements due to its fossorial behavior. They are restricted to areas with loose soil or substrate and moderate plant cover and cannot tolerate areas where soil has been compacted or graded (Jennings and Hayes 1994). Habitat studies of the Temblor legless lizard show that the species is predominately limited to alkali desert scrub and grassland at the base of the Temblor Mountain range in the San Joaquin Valley (Parham et al. 2019). Other studies of legless lizards have shown their need for specific soil moisture and density that enables essential life functions such as proper shedding and the ability to burrow and move about their environment (Miller 1944).

In a species assessment of *A. pulchra*, researchers determined that anthropogenic activities that alter the soil structure, moisture, and/or plant composition can degrade habitat quality and could cause local extinctions (Thomson et al. 2016).

Conclusion

The Petition provides sufficient information regarding the habitat necessary for survival of the Temblor legless lizard.

Factors Affecting the Ability to Survive and Reproduce

Scientific Information in the Petition

The Petition describes factors affecting the Temblor legless lizard's ability to survive and reproduce in Section VIII, "Factors Affecting Ability to Survive and Reproduce," on pages 11–27. Factors discussed include oil and gas development, urbanization, industrial solar projects, climate change, and invasive species.

Oil and Gas Development

The Petition discusses in detail the threats imposed on the Temblor legless lizard by oil and gas development throughout its range, including:

- The extensiveness of oil and gas development in the limited range of the Temblor legless lizard, stating that more than 98% of the lizard's restricted range is already open or potentially available to oil and gas development;
- Habitat loss and fragmentation;
- Soil compaction, loss of native plant life, and changes in soil moisture;
- Noise and light pollution;
- Oil spills and produced water spills;
- Wastewater disposal pits.

Urbanization

The Petition discusses the general threats of urbanization on native species and the inability of most lizard species to relocate to new habitats to avoid impacts of urbanization (Howland et al. 2014). Ecological niche modeling predicted that the Temblor legless lizard's range once

extended much further into the San Joaquin Valley, but the species has not been found east of Highway 33 (Parham et al. 2019). This area is highly developed and may have caused a local extirpation of the species in that region.

Industrial Solar Projects

The Petition discusses the impacts of industrial solar projects on habitat, including soil compaction, the removal of vegetation, changing of soil characteristics, and changes in microclimate from the presence of the solar panels (Turney and Fthenakis 2011). It also discusses the extent of solar fields currently within the San Joaquin Valley and the Temblor legless lizard's range as well as planned future solar projects in Kern County that could have an impact on habitat connectivity and suitability.

Climate Change

The Petition discusses the impacts of climate change on the Temblor legless lizard, including drought, rising temperatures, changes in hydrology and soil moisture composition, and increased frequency and severity of wildfires (Thorne et al. 2018). It further discusses how these changes in climate will impact the species given its use of and dependence on microhabitats and life history. Temperature is an important aspect of reptile biology. Major changes in average and extreme temperatures may therefore have impacts on Temblor legless lizard activity, including the species' ability to forage and find mates. In addition, the Petition describes the importance of specific soil moisture levels for the Temblor legless lizard as essential for proper shedding and the ability to hunt and feed (Miller 1944). While drought can dry out the soil, heavy flooding from more intense precipitation events such as those produced by atmospheric rivers could lead to drowning lizards in low-lying areas.

Invasive Species

The Petition also discusses how development and climate change facilitate the spread of invasive species, including invasive grasses and non-native wild pigs, causing threats to the Temblor legless lizard through degradation of habitat and increased susceptibility to predation. Invasive grasses are particularly detrimental as they change soil moisture and root structures, affecting the soil composition and reducing its suitability to Temblor legless lizards. These changes can also reduce the quality of habitat and diversity of native insects that serve as prey for the Temblor legless lizard. In addition, the presence of non-native invasive grasses can increase wildfire frequency and intensity, often converting habitat to non-native grassland following a fire which may negatively impact habitat suitability (Howland et al. 2016, Thomson et al. 2016, Evelyn and Sweet 2018).

Other Relevant Scientific Information

The Petition did not address potential impacts of non-native domesticated animals brought in through urbanization and agriculture such as cats, dogs, and rats. It has been well documented

that free-roaming cats cause an excessive amount of wildlife mortality (Loss et al. 2013), and it can be inferred that in areas where urbanization approaches the lizard's range, cats would pose an increased predatory threat.

Conclusion

The Petition provides sufficient information regarding factors affecting the ability of the Temblor legless lizard to survive and reproduce, including oil and gas development, urbanization, industrial solar projects, climate change, and invasive species that result in habitat loss, degradation and fragmentation and can restrict the species' ability to carry out essential functions such as feeding, burrowing, and reproduction.

Degree and Immediacy of Threat

Scientific Information in the Petition

The Petition discusses the degree and immediacy of threat to the Temblor legless lizard in Section IX, "Degree and Immediacy of Threat," on pages 27–28, in which it refers to other sections of the Petition and specifically discusses the severe and immediate threat of oil and gas development, which is extensive throughout the Temblor legless lizard's range. It also discusses the increasing risks posed from climate change, invasive species, and habitat loss and fragmentation from agriculture and industrial solar projects. Given the previously discussed small range and distribution of the species, along with its specialized habitat requirements, the Petition states that any of these issues could be immediately threatening to the species' continued survival and reproduction.

Conclusion

The Petition provides sufficient information detailing the degree and immediacy of threats to the Temblor legless lizard.

Impact of Existing Management Efforts

Scientific Information in the Petition

The Petition discusses existing management and regulatory mechanisms for the Temblor legless lizard in Section X, "Inadequacy of Existing Regulatory Mechanisms," on pages 28–34. This section discusses the regulatory mechanisms in place at federal, state, and local government levels and states that there is a lack of adequate protection for the Temblor legless lizard.

Regarding oil and gas development, the Petition discusses expansion of lands available for lease and expedited approval of oil and gas development at federal, state, and county levels, which the Petition states has occurred without analyzing or mitigating impacts to Temblor legless lizard. It further describes that federal and state land ownership comprise just 5.5% of the Temblor legless lizard range (Parham et al. 2019) and that over 98% of the species' range is

already open or potentially available to oil and gas development. Regarding threats to Temblor legless lizard from climate change, the Petition cites several international reports and discusses the deviation of U.S. policy at the time the Petition was submitted from commitments made in the international Paris Agreement. It further describes that the U.S. is not on track to limit warming to 1.5 °C or even 2 °C (2.7 or 3.6 °F) and is expanding, rather than restricting, fossil fuel extraction.

Related to mechanisms that could provide protections for Temblor legless lizard and its habitat, the Petition discusses the potential protection of the Temblor legless lizard under the federal ESA but describes that the 12-month finding is overdue, and the species does not receive any protection under ESA until it is listed. It also discusses two Habitat Conservation Plans (HCPs) proposed within the Temblor legless lizard's range that do not address this species in the HCPs or related environmental assessments. It further describes that other *Anniella* species are included in East San Diego and Bakersfield Natural Community Conservation Plans (NCCPs), but that the Temblor legless lizard is not yet included in any NCCP. The overlap of the Temblor legless lizard range with other protected species such as the blunt-nosed leopard lizard (*Gambelia sila*) and the San Joaquin kit fox (*Vulpes macrotis mutica*) is also discussed, and while all three species face similar threats, the Petition states that their varied use of those areas means that measures in place to protect the blunt-nosed leopard lizard or San Joaquin Kit Fox would be insufficient for protecting the Temblor legless lizard. It also states that the protections offered the species under the California Environmental Quality Act may not be strong enough despite its current status as a Species of Special Concern. The Petition discusses the Kern County General Plan, and states that it does not provide protection for the species or its habitat. The Petition further states that Temblor legless lizard would greatly benefit from the legal protections granted to a threatened or endangered species at all levels of government.

Other Relevant Scientific Information

The California Protected Areas Database (GreenInfo Network 2022) confirms that land ownership within the Temblor legless lizards' range is primarily private and unprotected, comprised of just 6.5% of lands owned in fee and protected for open space purposes.

Conclusion

The Petition provides sufficient information regarding the impact of existing management efforts. It describes the variety of regulatory mechanisms that could provide protection for Temblor legless lizard but argues that they have been inadequate to date.

Suggestions for Future Management

Scientific Information in the Petition

The Petition discusses suggestions for future management in Section XI, "Recommended Management and Recovery Actions on pages 34–35. The Petition calls for immediately stopping new oil and gas development within the Temblor legless lizard range, phasing out existing oil and gas development within the Temblor legless lizard range, initiating habitat protections to reduce impacts from development, initiating strong actions to limit climate change, and reducing the spread and impacts of invasive species.

The Petition suggests specific actions to be taken by the Governor to end new approvals for oil and gas development, begin a phase-out of existing infrastructure, and to take action on climate change. It also recommends species management actions by the Department and California Department of Parks and Recreation. These include the Department's preparation of a species recovery plan, acquisition and protection of land where Temblor legless lizards are known to occur and where habitat could be restored, development of NCCPs to protect the species on private lands, and coordination with federal agencies, local jurisdictions, and academic institutions to protect the Temblor legless lizard and its habitat.

Other Relevant Scientific Information

Other potential management actions include expansion of surveys and genetic studies to better understand the distribution of *Anniella* species in California. In addition, further research on the life history and habitat use of Temblor legless lizard specifically would be beneficial to better understand the needs of and threats to the species.

Conclusion

The Petition provides suggestions for future management actions for the Temblor legless lizard and its habitat including stopping oil and gas development, initiating habitat protections, climate action, and reducing invasive species.

Availability and Sources of Information

Scientific Information in the Petition

The Petition cites an extensive list of sources in pages 36–45.

Other Relevant Scientific Information

The Department utilized some additional information and sources when developing this Petition Evaluation. These sources include Crother (2017), Loss (2013), CAS (2022), GreenInfo Network (2022), MCV (2022), MVZ (2022), and additional data found in the Department's CNDDB.

Conclusion

The Petition provides sufficient sources of information and has made them available to the Department along with the Petition.

RECOMMENDATION TO THE COMMISSION

Pursuant to Section 2073.5 of the Fish and Game Code, the Department has evaluated the Petition on its face and in relation to other relevant information the Department possesses. In completing its Petition Evaluation, the Department has determined that the Petition and other relevant information indicates there is sufficient scientific information to indicate that the petitioned action to list the Temblor legless lizard as threatened or endangered may be warranted. The difficulty in detecting this species, as well as its new species designation and lack of species-specific research, limits the available information upon which to assess abundance and population trends. However, the Temblor legless lizard's small geographic range and limited distribution, low number of detections, habitat loss and fragmentation, and other threats described in the Petition provide an inference of threat or endangerment leading the Department to recommend that the petitioned action may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

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California Department of Fish and Wildlife

Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species

June 6, 2023

Contents

1. Introduction

The California Department of Fish and Wildlife developed this document to provide an overview of survey considerations and methods for Crotch's bumble bee (*Bombus crotchii*), western bumble bee (*Bombus occidentalis*), Franklin's bumble bee (*Bombus franklini*), and Suckley's cuckoo bumble bee (*Bombus suckleyi*). These four bumble bee species are candidates for listing under the California Endangered Species Act (CESA). The scientific information provided herein is intended to assist CDFW staff, project proponents, and consultants in developing, proposing, and evaluating survey protocols and surveys on a project- and site-specific basis. This document should not be interpreted as an order or mandatory protocol for species surveys.

2. Evaluating Potential for Presence

Historical and current occurrence data can provide information on whether one of the candidate species is likely to occur within or near a given project area[1]. We recommend that evaluations include a review of occurrence data within and adjacent to the project site. Species' range data in resources such as Williams et al. (2014) or species distribution models in published literature can also be used to help determine potential site occupancy. See Appendix 1 for range maps of the four candidate species.

Historical and current records should be evaluated by consulting a combination of reliable data sources including the California Natural Diversity Database (CNDDB) and the Bumble bees of North America occurrence database (which can be requested from its curator Dr. Leif Richardson). Citizen science data platforms such as iNaturalist and Bumble Bee Watch can also provide occurrence data, however the data may or may not be verified by expert taxonomists.

Occurrence data may not always be available for a variety of reasons including the lack of systematic surveys across all potential habitat and recent species declines. Absence of occurrence records should not be interpreted as absence of the species at or near a given site. When records do exist, they often only provide positive data and do not provide negative data from surveys where species went undetected. It is therefore inadvisable to solely rely on occurrence records to assert that a species is absent from a project site. When there is a data deficiency or lack of sightings in a given area that contains suitable habitat for the candidate species, site specific surveys should be conducted.

3. Habitat Assessment

A habitat assessment evaluating the likelihood of bumble bees occurring within and adjacent to the project area should occur and results should be submitted to CDFW prior to initiation of ground disturbing project activities. The assessment should include historical and current species occurrences as well as proximity to the last known sighting. The habitat assessment should include data from site visits to observe and document potential habitat including potential foraging, nesting, and/or overwintering resources. The habitat assessment should quantify which plant species are in bloom and what their percent cover is. General plant diversity should also be assessed and documented. The foraging resources should be quantified across multiple site visits, corresponding with the Colony Active Season (see Table 1) of the

[1] The dispersal distance of new queens as well as the colony's foraging range are difficult to determine and can vary greatly. It is estimated through homing studies and genetic distance analysis that queen dispersal distance may be around 10 km (6.2 miles) (Kraus et al. 2009; Jha and Kremen 2013; Williams et al 2014). However, in Europe, there are reports of bumble bee queens migrating en masse over large distances including over water for several hundred kilometers (Fijen 2021), so these estimates may be much smaller than true distances. Bumble bee foraging range varies among species, the size of the colony, the size of the individual bees, and can also be attributed to the quality of habitat present (Goulson 2010; Kreyer et al. 2004; Walther-Hellwig and Frankl 2000). Though some bumble bee species have been recorded foraging in patchy agricultural landscapes up to 11.5 km from their nest (Rao and Strange 2012; Goulson and Stout 2001), it is likely that the foraging range occurs much closer to the nest, from 1-2 km in a single trip (Walther-Hellwig and Frankl 2000; Dramstad et al. 2003; Williams et al. 2014).

candidate species in the region where the project is located. Foraging resources recorded should not be limited to the preferred plant species known to be favored by a given candidate species but should include all flowering plants including non-natives and invasives. Nesting resources quantified can include bare ground, rodent burrows, and other potential nesting sites that may support bumble bee colonies[2]. Leaf litter and woody forest edge that could provide overwintering habitat should also be described.

It is important to assess habitat both within the proposed project area and in the surrounding landscape, as habitat in the landscape may help predict whether candidate species could be nesting in adjacent areas and foraging within the project site. For additional information on what could be included in habitat assessments see the Rusty Patched Bumble Bee Habitat Assessment Form & Guide | Xerces Society.

4. Survey Method

On-site surveys provide the most valuable information for determining potential impacts of proposed projects and activities on the four candidate bumble bee species, and subsequently developing measures to avoid or minimize take of these species. Survey efforts should include multiple on-site surveys and should be developed to detect foraging bumble bees and potential nesting sites (nesting surveys). Survey timing should be determined on a project-by-project basis based on seasonality and when activity or foraging will most likely occur each year[3]. Timing of the surveys may vary depending on the location, elevation, seasonal rainfall, average ambient air temperatures, and local seasonal weather conditions. To increase probability of detection, bumble bee survey efforts should be conducted during the Colony Active Period (Table 1) and when floral resources are present, ideally during peak bloom.

Surveys efforts should occur and results should be submitted to CDFW prior to initiation of ground disturbing project activities. The number and type of surveys conducted during a survey effort may vary on a project- and site-specific basis. For very large project sites, for example, surveyors should use large meandering transects that incorporate patches of floral resources across the landscape. It is recommended that at least 3 on-site surveys take place prior to project implementation. Each survey should ideally be spaced 2-4 weeks apart during the Colony Active Period to ensure that they cover a range of dates and account for variability in resource use by the candidate species and floral resource phenology within the site. Separate

[2] Although there is little data describing the nesting of candidate bumble bee species, they may utilize similar nesting habitats as other *Bombus* species (Williams et al. 2014). Bumble bee queens from the *Bombus* subgenus do not dig or make their own nests, rather they search for suitable nest sites by flying low to the ground investigating cavities in a variety of different substrates including thatched grasses, abandoned rodent burrows or bird nests, brush piles, rock piles, and fallen logs (Sladen 1912, Free and Colin Gasking Butler 1959, Alford 1975, Fussell and Corbet 1992, Lye et al. 2012, Williams et al. 2014). They have also been found nesting in man-made structures such as walls, rubble or abandoned furniture (Fussell and Corbet 1992, Williams et al. 2014).

[3] Peak activity figures for each species can be found in Bumble bees of North America, which show the timing of when queens, workers, and males have been observed (Williams et al. 2014). Peaks in activity can also be viewed on seasonality graphs in iNaturalist.

surveys should not be conducted on sequential days or in the same week as the species may not be using the site during those days. Surveys should occur during the day (at least an hour after sunrise and at least two hours before sunset, though ideally between 9am-1pm) on warm, but not hot, sunny days (65-90 degrees F), with low wind (less than 8 mph).

Common Name	Species Name	Queen Flight Season	Colony Active Period (highest detection probability)	Gyne Flight Season
Franklin's bumble bee	*Bombus franklini*	Late April-early June	Late June-August	September-October
Western bumble bee	*Bombus occidentalis*	February-March	April-September	October-November
Crotch's bumble bee	*Bombus crotchii*	February-March	April-August	September-October

Table 1: Approximate Queen and Gyne Flight Seasons and Colony Active Periods of three candidate bumble bee species (taken and adapted from seasonality charts in Williams et al. 2014). The highest detection probability for each species is during the Colony Active Period. Suckley's cuckoo bumble bee is not included because there is high potential the species would not be detected if surveys were conducted outside of the queen's flight season, which is typically late spring through mid-summer.

While surveys conducted using these flight seasons/active periods as a guide are considered the most effective and protective to the species, surveys may fail to detect the presence of candidate bumble bee species. Therefore, some project proponents may choose to assume presence and rely on habitat as an indicator of presence in lieu of, or in addition to, surveys.

Bumble bees move nests sites each year; therefore, surveys should be conducted each year that project activities will occur. Even if surveys from a particular project site failed to detect bumble bees one year, project proponents should perform a full round of surveys each year that project activities will occur or assume presence.

4.1 Survey Protocol

The following are example protocols that can be used in survey method development:

- CA Bumble Bee Atlas non-lethal protocol (volunteer handbook)- https://www.cabumblebeeatlas.org/point-surveys.html
- USFWS Rusty patched bumble bee protocol- https://www.fws.gov/sites/default/files/documents/Survey_Protocols_RPBB_12April2019.pdf

CDFW's preferred survey method includes non-lethal photo vouchers of all captured bumble bees - photos that show multiple angles of a specimen to allow for accurate identification. This is best accomplished by netting then chilling specimens to facilitate manipulation. When done properly, this method has a low risk to the species (USFWS 2018). Photos of bees on vegetation are also acceptable, but identification may be impaired by photo quality or inability to show identifying characteristics in sufficient detail. Survey methods that involve lethal take of species are not acceptable.

If candidate bumble bees will be captured or handled, a 2081(a) Memorandum of Understanding (MOU) with CDFW will likely be required. MOU authorizations do not require submittal of an application fee. A Scientific Collecting Permit (SCP) may be required in conjunction with the issuance of an MOU if the surveys are likely to impact the two additional bumble bee species on CDFW's Terrestrial and Vernal Pool Invertebrates of Conservation Priority List, *B. morrisoni* and *B. caliginosis*.

MOU website: Wildlife Branch Research Permitting
Application Procedure: Contact the Wildlife Branch, wildlifemgt@wildlife.ca.gov

SCP website: Scientific Collecting Permits
Application Procedure: Apply through the CDFW Scientific Collecting Permit Portal

4.1.1 Foraging Bumble Bee Surveys

Focused surveys should be conducted for a minimum of one person-hour of searching per three acres of suitable habitat (see example for Rusty patched bumble bee protocol provided above). This one-hour time period does not include the time for capture, photography, identification, or release. Alternately, surveys can continue until at least 150 bumble bees have been captured, photographed and/or identified, and released[4]. The surveyor should walk through the habitat focusing on areas with floral resources. The surveyor can target bees matching the candidate species description or capture all bees if they are unsure of proper identification.

Bumble bees should be captured with a net from blooms, avoiding destruction of the flower when possible[5]. Each bee should be carefully transferred into a sterile vial and moved to a cooler with only one bee per vial to avoid disease spread. The bee should be kept in the vial for no more than 10 minutes in ambient temperature before being placed in a cooler as they have a tendency to over-heat (the amount of time should be decreased on hotter days). The vial should be placed in a cooler at a temperature above 25 degrees F, as lower temperatures could

[4] See Appendix E of the USFWS Rusty patched bumble bee protocol.
[5] CDFW recommends becoming familiar with any existing state-listed plants in an area before conducting foraging bumble bee surveys. If state-listed plants occur in the survey area, surveyors should ensure that pollination disruption is minimal during peak flowering and that disturbance of vegetative tissue and soil is minimized. If any state-listed plant occurrences are visited during bumble bee surveys, GPS location and any pollinator association data should be included with survey reports to CDFW and to Nativeplants@wildlife.ca.gov for data collection purposes.

freeze and kill the bee. A thermometer should be placed in the cooler to avoid potential freezing. Crushed ice should be used rather than ice packs to avoid freezing the bee. Time in the cooler should be limited to no more than 120 minutes.

Photographs for Identification

To identify the bumble bee species captured in vials, carefully remove the cooled bee from the vial and take several photographs against a solid or grided background in light shade so that the bee does not wake up right away or overheat. The bee should never be left or positioned in direct sun. Photographs should be clear and in focus, they should be taken from multiple angles including:

- Face including cheek length
- Top of the head
- Banding on the abdomen
- Color pattern on the thorax
- Hind leg for Psithyrus/sex diagnosis

After photographs have been taken, release the bee in the shade near where the bee was collected (it will slowly start moving and fly away on its own). Keep an eye on bees to ensure they rouse, if any bees die, collect them and report the mortality as specified in the MOU. In the event of a mortality event cease all new activities until you receive direction from CDFW. More information on how to preserve deceased bees can be found in Section 6 below. If there are unsafe conditions such as pesticide application, do not return the bee to the location collected, instead return it to a suitable location as close as possible to where it was found while remaining out of harm's way.

Sterilization Methods

Surveyors should have a sterilized, dry vial and lid for each bee collected to prevent the spread of disease. The nets should be sterilized between survey locations. Sterilizing should include soaking in 10 percent liquid bleach solution (do not use crystalized bleach). Vials and nets need to be rinsed and dried before subsequent use. Surveyors should not attempt sterilization in the field because the sterilizing solution could poison the bees; surveyors should have enough clean vials and nets for each day of surveys.

4.1.2 Nesting Surveys

Potential nesting sites in project areas should be surveyed for active colonies. Surveyors can consult maps or habitat assessment(s) to determine potential area(s) to survey. Recall nests may not be co-located with foraging resources and could occur in forest edges, unmowed areas, or areas with rodent burrows or other habitat used as nest sites. Surveys for nests can begin in early spring when new queens search for a nest location. This can be challenging, however, as queens may spend weeks searching for a suitable site. If a site is suspected to be occupied by a queen, it can be flagged and then surveyed in 1-2 weeks once a nest has been established or you may wait until later in the Colony Active Period (see Table 1). Another

possible, though potentially challenging, method is to try to follow the bees from blooms to their nests and look for concentrated bumble bee activity in suitable nesting habitat to focus on where active nest sites may be located. More typically, areas with potential nesting resources are systematically walked and nest activity is observed (high levels of bee movements from a given location). Dogs have been trained to sniff for bumble bee nests, but success rates have been found to be on par with human searchers (Hatfield et al. 2012).

If a nest is suspected, the surveyor can block the entrance of the possible nest with a sterile vial or jar until nest activity is confirmed. If the nest is active, it will typically only take a few minutes before the bees start congregating inside or outside the vial. Vials should not be left on suspected nests for longer than 30 minutes, though less than 5 minutes should be sufficient to confirm use.

If active nests of the candidate bumble bee species are present, an appropriate no disturbance buffer zone should be established around the nest to reduce the risk of disturbance or accidental take.

Overwintering habitat for the majority of North American bumble bees is poorly understood and therefore surveys for it are not recommended. Sloping areas or areas under trees insulated with moss or leaf litter have been found to support overwintering gynes.

4.2 Interpreting Survey Results

If no CESA-protected bumble bees are found during the multiple rounds of focused surveys, but the habitat assessment identified suitable nesting, foraging, or overwintering habitat within the project site, it is recommended that a biological monitor be onsite during vegetation or ground disturbing activities that take place during any of the Queen and Gyne Flight Period and Colony Active Period.

If CESA-protected bumble bees are observed, project proponents may propose site-specific measures to avoid take, or consult with CDFW to obtain an Incidental Take Permit (ITP) if take of CESA-protected bumble bees may occur during project activities.

4.3 Surveyor Qualifications

Surveyors must be qualified to conduct surveys for the candidate bumble bee species. There are a range of potential qualifications including coursework, bumble bee-specific workshops, and focused surveys. It is important to consider the type of training or field work when evaluating whether it provided relevant experience. Project proponents applying for a permit should submit a resume of the proposed surveyor (designated biologist) with their research MOU or ITP application for review by CDFW (see DFW820 resume form). Given the level of expertise needed for taxonomic identification, it may be acceptable for a less experienced surveyor to confirm the identifications of the bumble bees encountered during surveys by sending photo vouchers to an experienced taxonomist. If this is the case, please also provide the resume of the taxonomist in addition to the qualified biologist.

5. Monitoring and Reporting

For projects that will be receiving an ITP or surveyors receiving a research MOU, survey reporting may be required. Generally, survey reports should include the following information:

1. Qualifications/resumes of surveyor(s) and, if applicable, approved biologists for identification of photo vouchers.
2. Location (latitude and longitude) and extent of surveyed area (maps recommended).
3. Description of conditions during each survey: date, time, temperature, wind speed.
4. Detailed habitat assessment including percent cover of floral resources and potential nesting and overwintering habitat.
5. Number of surveyors per acre, number of acres surveyed, amount of time of focused surveys.
6. List of bee species observed.
7. Foraging habitat surveys: name (at least down to genus) of host plants observed and whether bees were captured on them.
8. Nesting habitat surveys: type of nest/structure surveyed and if bees were found in them, number of nests found in project site, photo log of suitable habitat and plants.
9. Photo vouchers of bumble bees for identification.
10. Confirmation that photo vouchers were submitted and candidate bumble bees were identified, if applicable.

6. When to Contact CDFW

If any of the candidate bumble bee species are detected during surveys, the designated biologist should notify CDFW as further coordination may be required to avoid or mitigate certain impacts. As very little is known about nesting or overwintering sites of the candidate species, if nest or overwintering sites are discovered or can be documented, contact (preferably within three days) CDFW (wildlifemgt@wildlife.ca.gov), USFWS (for *B. franklini B. occidentalis,* and/or *B. suckleyi*), as well as regional CDFW staff (CDFW region) in which the sighting occurred to assist us in learning more about their habitat and behavior.

If a bumble bee is killed during the source of survey efforts, stop all work and immediately contact CDFW for guidance. Collect the bumble bee into a vial and freeze it as you may be asked to send the specimen to CDFW for further assessment. Record the date, location, GPS coordinators, project name, collector, and any other relevant information related to how it came to die (e.g., freezer may have been too cold; hot day and extreme shifts in temperature from ambient air to cooler may have contributed).

Survey data should also be submitted to the California Natural Diversity Database (CNDDB). Information that should be included in this nest observation report are; the nest type, type of vegetation cover, slope, aspect, GPS location, distance to foraging location (if known) and other relevant conditions noted about the nest. Negative survey data should also be reported.

NOTE: Due to the sensitivity of the species, suspected or confirmed presence of candidate bumble bee species should not be documented on publicly available databases.

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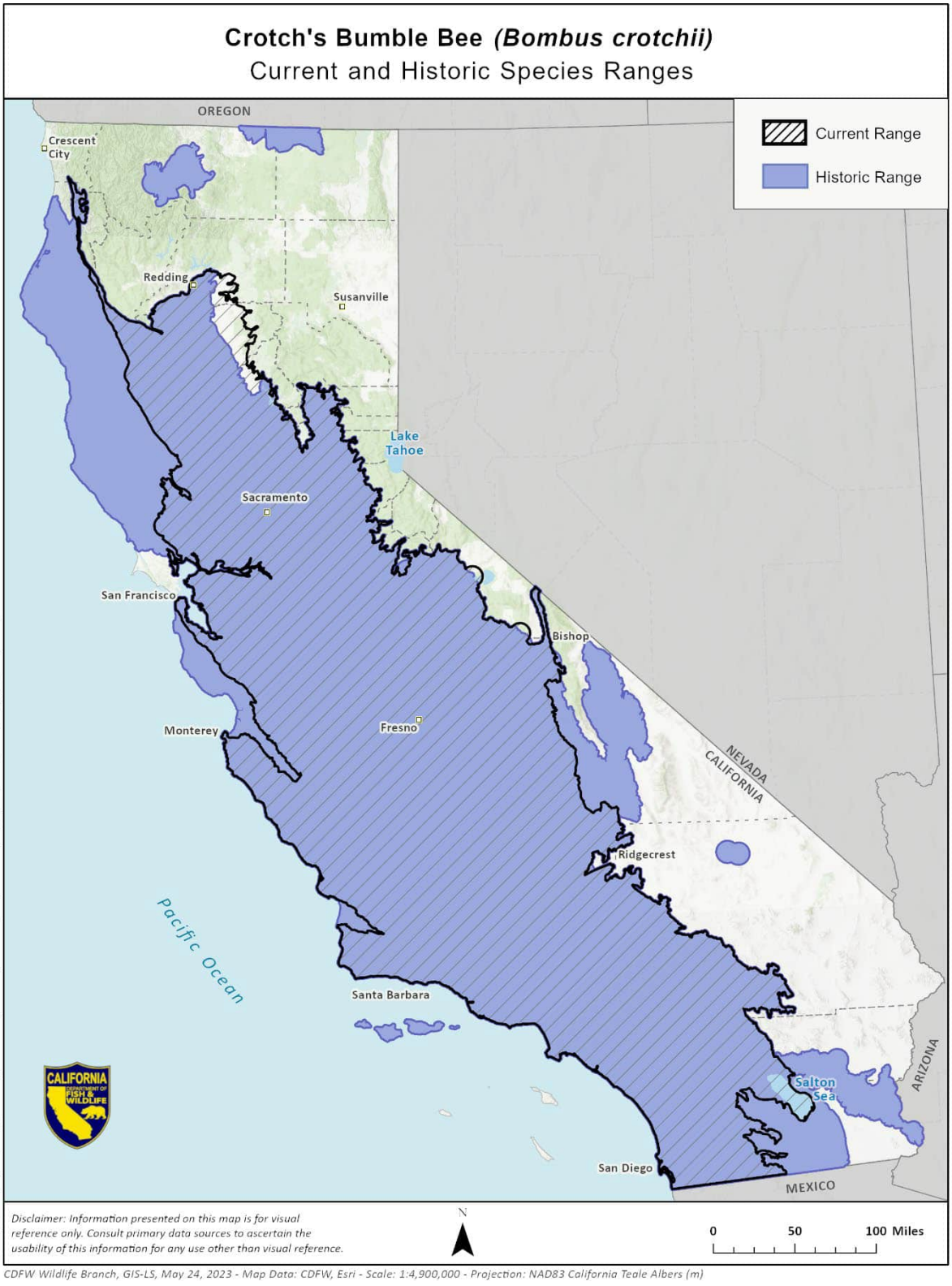
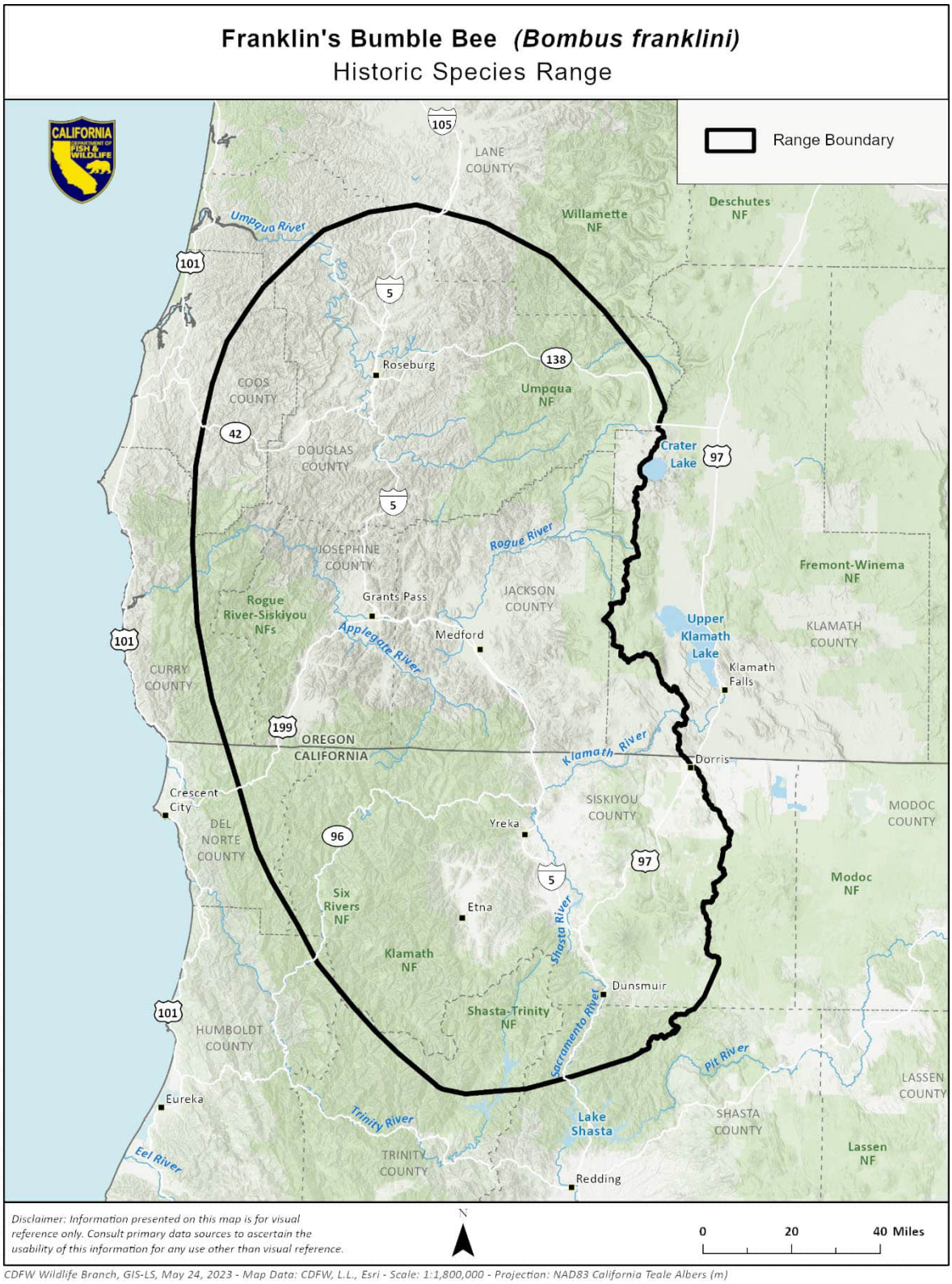
Appendix 1: Range Maps




Franklin's Bumble Bee (Bombus franklini)
Historic Species Range
Range Boundary
CALIFORNIA DEPARTMENT OF FISH & WILDLIFE
LANE COUNTY
Willamette NF
Deschutes NF
Umpqua River
Roseburg
COOS COUNTY
Umpqua NF
DOUGLAS COUNTY
Crater Lake
JOSEPHINE COUNTY
Rogue River
Fremont-Winema NF
Rogue River-Siskiyou NFs
Grants Pass
JACKSON COUNTY
Applegate River
Medford
Upper Klamath Lake
KLAMATH COUNTY
Klamath Falls
CURRY COUNTY
OREGON
CALIFORNIA
Klamath River
Dorris
Crescent City
DEL NORTE COUNTY
SISKIYOU COUNTY
MODOC COUNTY
Yreka
Six Rivers NF
Etna
Modoc NF
Shasta River
Klamath NF
Dunsmuir
Shasta-Trinity NF
Sacramento River
HUMBOLDT COUNTY
Pit River
LASSEN COUNTY
Eureka
Trinity River
Lake Shasta
SHASTA COUNTY
Eel River
TRINITY COUNTY
Lassen NF
Redding
Disclaimer: Information presented on this map is for visual reference only. Consult primary data sources to ascertain the usability of this information for any use other than visual reference.
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CDFW Wildlife Branch, GIS-LS, May 24, 2023 - Map Data: CDFW, L.L., Esri - Scale: 1:1,800,000 - Projection: NAD83 California Teale Albers (m)
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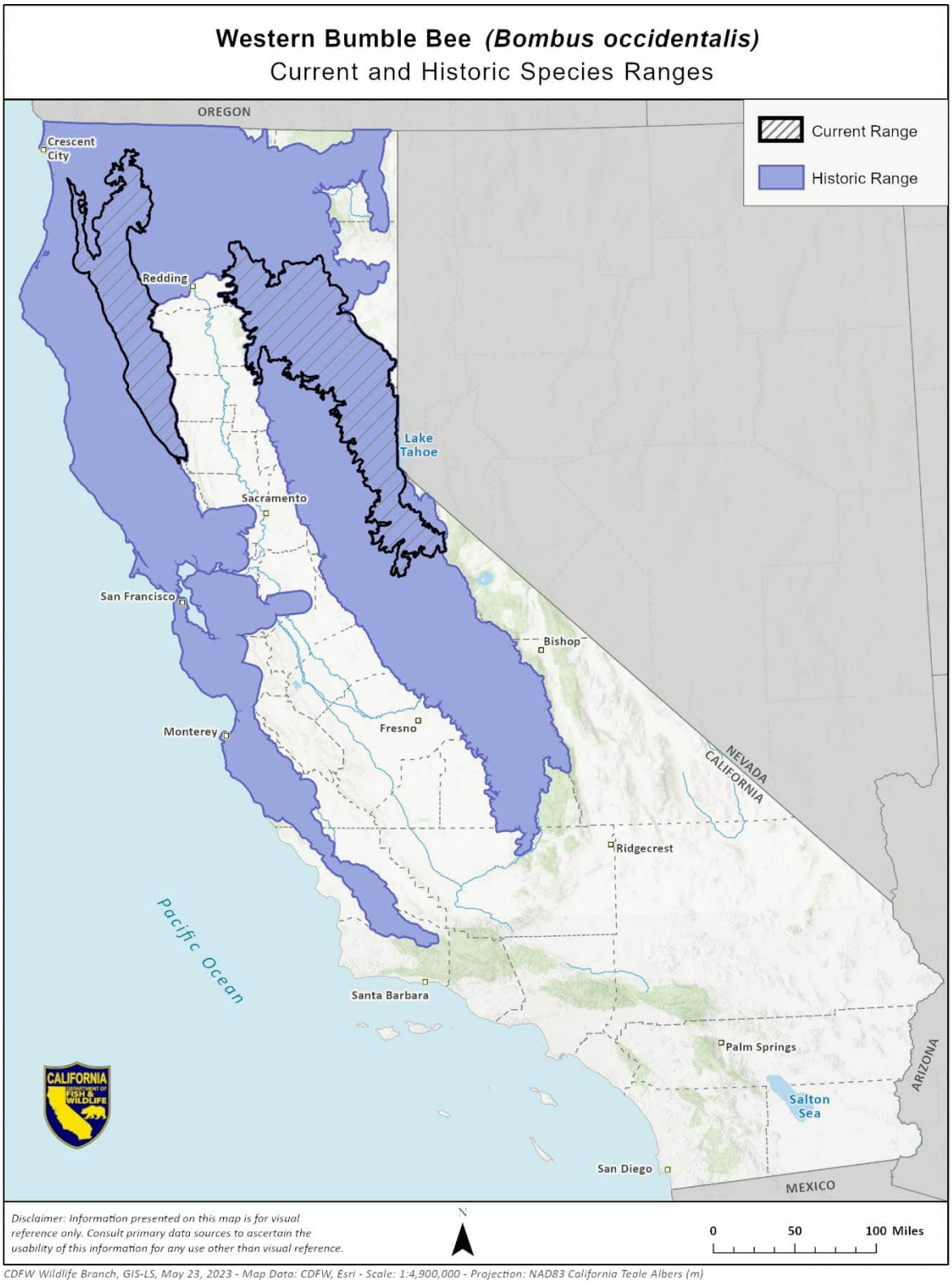
Western Bumble Bee (Bombus occidentalis)
Current and Historic Species Ranges
OREGON
Crescent City
Redding
Lake Tahoe
Sacramento
San Francisco
Monterey
Fresno
Bishop
Ridgecrest
Santa Barbara
Palm Springs
Salton Sea
San Diego
NEVADA
CALIFORNIA
ARIZONA
MEXICO
Pacific Ocean
Current Range
Historic Range
Disclaimer: Information presented on this map is for visual reference only. Consult primary data sources to ascertain the usability of this information for any use other than visual reference.
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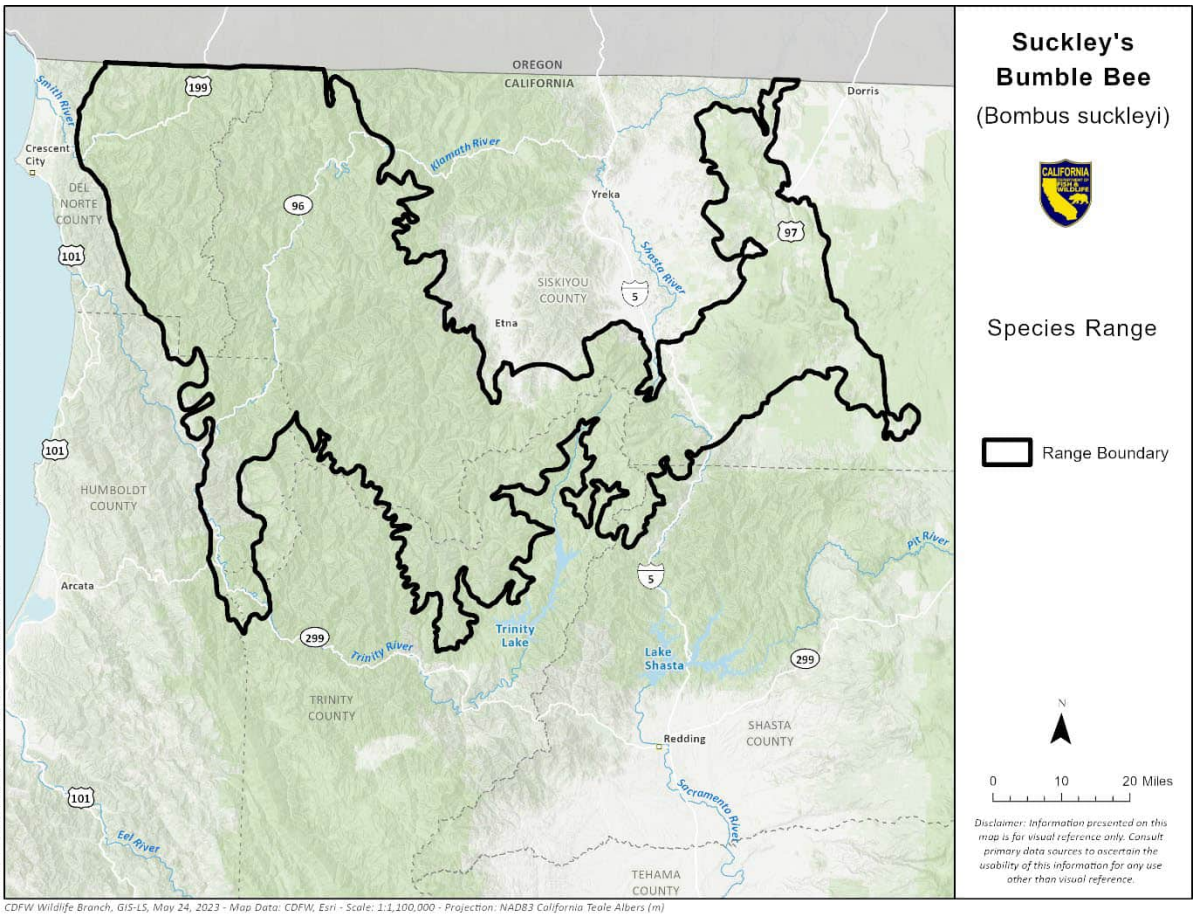
100 Miles
CDFW Wildlife Branch, GIS-LS, May 23, 2023 - Map Data: CDFW, Esri - Scale: 1:4,900,000 - Projection: NAD83 California Teale Albers (m)
T:\Wildlife_Branch\Programs\Wildlife_Biodiversity\Invertebrates\BumbleBee\StatusReview\2023\Deliverables\Map_Exports\Bombus_occidentalis_Ranges_for_SurveyProtocol_052423


OREGON
CALIFORNIA
Dorris
Smith River
199
Crescent City
DEL NORTE COUNTY
Klamath River
Yreka
96
97
101
SISKIYOU COUNTY
Shasta River
5
Etna
101
HUMBOLDT COUNTY
Pit River
Arcata
5
299
Trinity River
Trinity Lake
Lake Shasta
299
TRINITY COUNTY
Redding
SHASTA COUNTY
101
Sacramento River
Eel River
TEHAMA COUNTY
Suckley's Bumble Bee
(Bombus suckleyi)
Species Range
Range Boundary
N
0
10
20 Miles
Disclaimer: Information presented on this map is for visual reference only. Consult primary data sources to ascertain the usability of this information for any use other than visual reference.
CDFW Wildlife Branch, GIS-LS, May 24, 2023 - Map Data: CDFW, Esri - Scale: 1:1,100,000 - Projection: NAD83 California Teale Albers (m)

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Bay Delta Region
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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

April 16, 2025

James Willis, Senior Planner
City of Fremont
39550 Liberty Street
Fremont, CA 94538
JWillis@fremont.gov

Subject: Vallejo Mill Historical Park Pickleball Courts and Dog Park Project, Mitigated Negative Declaration, SCH No. 2025030735, City of Fremont, Alameda County

Dear James Willis:

The California Department of Fish and Wildlife (CDFW) received a Notice of Intent to Adopt a Mitigated Negative Declaration (MND) from the City of Fremont (City) for the Vallejo Mill Historical Park Pickleball Courts and Dog Park Project (Project) pursuant the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources and holds those resources in trust by statute for all the people of the State. (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a).) CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. (*Id.*, § 1802.) Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

CDFW is also submitting comments as a **Responsible Agency** under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381.) CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

proposed, for example, the Project may be subject to CDFW's Lake and Streambed Alteration (LSA) regulatory authority. (Fish & G. Code, § 1600 et seq.) Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA, Fish & G. Code, § 2050 et seq.), the Project proponent may seek related take authorization as provided by the Fish and Game Code.

REGULATORY REQUIREMENTS

California Endangered Species Act

A CESA Incidental Take Permit (ITP) must be obtained from CDFW if the Project has the potential to result in "take" of plants or animals listed under CESA, either during construction or over the life of the Project. Under CESA, "take" means "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." (Fish & G. Code, § 86). CDFW's issuance of an ITP is subject to CEQA and to facilitate permit issuance, any Project modifications and mitigation measures must be incorporated into the CEQA document analysis, discussion, and mitigation monitoring and reporting program. If the Project will impact CESA listed species, early consultation is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA Permit.

CEQA requires a mandatory finding of significance if a project is likely to substantially impact threatened or endangered species. Pub. Resources Code, §§ 21001, subd. € & 21083; CEQA Guidelines, §§ 15380, 15064 & 15065). In addition, pursuant to CEQA, the Lead Agency cannot approve a project unless all impacts to the environment are avoided or mitigated to less-than-significant levels, or the Lead Agency makes and supports Findings of Overriding Consideration (FOC) for impacts that remain significant despite the implementation of all feasible mitigation. FOC under CEQA, however, does not eliminate the Project proponent's obligation to comply with the Fish and Game Code.

Lake and Streambed Alteration

CDFW requires an LSA Notification, pursuant to Fish and Game Code section 1600 et seq., for Project activities affecting rivers, lakes or streams and associated riparian habitat. Notification is required for any activity that may substantially divert or obstruct the natural flow; change or use material from the bed, channel, or bank (including associated riparian or wetland resources); or deposit or dispose of material where it may pass into a river, lake, or stream. Work within ephemeral streams, drainage ditches, washes, watercourses with a subsurface flow, and floodplains is generally subject to notification requirements. In addition, infrastructure installed beneath such aquatic features, such as through hydraulic directional drilling, is also generally subject

to notification requirements**.** Therefore, any impact to the mainstems, tributaries, or floodplains or associated riparian habitat caused by the proposed Project will likely require an LSA Notification.

Migratory Birds and Raptors

CDFW has authority over actions that may result in the disturbance or destruction of active bird nest sites or the unauthorized take of birds. Fish and Game Code sections protecting birds, their eggs, and nests include section 3503 (regarding unlawful take, possession, or needless destruction of the nests or eggs of any bird), section 3503.5 (regarding the take, possession, or destruction of any birds-of-prey or their nests or eggs), and section 3513 (regarding unlawful take of any migratory nongame bird). Migratory birds are also protected under the federal Migratory Bird Treaty Act.

Fully Protected Species

Several Fully Protected Species (Fish & G. Code § 3511 and 4700) have the potential to occur within or adjacent to the Project area.

Project activities described in the MND should be designed to completely avoid any fully protected species that have the potential to be present within or adjacent to the Project area. Fully protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except as follows:

- Take is for necessary scientific research;
- Efforts to recover a fully protected, endangered, or threatened species, live capture, and relocation of a bird species for the protection of livestock; or
- They are a covered species whose conservation and management are provided for in a Natural Community Conservation Plan (Fish & G. Code, §§ 3511, 4700, 5050, & 5515); and
- Specified types of infrastructure projects may be eligible for an ITP for unavoidable impacts to fully protected species if certain conditions are met (see Fish & G. Code §2081.15).

CDFW also recommends the MND analyze potential adverse impacts to fully protected species due to habitat modification, loss of foraging habitat, and/or interruption of migratory and breeding behaviors. CDFW recommends that the City include in the analysis how appropriate avoidance, minimization and mitigation measures will reduce indirect impacts to fully protected species. Project proponents should consult with CDFW early in the Project planning process.

PROJECT DESCRIPTION SUMMARY

Proponent: City of Fremont

Objective: The City of Fremont is proposing improvements within the existing Vallejo Mill Historical Park footprint including replacing the existing parking lot with four pickleball courts with acrylic sport court surfacing on asphalt base, adding bark mulch and fencing around an area for use as a dog park, installation of a vault toilet restroom, and providing a new parking area and drop-off along the driveway. Other improvements would include lights, signs, park furnishings (drinking fountains, benches, trash and recycling receptacles), utility connections/ extensions as necessary, Americans with Disabilities Act (ADA) compliant walkways, and split-rail fencing and gates to discourage vehicles from leaving paved areas.

Location: The Project site is located at 299 Old Canyon Rd, at the corner of Niles Canyon Road and Mission Boulevard in the City of Fremont, Alameda County (County). The coordinates for the approximate center of the Project are 37°34'45.0"N latitude 121°58'09.0"W longitude (WGS 84). The Assessor's Parcel Number is 507-480-10-4.

Timeframe: Project construction is estimated to occur over approximately 100 days, to be determined.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist the City in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. Editorial comments or other suggestions may also be included to improve the document.

I. Environmental Setting and Related Impact Shortcoming

Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or U.S. Fish and Wildlife Service?

COMMENT #1: Rare Plants

The Native Plant Protection Act (NPPA) (Fish & G. Code §1900 *et seq*.) prohibits the take or possession of state-listed rare and endangered plants, including any part or product thereof, unless authorized by CDFW or in certain limited circumstances. Take of state-listed rare and/or endangered plants due to Project activities may only be

permitted through an ITP or other authorization issued by CDFW pursuant to California Code of Regulations, Title 14, section 786.9 subdivision (b).

Impacts to special-status plant species should be considered significant under CEQA unless they are clearly mitigated below a level of significance. CDFW considers plant communities, alliances, and associations with a statewide ranking of S1, S2, S3, and S4 as sensitive and declining at the local and regional level (Sawyer 2009).

Additionally, plants that have a California Native Plant Society (CNPS) California Rare Plant Rank (CRPR) of 1A, 1B, 2A, and 2B are rare throughout their range, endemic to California, and are seriously or moderately threatened in California. All plants constituting CRPR 1A, 1B, 2A, and 2B are eligible for State listing. Impacts to these species or their habitat must be analyzed during preparation of environmental documents relating to CEQA, as they meet the definition of rare or endangered (CEQA Guidelines, § 15380). Please see CNPS Rare Plant Ranks (CNPS 2022) page for additional rank definitions.

The Project could impact rare plants through additional grading, earth movement and degraded habitat. In addition to direct impacts, indirect impacts to special-status species could also occur, including habitat degradation as a result of impacts to water quality, introduction of non-native species, and increased human presence.

A number of rare plant species could occur on the site, including Hall's bush-mallow (Malacothamnus hallii), saline clover (Trifolium hydrophilum), Mt. Diablo helianthella (Helianthella castanea), Hospital Canyon larkspur (Delphinium californicum ssp. interius), caper-fruited tropidocarpum (Tropidocarpum capparideum), and bent-flowered fiddleneck (Amsinckia lunaris). The MND did not mention Most beautiful jewel flower (*Streptanthus albidus ssp. peramoenus*), but this should be included in survey protocols as it was found in 2019 in the Fremont area in the Calflora Database. The MND noted a survey completed in January 2024, and as noted the survey was too early to detect most of these plant species.

Recommended Mitigation Measure #1: Compensatory Mitigation and Revegetation

Modify MM BIO-3 which requires replanting at 1:1 ratio.

A review of protocol-level survey results should be conducted to establish appropriate compensatory mitigation ratios specific to each special-status plant species. Compensatory mitigation ratios should be developed based on the biological factors specific to each species and should be sufficient to compensate for the loss of those species.

Modify the habitat mitigation and monitoring plan requirements to include approval by CDFW prior to any ground disturbance, annual success criteria, and a funding mechanism for long-term management.

COMMENT #2: Crotch's Bumble Bee

Project activities will temporarily and/or permanently impact 1.75 acres of California annual grassland. The MND notes that individual Crotch's bumble bee (*Bombus crotchii*) may occur occasionally and in small numbers as foragers throughout the Project site, and the possibility that nesting could occur on the site (e.g., in a ground squirrel burrow) cannot be ruled out.

The Project location is within the Crotch's bumble bee range (https://wildlife.ca.gov/Conservation/CESA) and grassland within and adjacent to the Project site may contain potential habitat for Crotch's bumble bee. As a candidate species, unauthorized take of this species pursuant to CESA is a violation of California Fish and Game Code section 2080 et seq.

The loss of nesting and foraging habitat for Crotch's bumble bee, and potentially the loss of individuals in nests due to crushing by construction personnel or equipment, excavation, and placement of soil stockpiles. Direct mortality through crushing or filling of active bee colonies and hibernating bee cavities, reduced reproductive success, loss of suitable breeding and foraging habitats, loss of native vegetation that may support essential foraging habitat.

Recommended Mitigation Measure #2: Habitat Assessment

A habitat assessment shall be conducted by a qualified entomologist knowledgeable with the life history and ecological requirements of Crotch's bumble bee. The habitat assessment shall include all suitable nesting, overwintering, and foraging habitats within the Project area and surrounding areas. Potential nest habitat (February through October) could include that of other *Bombus* species such as bare ground, thatched grasses, abandoned rodent burrows or bird nests, brush piles, rock piles, and fallen logs. Overwintering habitat (November through January) could include that of other *Bombus* species such as soft and disturbed soil or under leaf litter or other debris. The habitat assessment shall be conducted during peak bloom period for floral resources on which Crotch's bumble bee feed. Further guidance on habitat surveys can be found within *Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species* (https://wildlife.ca.gov/Conservation/CESA).

Recommended Mitigation Measure #3: Survey Plan

If Crotch's bumble bee habitat is present within the Project area, the Project should include a pre-construction survey plan as a mitigation measure. The survey plan should be submitted to CDFW for review. Surveys should be conducted by a qualified entomologist familiar with the behavior and life history of Crotch's bumble bee. If CESA candidate bumble bees will be captured or handled, surveyors should obtain a 2081(a) Memorandum of Understanding (MOU) from CDFW.

Surveys should be conducted during the colony active period (i.e. April through August) and when floral resources are in peak bloom. Bumble bees move nests sites each year, therefore, surveys should be conducted each year that Project work activities will occur. Further guidance on presence surveys can be found within Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species (https://wildlife.ca.gov/Conservation/CESA).

Recommended Mitigation Measure #4: Crotch's Bumble Bee Avoidance or Take Authorization

If Crotch's bumble bee are detected during pre-construction surveys, a Crotch's bumble bee avoidance plan should be developed and provided to CDFW for review prior to work activities involving ground disturbance or vegetation removal.

If full take avoidance is not feasible, CDFW strongly recommends that the MND state that the Project proponent will apply to CDFW for take authorization under an ITP.

Recommended Mitigation Measure #5: Herbicide Application

To minimize impacts to bumble bees, avoid the bloom periods for herbicide application and mowing activities. If this is not possible, CDFW recommends that the Project obtain take authorization under an ITP, pursuant to Fish and Game Code section 2081 subdivision (b).

Recommended Mitigation Measure #6: Compensatory Mitigation

CDFW recommends that the MND include compensatory mitigation for the loss of all suitable Crotch's bumble bee habitat. Bumble bee floral resources should be mitigated at a 3:1 ratio for permanent impacts in the absence of information regarding the compensatory mitigation site. Floral resources should be replaced as close to their original location as is feasible. If active Crotch's bumble bee nests have been identified and floral resources cannot be replaced within 600 feet of their original location, floral resources should be planted in the most centrally available location relative to identified nests. This location should be no more than 4,900 feet (1.5-kilometers) from any

identified nest. Replaced floral resources may be split into multiple patches to meet distance requirements for multiple nests. The MND should state that mitigation lands will be protected in perpetuity under a conservation easement with an endowment established for long-term management of the lands.

COMMENT #3: Burrowing Owl

The burrowing owl (*Athene cunicularia*) is currently a candidate species under CESA and is afforded the same protection as a CESA-listed species (CEQA Guidelines, §15380, subds.(b)). Unauthorized take of this species pursuant to CESA is a violation of Fish and Game Code section 2080 et seq.

Suitable burrows to support burrowing owl nesting and overwintering activities are present on the Project site. A 2019 occurrence of Burrowing owl is noted 0.5 miles north of the Project area in CNDDB. The Project would also result in the temporary and/or permanent loss of 1.75 acres of suitable nesting, roosting, and foraging habitat for burrowing owl in California annual grasslands on the Project site.

Individual burrowing owl may be affected during construction activities, if present on or very close to the Project site. Because they roost underground, burrowing owl may be killed or injured during development activities from trampling or compaction of burrows by construction personnel or equipment if appropriate protective measures are not implemented. Construction activities that occur in close proximity to active burrows may disturb owls to the point of abandoning their burrows, potentially resulting in the loss of eggs or young in active nests

The Project will implement measures required by the City Municipal Code and described in Section 1.3 above to protect burrowing owl on and adjacent to the Project site. These include conducting preconstruction surveys prior to the start of project activities, implementing no-disturbance buffer zones around occupied burrows, and passively relocating burrowing owl during the nonbreeding season.

Burrowing owl were formerly numerous throughout the San Francisco Bay Area region, particularly in the interior east of the Bay. Based on the burrowing owl endangered species petition, the number of breeding burrowing owl pairs in the SF Bay area have declined from 165 in 1993 to less than 25 in 2023. Of the five primary threats it lists, the 2024 Burrowing Owl Petition identifies habitat loss, fragmentation, and degradation as the primary threat to burrowing owl in California.

Small, isolated colonies such as those that likely occur in the area are vulnerable to extirpation, especially without the influx of immigrants. Fragmented populations are at higher risk of extinction due to factors like reproductive isolation, inbreeding, and

increased predation, and environmental factors such as drought or reduced prey density may further threaten these small populations.

Direct mortality could occur through crushing of adults or young within burrows, loss of nesting burrows, loss of nesting habitat, loss of foraging habitat resulting in reduced nesting success (loss or reduced health or vigor of eggs or young), nest abandonment, and reduced frequency or duration of care for young resulting in reduced health or vigor of young. Because of their highly specialized, ground-dwelling lifestyle and dependence on underground tunnels, burrowing owl are extremely vulnerable to direct and indirect impacts of grading, disking, tilling, earthmoving, burrow blockage, and eradication of ground squirrels.

Recommended Mitigation Measure #7: Burrowing Owl Avoidance

If burrowing owl are detected during surveys within or near the Project area, a protective buffer in which construction activities will be avoided will be established. Appropriate buffers typically have a 150 to 1,500-foot radius and vary depending on the level of disturbance and timing of construction. If the burrowing owl show signs of distress (e.g., defensive vocalizations and/or flying away from the nest), the buffer distance should be increased. The Designated Biologist shall submit the results of the surveys, including a Burrow Complex Map to CDFW for approval prior to beginning Covered Activities. If changes in BUOW presence are detected (e.g., burrowing owl have moved onsite or changed burrow use), the Designated Biologist shall contact the CDFW Regional Representative by phone or email within 24 hours of the observation to consult on appropriate measures to avoid or minimize impacts of the Project. If a lapse in project-related work of 14 calendar days or longer occurs, the Lead Agency shall contact the CDFW Regional Representative by phone or email and may be required to conduct additional surveys before work may be reinitiated.

The Designated Biologist shall visually inspect any pipes, debris piles, culverts, pallet stacks, burrow exclusion installations, or similar structures for burrowing owl before the material is moved, buried, or capped. The Designated Biologist shall inspect all open holes and trenches within the Project Area at a minimum of twice a day and immediately prior to backfilling. At the end of each workday, the Lead Agency shall place an escape ramp at each end of trenches or holes to allow any animals that may have become trapped in the trench or hole to climb out overnight. The ramp may be constructed of either dirt fill or wood planking or other suitable material that is placed at an angle no greater than 30-45 degrees. If any worker discovers that burrowing owl have become trapped, they shall halt Covered Activities and notify the Designated Biologist immediately. Project workers and the Designated Biologist shall allow the burrowing owl to escape unimpeded.

Recommended Mitigation Measure #8: Burrowing Owl Monitoring

The Designated Biologist(s) shall be present during construction activities to monitor the behavior of any burrowing owl. The Designated Biologist(s) shall have the authority to order stop work if burrowing owl exhibit distress and/or abnormal behavior for (e.g., excessive vocalizations, defensive flights at intruders, flushing frequently, or otherwise displaying agitated behavior). Permittee shall not resume activities until CDFW has been consulted by the Designated Biologist and both the Designated Biologist and CDFW confirm that the burrowing owl's behavior has normalized. CDFW, in consultation with the Designated Biologist(s), shall determine whether to increase the size of the no-disturbance buffer.

Recommended Mitigation Measure #9: Compensatory Mitigation

CDFW highly recommends that the Project proponent obtain take authorization from CDFW through issuance of an ITP if full avoidance of take during construction and/or operations is not feasible. The MND must include all biologically appropriate and feasible take avoidance measures. If permanent or temporary impacts of the proposed Project to burrowing owl foraging and/or nesting habitat cannot be completely avoided, the MND should include measures to minimize the impacts of construction on owls and their habitat, and effective compensatory mitigation to offset all habitat loss. A mitigation plan should be prepared in consultation with CDFW.

COMMENT #4: Bats

Bats are considered non-game mammals and are protected by state law from take and/or harassment (Fish and Game Code §4150, CCR §251.1). Pallid bat (Antrozous pallidus) Several sycamore trees on the Project site support large cavities that provide potentially suitable roosting habitat for a large colony or a maternity colony of pallid bat. Individual pallid bats from colonies in the region could also occasionally forage on the Project site.

Construction activities may result in the disturbance of hibernation or maternal roost sites, which may result in the harm, death, displacement of individual bats and/or the disruption of reproductive success of nursery colony roosts. Proposed activities may result in the disturbance and/or loss of hibernation or maternal roost sites, which may result in the harm, death, displacement of individual bats and/or the disruption of reproductive success of nursery colony roosts.

Recommended Mitigation Measure #10: Bat Habitat Monitoring

CDFW recommends that a qualified biologist with applicable species and habitat experience should conduct a survey from March 1 to April 1 or August 31 to October 15

prior to construction activities. The habitat assessment shall include a visual inspection of features within the work area for potential roosting features including trees, crevices, parking garages, siding or roofs of buildings, and hollow areas (bats need not be present). The surveys should occur at least two seasons in advance of Project initiation. If the focused survey reveals the presence of roosting bats, then the appropriate exclusionary or avoidance measures will be implemented prior to construction during the period between March 1 to April 15 or August 31 to October 15.

Recommended Mitigation Measure #11: Avoidance

If active bat roosts are observed during environmental assessments or during construction, at any time, all Project activities should stop until a qualified biologist develops a bat avoidance plan to be implemented at the Project site. The bat avoidance plan should utilize seasonal avoidance, phased construction as well as temporary and permanent bat housing structures developed in coordination with CDFW.

Recommended Mitigation Measure #12: Reporting

Prior to Project activities, the qualified biologist shall submit a report to CDFW that discusses the results of the suitable habitat assessment and if any bats or signs of bats (feces or staining at entry/exit points) are discovered.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations. (Pub. Resources Code, § 21003, subd. (e).) Accordingly, please report any special-status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be filled out and submitted online at the following link: https://wildlife.ca.gov/Data/CNDDB/Submitting-Data. The types of information reported to CNDDB can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

ENVIRONMENTAL DOCUMENT FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of environmental document filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the environmental document filing fee is required in order for the underlying project approval to be operative, vested, and final. (See Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089.)

CONCLUSION

CDFW appreciates the opportunity to comment on the MND to assist City in identifying and mitigating Project impacts on biological resources.

Questions regarding this letter or further coordination should be directed to Marcus Griswold, Senior Environmental Scientist (Specialist), at (707) 815-6451 or Marcus.Griswold@wildlife.ca.gov.

Sincerely,

Erin Chappell
Regional Manager
Bay Delta Region

Attachment 1: Special-Status Species and Commercially/Recreationally Important Species

ec: Office of Planning and Research, State Clearinghouse, (SCH No. 2024080035)
Craig Weightman, CDFW Bay Delta Region – Craig.Weightman@wildlife.ca.gov
Jason Faridi, CDFW Bay Delta Region – Jason.Faridi@wildlife.ca.gov

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ATTACHMENT 1: Special-Status Species

Species	Status
Fish and Invertebrates	
Crotch's bumble bee (*Bombus crotchii*)	State candidate (SC)
Birds	
Cooper's hawk (*Accipiter cooperii*)	State Watch List
burrowing owl (*Athene cunicularia*)	Species of Special Concern (SSC)
golden eagle (*Aquila chrysaetos*)	FP (Fully Protected)
loggerhead shrike (Lanius ludovicianus)	SSC
northern harrier (*Circus hudsonius*)	SSC
tricolored blackbird (*Agelaius tricolor*)	ST (State Threatened), SSC
white-tailed kite (*Elanus leucurus*)	FP
Mammals	
pallid bat (*Antrozous pallidus*)	SSC
San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*)	SSC
Townsend's big-eared bat (*Corynorhinus townsendii*)	SSC
Reptiles and Amphibians	
western pond turtle (*Emys marmorata*)	Proposed FT, SSC
Plants	
Bent-flowered fiddleneck (*Amsinckia lunaris*)	1B.2
Caper-fruited tropidocarpum (*Tropidocarpum capparideum*)	1B.1
Hospital Canyon larkspur (*Delphinium californicum ssp. interius*)	1B.2

Species	Status
Mt. Diablo helianthella (*Helianthella castanea*)	1B.2
Most beautiful jewel flower (*Streptanthus albidus ssp. peramoenus*)	1B.2

Science of the Total Environment 806 (2022) 150298

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Upstream oil and gas production and ambient air pollution in California

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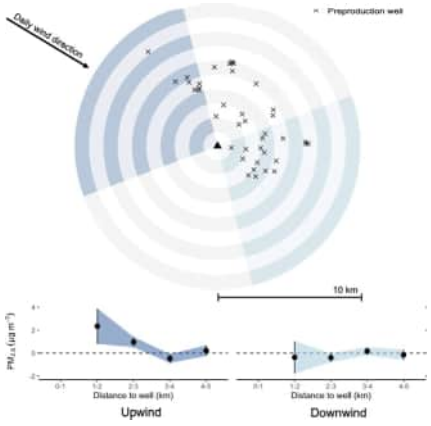
HIGHLIGHTS

- Oil and gas wells have been linked to adverse health, but mechanisms not well understood.
- Applied a quasi-experimental design with daily air pollution and oil production data
- We leveraged wind direction as source of exogenous variation for exposure to wells.
- Upstream oil and gas production emitted air pollutants at concentrations that may be harmful.
- Evaluated proximity as an appropriate indicator of air pollution exposure from wells

GRAPHICAL ABSTRACT



ARTICLE INFO

Article history:
Received 12 April 2021
Received in revised form 31 August 2021
Accepted 7 September 2021
Available online 11 September 2021

Editor: Lidia Morawska

Keywords:
Oil and gas
Exposure assessment
Ambient air pollution
Particulate matter

ABSTRACT

Background: Prior studies have found that residential proximity to upstream oil and gas production is associated with increased risk of adverse health outcomes. Emissions of ambient air pollutants from oil and gas wells in the preproduction and production stages have been proposed as conferring risk of adverse health effects, but the extent of air pollutant emissions and resulting nearby pollution concentrations from wells is not clear.
Objectives: We examined the effects of upstream oil and gas preproduction (count of drilling sites) and production (total volume of oil and gas) activities on concentrations of five ambient air pollutants in California.
Methods: We obtained data on approximately 1 million daily observations from 314 monitors in the EPA Air Quality System, 2006-2019, including daily concentrations of five routinely monitored ambient air pollutants: $PM_{2.5}$, CO, NO_2, O_3, and VOCs. We obtained data on preproduction and production operations from Enverus and the California Geographic Energy Management Division (CalGEM) for all wells in the state. For each monitor and each day, we assessed exposure to upwind preproduction wells and total oil and gas production volume within 10 km. We used a panel regression approach in the analysis and fit adjusted fixed effects linear regression models for each pollutant, controlling for geographic, seasonal, temporal, and meteorological factors.

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https://doi.org/10.1016/j.scitotenv.2021.150298

Results: We observed higher concentrations of $PM_{2.5}$ and CO at monitors within 3 km of preproduction wells, NO_2 at monitors at 1-2 km, and O_3 at 2-4 km from the wells. Monitors with proximity to increased production volume observed higher concentrations of $PM_{2.5}$, NO_2, and VOCs within 1 km and higher O_3 concentrations at 1-2 km. Results were robust to sensitivity analyses.
Conclusion: Adjusting for geographic, meteorological, seasonal, and time-trending factors, we observed higher concentrations of ambient air pollutants at air quality monitors in proximity to preproduction wells within 4 km and producing wells within 2 km.

1. Introduction

Recent studies have found that residing in proximity to oil and gas wells is associated with adverse cardiovascular, psychological, perinatal, and other health outcomes (Casey et al., 2015, 2018; Currie et al., 2017; Denham et al., 2021; McKenzie et al., 2014, 2018, 2019; Tang et al., 2020; Whitworth et al., 2017; Willis et al., 2021). Studies in California have found higher risk of preterm birth and low birthweight with exposure to upstream oil production, as well as impaired lung function and higher asthma prevalence (Gonzalez et al., 2020; Johnston et al., 2021; Shamasunder et al., 2018; Tran et al., 2020). Several possible mechanisms have been hypothesized for the observed associations between proximity to wells and adverse health outcomes, including emissions of ambient air contaminants during various stages of upstream oil and gas production (Adgate et al., 2014; Allshouse et al., 2019; Gonzalez et al., 2020; Johnston et al., 2019; McKenzie et al., 2012). There is a potential for widespread risk of exposure to air pollutant emissions from upstream oil and gas development, with an estimated 17.6 million U.S. residents, including 2.1 million Californians, living within 1.6 km (1 mile) of at least one active well (Czolowski et al., 2017).

Despite widespread potential exposure to wells and reported health risks, the effects of upstream oil and gas production on ambient air quality are still not well understood (Johnston et al., 2019). Under the Clean Air Act and its amendments, local regulatory agencies are responsible for maintaining networks of in situ air pollution monitors (Grainger et al., 2017). Agencies routinely monitor criteria air pollutants, which are statutorily regulated under the Clean Air Act and which include fine particulate matter with an aerodynamic diameter less than 2.5 μm ($PM_{2.5}$), carbon monoxide (CO), nitrogen dioxide (NO_2), and ozone (O_3). Other hazardous pollutants are also routinely monitored, including non-methane volatile organic compounds (VOCs) such as acetaldehyde, benzene, ethylbenzene formaldehyde, n-hexane, toluene and xylene. In prior studies, such as in situ monitoring campaigns conducted in California, Colorado, and Texas, investigators have reported elevated concentrations of $PM_{2.5}$, CO, NO_2, O_3, and VOCs near wells (Allshouse et al., 2019; Arbelaez and Baizel, 2015; Garcia-Gonzales et al., 2019a; Schade and Roest, 2016, 2018). Sources of $PM_{2.5}$ emissions associated with upstream oil and gas production may include combustion of diesel fuel from on-site equipment and heavy trucks, dust from construction sites and unpaved roads, and secondary formation in the atmosphere (Adgate et al., 2014); emissions of CO and NO_2 may also be associated with fossil fuel combustion in vehicles and off-road equipment (Holloway et al., 2000; Jackson et al., 2014); O_3 may be formed as a secondary pollutant in photochemical reactions involving nitrous oxides (such as NO_2) and VOCs in the presence of sunlight (Mauzerall et al., 2005; Rodriguez et al., 2009).

Studies have found elevated concentrations of harmful pollutants near oil and gas wells (Garcia-Gonzales et al., 2019b). However, prior studies have been geographically and temporally constrained and often do not mirror methods applied by population health researchers. In particular, exposure characterization is often spatial in nature, whereas population health researchers often seek to exploit temporal variation to isolate the role of exposure to oil and gas wells from exposure to other spatially correlated activities that may affect pollution and health (Currie et al., 2017; Willis et al., 2021). Additionally, the unique geological conditions of California may constrain external validity of air quality studies that investigate oil and gas production-related emissions in other settings (Garcia-Gonzales et al., 2019a). Population health studies investigating exposure to upstream oil and gas production typically use proximity to wells as the indicator of exposure without directly measuring concentrations of air pollutant emissions or other potential hazards, such as noise and water pollution (Casey et al., 2015; Currie et al., 2017; Gonzalez et al., 2020; McKenzie et al., 2014; Rasmussen et al., 2016; Tang et al., 2020; Tran et al., 2020; Willis et al., 2021). Improved understanding of pollutants emitted during upstream oil and gas production, including the classes of pollutants emitted (or secondarily produced) and the distances to which they are transported could help population health scientists more accurately parameterize exposure assessments and determine which aspects of exposure to production activities may adversely affect human health.

In our prior study (Gonzalez et al., 2020), we found that proximity to wells was associated with higher preterm birth risk, but we were not able to measure specific chemical pollutants parents were potentially exposed to during their pregnancy, or to separate proximity to wells from other activities that may also affect preterm birth risk. Our objectives in the current study were to examine how upstream oil preproduction and production activities affected ambient air quality in California from 2006 to 2019, with the aim of informing population health studies of exposure to upstream oil and gas production. We investigated whether marginal changes in preproduction and production activities resulted in increased concentrations of $PM_{2.5}$, CO, NO_2, O_3, and VOCs. Where we observed marginal increases in pollutant concentrations with proximity to wells, we also aimed to determine the distance at which elevated concentrations decay to background levels. To address these objectives, we applied a quasi-experimental design using a panel of publicly available air quality monitoring data.

2. Methods

2.1. Study design

We constructed a panel dataset with repeated daily measures of ambient air pollutant concentrations as well as upstream oil and gas production across California from January 1, 2006, to December 31, 2019. We made use of geospatial and temporal variation in oil and gas extraction activities, including well preproduction (defined as the interval between spudding, or initiation of drilling, and completion) and production (total monthly volume of oil and gas produced), and leveraged daily variation in wind direction as a source of exogenous variation. The type and magnitude of emissions may vary by stage due to differences in activities related to preproduction and production, and the intensity of well pad activity varies within each stage (Allshouse et al., 2017). For each monitor, we assessed daily exposure to upwind wells in preproduction and production during the study period. In the current study, we did not assess exposure of any human populations; rather, we assessed exposure of air quality monitors as a surrogate receptor. Then we used a fixed effects regression approach to assess the effect of exposure to preproduction and producing wells on the concentrations of each pollutant, accounting for geographic, seasonal, and time-trending, and meteorological factors.

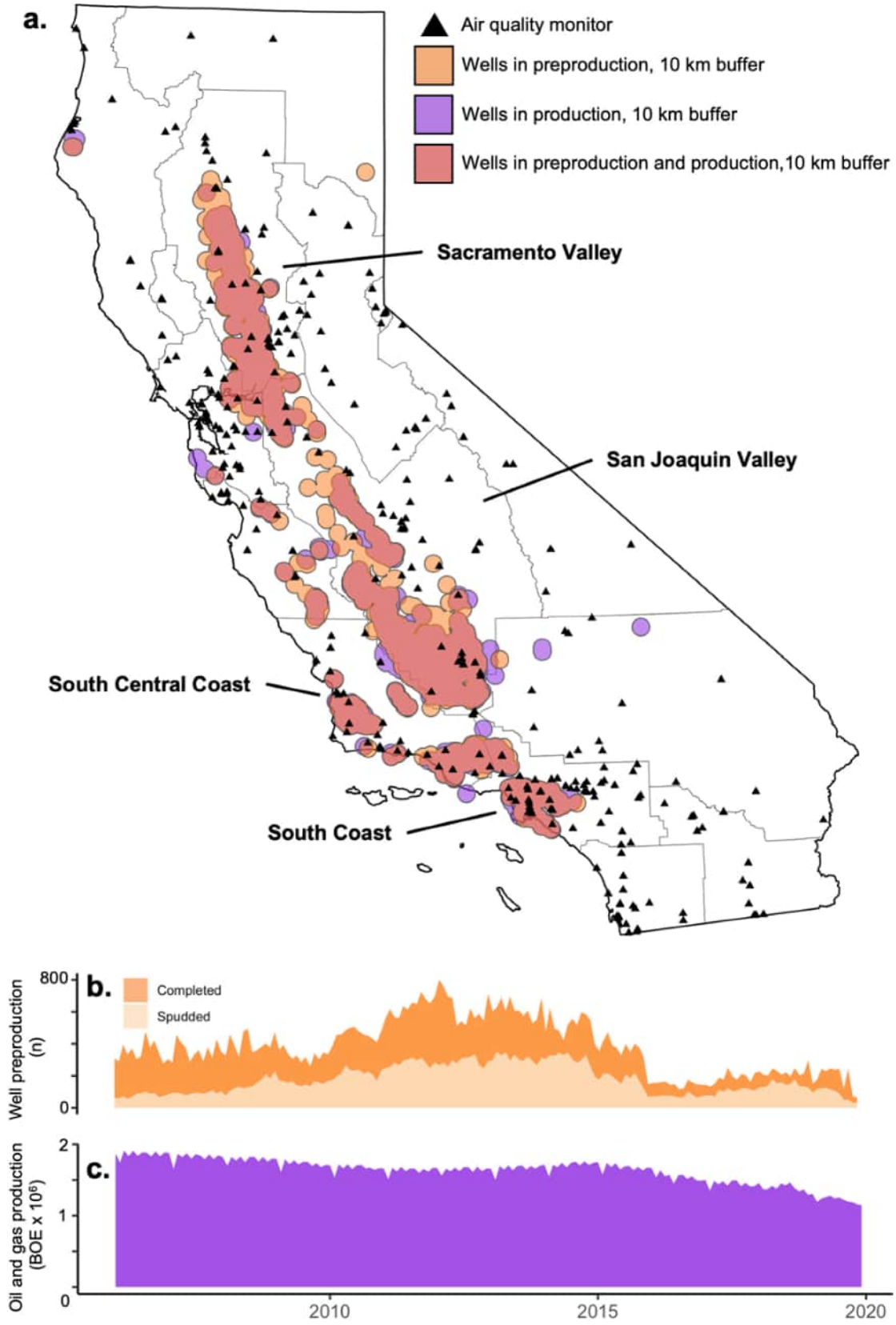

Fig. 1. (a) A map of the study region, showing air basins, air quality monitor locations, and 10 km buffers around wells in preproduction (orange) and production (purple), as well as the overlap (red). (b) Count of wells spudded and completed by month across California, including recompletions of previously drilled wells. (c) Total oil and gas production by month for all wells in California, reported as million barrels of oil equivalent (BOE).

2.2. Data

We obtained air quality data from the U.S. Environmental Protection Agency (EPA) Air Quality System (AQS). This dataset comprised daily measurements of seven air pollutants, with daily mean concentrations of $PM_{2.5}$ (μg m^{-3}) as well as daily max concentrations of CO (ppm), NO_2 (ppb), O_3 (ppb), and non-methane VOCs (ppb C). In all analyses, the unit of observation was the pollutant concentration at each monitor for each day, or the monitor-day. We included data for all 314 AQS monitors in California that were operating during the study period and that monitored for the five pollutants of interest (Fig. 1). Missing air pollution data were omitted from the analyses; we did not impute missing air pollution data. Due to the sparse monitoring of VOCs compared to other pollutants, we included data on VOC measurements for 1999-2005; we excluded pre-2006 measurements for other pollutants because data for wildfire smoke plumes, described below, were not available before 2006. Air qualtity monitors detected and measured non-methane VOC concentrations via the EPA Method TO-3 for ethylbenzene, n-hexane, toluene, benzene, and ethylene using cryogenic preconcentration techniques, gas chromatography, and flame ionization detection. Xylene concentrations were estimated using preconcentration techniques, gas chromatography, and Saturn 2000 ion mass spectrometry. Acetaldehyde and formaldehyde concentrations were measured using 2,4-dinitrophenylhydrazine (DNPH) silica gel cartridges, an O_3 scrubber, and ultraviolet absorption spectroscopy.

Data on the oil and gas wells, including development dates and monthly production volume, was obtained from the California Geologic Energy Management Division (CalGEM) and Enverus, a private data aggregation service. The analytic dataset included 38,157 wells that were in the preproduction and 90,697 wells in production in California during the study period (Table S1). We defined the preproduction stage of the well as starting with the reported spud date (when drilling begins) and ending with the completion date. We assessed monitors as exposed to proximate preproduction wells on days when the well was between the dates of spudding and completion. Preproduction wells were included in the study if the preproduction interval (spudding to completion) occurred during the study period. For wells with missing data for spud date, we assumed that the preproduction interval began 30 days before completion; for wells missing completion date, we assumed the preproduction stage ended 30 days after spudding. Wells missing both spud and completion dates were assumed to have been drilled outside the study period; since the record dates to the late 19th century, we expected there to be missingness in these variables for wells drilled prior to 1999. Wells in the production stage were included for all sites with any reported oil or gas production during the study period. Because oil and gas are frequently produced from the same wells, we used a combined metric of oil and gas production reported as barrels of oil equivalent (BOE). The dataset comprised 8,064,549 well-month observations of a total of approximately 3.8 billion BOE.

We obtained meteorological data from the North American Regional Reanalysis (NARR), a product developed by the National Centers for Environmental Prediction. This dataset included modeled daily mean wind direction and speed, reported as vectors (*u* and *v*), as well as observations of mean daily surface temperature (°C) and total daily precipitation (mm). There were no missing estimates for these meteorological variables. We also obtained administrative shapefiles for air basins across the state from the California Air Resources Board (CARB). We used data from the 2010 decennial census to determine whether monitors were located in urban areas (with 50,00 or more residents) or urban clusters (with 2500-50,000 residents) compared with rural areas, which comprise all other areas. To control for potential effects of wildfire smoke on daily concentrations ambient air pollutants, we used data on the daily location of wildfire smoke plumes from the Hazard Mapping System of the National Oceanic and Atmospheric Administration (NOAA), which assessed the number of overhead smoke plumes at the zip code level (Schroeder et al., 2008).

2.3. Exposure assessment

We constructed a panel dataset where, for each monitor and each day with a pollutant observation, we summed (a) the number of upwind wells in preproduction and (b) the total volume of upwind oil and gas production (BOE) in 1 km increments out to 10 km (Fig. 2). We determined the wind direction for each monitor and day from the *u* and *v* vector components from the NARR wind product. The resultant of the *u* and *v* vector components conveys wind direction and speed (magnitude). Preproduction and production wells that intersected the upwind quadrant on each day for each monitor comprised the primary exposure variables; wells outside the quadrant were excluded in the primary analyses.

As sensitivity analyses, we also assessed exposure to wells in the downwind quadrant as a placebo exposure. Additionally, we assessed exposure to all preproduction wells and production volume in 1 km annuli (or rings) radiating out from the monitor, i.e., without taking wind into account.

The receptor in our exposure assessment was the air quality monitor; this study did not consider any human receptors or health outcomes. Our aim was to use air monitors as a proxy for the residential receptors typically targeted in population health studies that assess exposure to oil and gas wells.

2.4. Identification strategy

We leveraged daily variation in wind direction as a plausibly exogenous source of variation, uncorrelated with well preproduction and production activities as well as other sources of pollution. This strategy allowed us to, by design, isolate the marginal contributions of additional preproduction wells and production volume to ambient air pollutant concentrations.

2.5. Statistical analyses

We used adjusted fixed effects linear regression models to assess how marginal changes in (a) the count of wells in preproduction or (b) the volume of oil and gas production affects concentrations of each observed pollutant ($PM_{2.5}$, CO, NO_2, O_3, and VOCs). For each combination of pollutants and well stage (preproduction or production), we fit the following model:

$$Y_{md} = U_{mda} + D_{mda} + O_{mda} + C_{md} + \gamma_{md} + \delta_{by} + e_{md},$$

where Y is the observed daily concentration of the pollutant at monitor *m* on day *d*; U is a vector of either the (a) upwind count preproduction wells or (b) upwind sum oil and gas production on day *d* in annulus *a* (0-1 km, 1-2 km, … 9-10 km) radiating from monitor *m*; D is similar to U but for downwind wells; O is also similar to U, but were wells in the two quadrants orthogonal to the upwind quadrant (i.e., lateral wells); C is a vector of covariates (day of week, precipitation in mm, temperature in °C, wind speed in ms^{-1}, and the count of overhead smoke plumes) at monitor *m* on day *d*; γ is a fixed effect for monitor by month, *n*; δ is a fixed effect for air basin, *b*, by year, *y*; *and e* is an error term representing unmodeled sources of variation in pollution at monitor *m* on day *d*. We fit additional models with polynomial terms for each exposure bin to examine whether the response was nonlinear.

We compared the point estimates for upwind wells with downwind placebos. As sensitivity analyses, we also modified the fixed effects in the model, using monitor-by-year and air basin-by-month-by-year fixed effects in the model. Additionally, we fit models as described above in the primary analysis but using exposure assessment data that did not take wind into account (i.e., the sum of all preproduction wells or production volume within each annulus). Finally, as an additional sensitivity analysis for co-exposure to wildfire smoke, we fit models

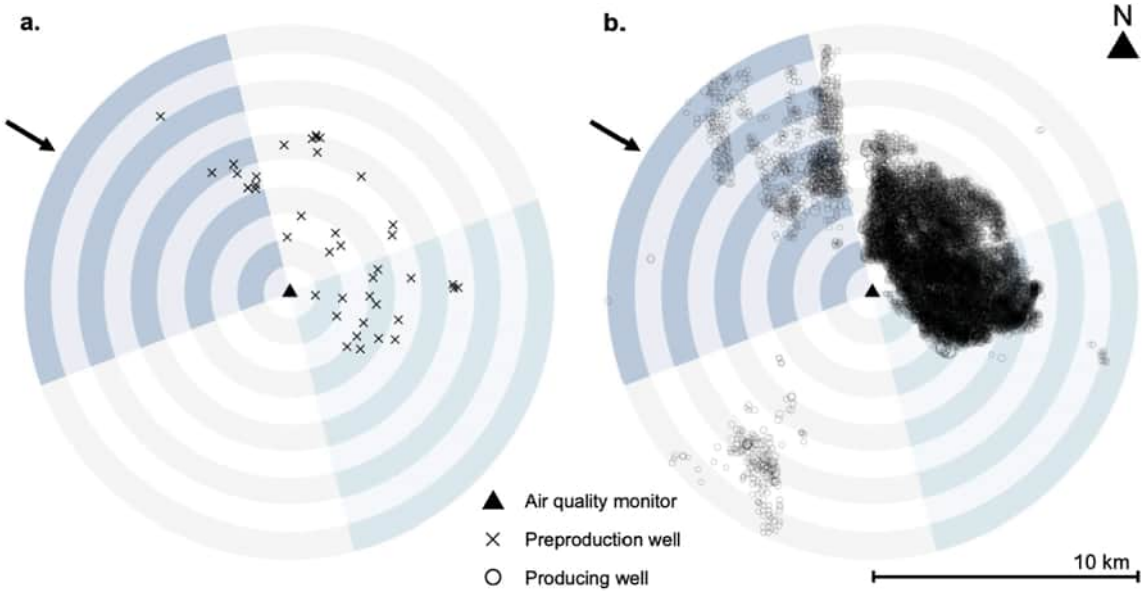

Fig. 2. A visualization of the exposure assessment method at a monitor located in Bakersfield, California, using sample data from July 1, 2009, when the wind was blowing from the northwest (arrow). For each monitor-day, we assessed exposure to (a) the count of wells in preproduction and (b) the total volume of oil and gas produced upwind (darker shaded area) of the monitor. As a placebo test, we assessed exposure to wells downwind (lighter shade) of the monitor.

for $PM_{2.5}$ where monitor-day observations that had >0 smoke plumes overhead were omitted.

In total we fit 27 models, and, as the primary analysis, we focused on the adjusted fixed effects regression models for exposure to preproduction wells and production volume. In particular, we were interested in the point estimates for exposure to upwind wells and production within 5 km of the monitor.

All data preparation and analyses were conducted using R v. 4.0 (R Core Team, 2020).

3. Results

3.1. Descriptive statistics

The analytic dataset comprised 1,058,230 daily observations of the five pollutants from 314 monitors across California collected from 2006 to 2019, with additional observations for VOCs from 1999 to 2005 (Table 1). Most (208) monitors were located in urban areas and approximately half (158) were in the four air basins with the majority of oil and gas wells (96.4%) and production (87.2%): Sacramento Valley, San Joaquin Valley, South Central Coast, and South Coast (Table S1). Not all monitors collected data for all pollutants. The majority (79.5%) of monitor-days included observations for O_3, with 43% of monitor-days including data for NO_2 and $PM_{2.5}$. Some 31% of monitor-days included CO observations and 8.9% included observations of VOCs. Among the 94,349 monitor-days with an observation for VOCs, 39.3% were in the San Joaquin Valley and 12.8% were in the South Coast basin, both basins where most oil and gas wells were concentrated. For each pollutant, there were more observations at monitors more than 10 km from wells than monitors near wells. More observations were collected in the later years of the study period compared to earlier in the study period. The number of monitors in operation throughout the study period was relatively consistent from year to year; the minimum number of monitors in operation was 223 in 2006 and the maximum was 245 in both 2012 and 2014, with a median of 239 (Fig. S4). The number of monitors that assessed $PM_{2.5}$ concentrations increased throughout the study period. Concentrations of pollutants at monitors within 10 km of wells were similar to the concentrations at monitors further away (Table 1).

Wells in all production stages were concentrated in the San Joaquin Valley, which includes Kern County, with substantial production in the South Coast air basin, which includes Los Angeles County (Table S1). Among the 314 monitors included in the analytic dataset, 79 (25.2%) were within 10 km of at least one oil or gas well, 33 (10.5%) were within 3 km, and 11 (3.5%) were within 1 km. Of the monitor-days included in the analysis, 46,477 (4.4%) were exposed to at least one preproduction or production well within 1 km, 115,648 (10.9%) were within 3 km, and 239,764 (22.7%) were within 10 km. For monitor-days with data for $PM_{2.5}$ and VOCs, there were no preproduction wells within 1 km.

Among exposed monitor-days, the median number of preproduction wells within each upwind 1-km bin was between 1 and 4, with a maximum of 41 (Table S2). For producing wells, median upwind exposure spanned 7.2 to 166.9 BOE, with a right-skew and a maximum of 24,166.1 BOE. There was both seasonal and geographic variation in wind direction: in the San Joaquin Valley, the wind predominantly originated in the northwest; in the South Coast basin, wind predominantly came from the southwest (Fig. S1). Exposure to preproduction wells was correlated with exposure to production volume for all annuli beyond 1 km. Across producing wells, daily production volume was right-skewed, with a median of 7.3 BOE per day and mean ($\pm$ SD) of 17.1 ($\pm$ 50.6) BOE per day. Exposure to preproduction wells was highly correlated for adjacent annuli and moderately correlated with further annuli; we observed a similar trend for production volume (Table S3). Exposure to preproduction wells was moderately correlated with exposure to production volume at distances greater than 1 km from wells.

3.2. Primary analyses

In the primary analysis, we observed increased concentrations of $PM_{2.5}$, CO, NO_2, and O_3 with proximity to preproduction wells (Fig. 3). For $PM_{2.5}$, we observed an increase of 2.35 μg m^{-3} (95% CI: 0.81, 3.89) for each additional upwind preproduction well site within 2 km of the monitor, and 0.97 μg m^{-3} (0.52, 1.41) for an additional well between 2 and 3 km from the monitor. For CO, we observed an increase of 0.09 ppm (-0.0004, 0.18) with an additional upwind well within 2 km and 0.02 (0.004, 0.032) for a well at 2-3 km. Concentrations of NO_2 increased 2.27 with well at 0-1 km, 2.91 (0.99, 4.84) for a well at 1-2 km, and 0.65 (0.31, 0.99) for a well at 2-3 km upwind. For O_3, there

Table 1
Descriptive statistics of the air monitors, pollutant concentrations, and meteorological factors during the study period, 2006-2019. The unit of observation is the monitor-day; some monitors observe multiple pollutants. VOCs in the dataset comprise non-methane volatile organic compounds.

	≤ 10 km to wells	> 10 km to wells	All
Monitors, *n* (column %)	79 (25.2)	235 (74.8)	314 (100)
Urban	57 (72.2)	151 (64.3)	208 (66.2)
Rural	22 (27.8)	84 (35.7)	106 (33.8)
Sacramento Valley	16 (20.2)	26 (11.1)	42 (26.6)
San Joaquin Valley	18 (22.8)	24 (10.2)	42 (26.6)
South Central Coast	15 (19.0)	14 (6.0)	29 (18.4)
South Coast	15 (19.0)	30 (12.8)	45 (28.5)
$PM_{2.5}$	43 (54.4)	155 (66.0)	198 (63.1)
CO	34 (43.0)	76 (32.3)	110 (35.0)
NO_2	45 (57.0)	94 (40.0)	139 (44.3)
O_3	65 (82.3)	172 (73.2)	237 (75.5)
VOCs	24 (30.4)	24 (10.2)	48 (15.3)
Observations, *n* (column %)	307,095 (29.0)	751,135 (71.0)	1,058,230 (100)
Urban	214,011 (69.7)	507,287 (67.5)	721,298 (68.2)
Rural	93,084 (30.3)	243,848 (32.5)	336,932 (31.8)
$PM_{2.5}$	137,657 (44.8)	317,065 (42.2)	454,722 (43.0)
CO	98,165 (32.0)	229,646 (30.6)	327,811 (31.0)
NO_2	157,567 (51.3)	297,197 (39.6)	454,764 (43.0)
O_3	252,572 (82.2)	588,448 (78.3)	841,020 (79.5)
VOCs[a]	44,992 (14.7)	49,357 (6.6)	94,349 (8.9)
2006–2009	77,013 (25.1)	200,404 (26.7)	277,417 (26.2)
2010–2014	104,839 (34.1)	264,066 (35.2)	368,905 (34.9)
2015–2019	107,248 (34.9)	268,876 (35.8)	376,124 (35.5)
Smoke plume overhead	21,780 (7.1)	54,299 (7.2)	76,079 (7.2)
Pollutant concentrations, daily mean ± SD			
$PM_{2.5}$ ($\mu g/m^3$)	10.6 ± 9.5	9.9 ± 9.0	10.1 ± 9.1
CO (ppm)	0.5 ± 0.4	0.5 ± 0.4	0.5 ± 0.4
NO_2 (ppb)	21.4 ± 14.6	22.1 ± 14.5	21.9 ± 14.5
O_3 (ppm)	0.04 ± 0.01	0.04 ± 0.02	0.04 ± 0.02
VOCs (ppb C)	120 ± 166	104 ± 142	112 ± 155
Meteorological factors, daily mean ± SD			
Precipitation (mm)	0.9 ± 4.0	1.2 ± 5.1	1.1 ± 4.8
Temperature (°C)	18.6 ± 7.8	17.2 ± 9.1	17.6 ± 8.8
Wind speed (m/s)	3.0 ± 2.1	3.2 ± 2.0	3.1 ± 2.0

[a] The data for VOCs includes observations for 1999-2019.

were no significant changes for an additional well within 2 km, an increase of 0.31. (0.20, 0.42) with an additional well at 2-3 km, and an increase of 0.14 (0.05, 0.23) with a well at 3-4 km. There were no increases in concentration with upwind exposure to VOCs, though notably there was no exposure to preproduction wells within 1 km. Across all pollutants, we did not observe any substantial increased concentrations beyond 4 km. In the placebo test, with exposure assessed to downwind wells, we did not observe any substantial increases in pollutant concentrations.

We observed increased concentrations of $PM_{2.5}$, NO_2, O_3, and VOCs with higher exposure to upwind production (Fig. 4). We estimated the marginal effect of exposure to an additional 100 BOE of daily total oil and gas volume within each 1-km annulus. This degree of exposure roughly corresponds with median upwind production volume within each annulus among exposed monitor-days (Table S2) and is comparable to cutoffs used in recent population health work (Tran et al., 2020). For each additional 100 BOE of total oil and gas production within 1 km, we observed an increase of 1.93 $\mu g\ m^{-3}$ (95% CI: 1.08, 2.78) in the concentration of $PM_{2.5}$. For NO_2, we observed an increase of 0.62 ppb (0.37, 0.86) with an additional 100 BOE within 1 km. The concentration of O_3, increased by 0.11 ppb (0.08, 0.14) with for each 100 additional BOE at 1-2 km. There was an increase in VOC concentrations of 0.04 (0.01, 0.07) ppb C for an additional 100 BOE of production within 1 km. We did not observe any substantial changes in CO concentrations with upwind exposure to production volume. In the downwind placebo tests, we observed an increase in $PM_{2.5}$ concentrations for exposure to increased production within 1 km, a small increase in NO_2 concentrations at 1-2 km, and an increase in O_3 at 3-4 km.

3.3. Sensitivity analyses

We performed several sensitivity analyses. Fitting models that included exposure variables for both preproduction and production did not substantially change the results; point estimates and confidence intervals were similar in models with exposure variables for both preproduction and production compared to models examining each exposure separately (Fig. S4). In models with polynomial term for exposure we did not see evidence of non-linear responses to upwind exposure. Changing model specification in the primary analysis for preproduction wells (Table S4) or for production volume did not qualitatively change findings (Table S5). In a sensitivity analysis, we fit the model as described above but omitted the 35,422 monitor-days with smoke plumes overhead, comprising 7.8% of the $PM_{2.5}$ analytic dataset. The results were similar to the smoke-adjusted results for exposure to wells in both the preproduction and production stages (Fig. S3).

4. Discussion

We observed higher concentrations of ambient air pollutants at air monitors exposed to wells in both the preproduction and production stages. Concentrations of $PM_{2.5}$ were substantially higher on days when a well was in preproduction within 3 km of the monitor, and also when production volume increased within 1 km of the monitor. Notably, we observed increases in $PM_{2.5}$ within 1 km of producing wells with and without considering wind direction. There are several possible explanations for this result: it may be attributable to high volume of producing wells near monitors in San Joaquin Valley orthogonal to the upwind direction, imperfect data on wind direction,

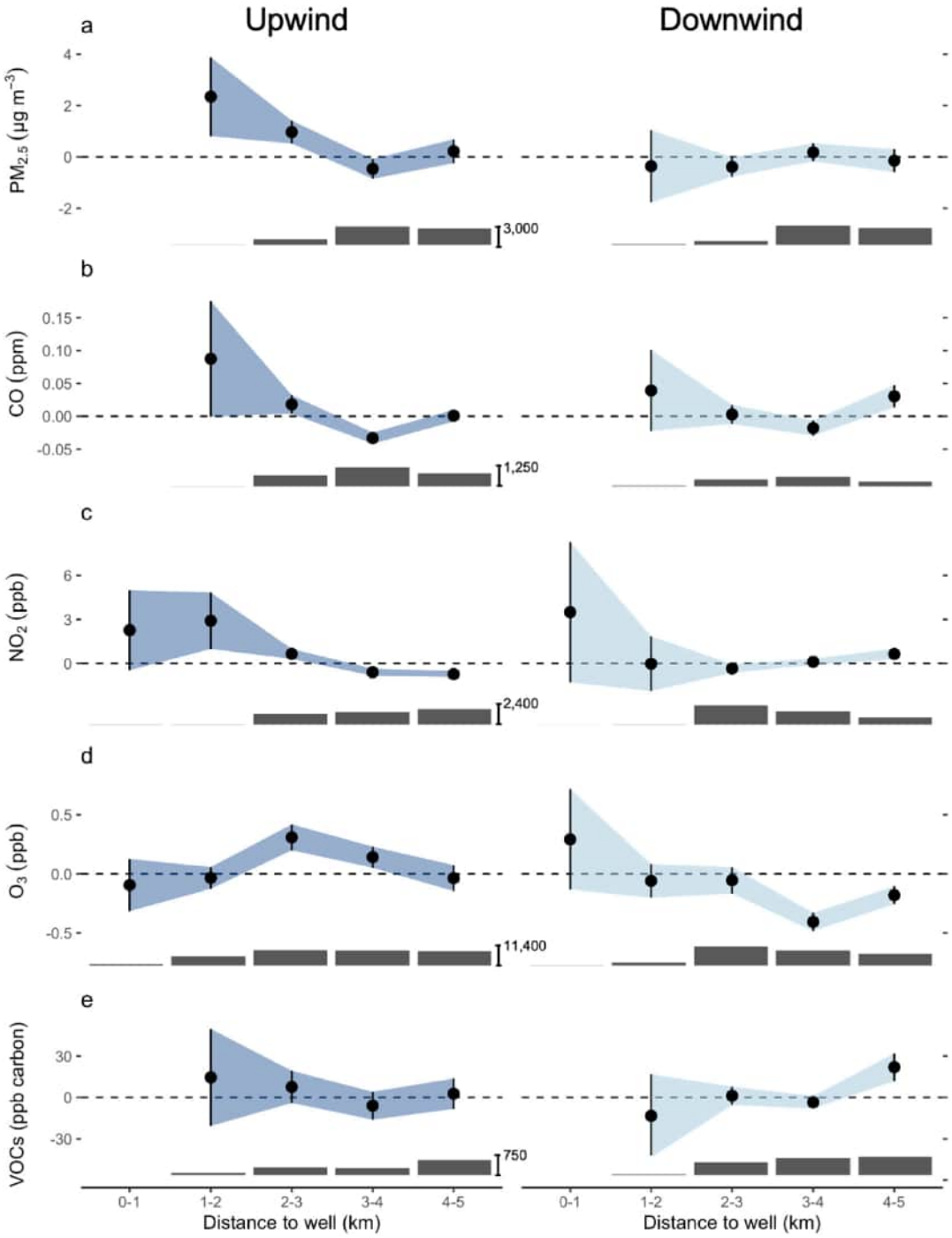

Fig. 3. Point estimates (95% CIs) for the marginal effect of one additional preproduction well upwind (left column) and downwind (right column) of the monitor. The bar plots show the number of monitor-days with exposure at least one preproduction well within each distance bin.

or shifts in wind direction during the day that were not adequately captured when we integrated wind direction over the course of a 24 h period. In addition to elevated $PM_{2.5}$ levels, concentrations of O_3 increased when production activity increased between 1 and 4 km upwind of the monitor, but not for activity within 1 km of the monitor. This result may be attributable to secondary formation from primary pollutants emitted from during preproduction and production. Ground-level O_3 may be secondarily formed from photochemical reactions involving CO, NO_x, and VOCs, all of which we also observed were emitted from wells (Real et al., 2007; Rodriguez et al., 2009). We observed increased CO concentrations on days when preproduction wells were drilled within 3 km of the monitor. Concentrations of NO_2 were higher on days when there was a preproduction well within 2 km or increased production volume within 1 km. For VOCs, we found higher concentrations when production volume increased within 1 km of the monitor. In the current study, VOCs comprised non-methane organic compounds including acetaldehyde, benzene, ethylene, and formaldehyde.

In models that considered both preproduction wells and production volume, we observed similar estimates to the models where we considered preproduction and production separately, as shown in Fig. S4. Preproduction activity near monitors was correlated with production volume, though this may not be apparent based on the correlation matrix in Table S3, which shows low correlation between preproduction

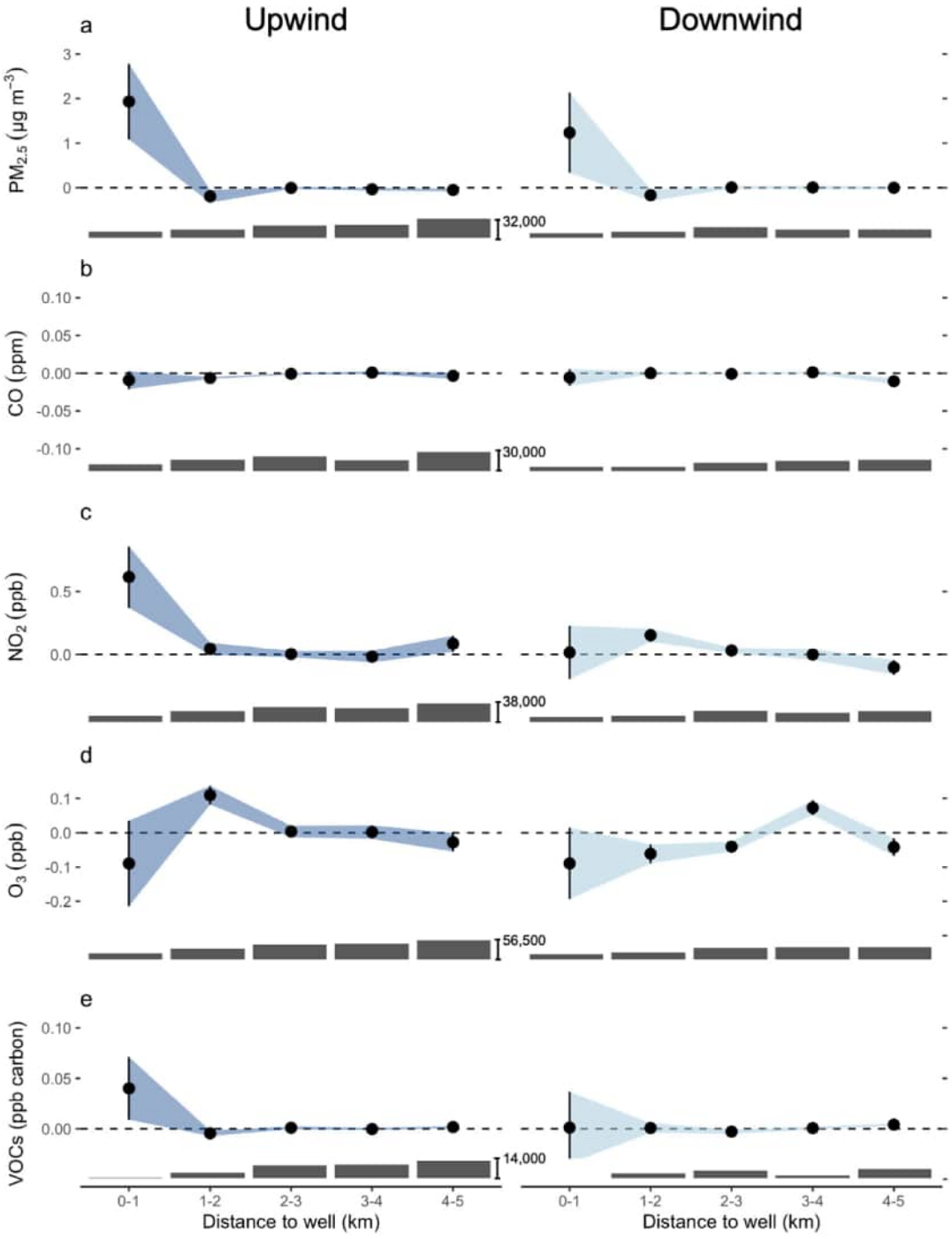

Fig. 4. Point estimates (95% CIs) for the marginal effect of 100 additional barrels of oil equivalent (BOE) of daily production volume, for wells upwind (left column) and downwind (right column) of the monitor. The bar plots show the number of monitor-days with exposure at least 1 BOE of daily production volume within each distance bin. Note that more monitor-days had exposure to production volume than preproduction wells.

wells and production volume. However, among all monitor-days with a preproduction well within 1 km of the monitor, there was also >0 BOE of production volume.

In this study, we conducted a quasi-experimental analysis that relied on the existing network of air quality monitors. The siting of air quality monitors is delegated to local authorities and prior studies have found evidence of bias in where monitors are sited, which should be considered when interpreting the results from the current study (Grainger et al., 2017; Grainger and Schreiber, 2019). For example, in counties just marginally in attainment for National Ambient Air Quality Standards (NAAQS), regulators had an incentive to place new monitors far from pollution sources, whereas in areas already in non-attainment, the regulators were incentivized to place monitors close to polluting sources (Grainger et al., 2017). This could lead to biased estimates of emissions from oil and gas wells, as monitors may be sited away from the most intensively producing oil fields. There is also evidence that monitors are less likely to be located in communities with racially and socioeconomically marginalized populations, which could lead to underestimation of oil and gas-related emissions if oil production in excluded areas was more intensive and polluting (Grainger and Schreiber, 2019). In the current study, the majority of oil and gas production was concentrated in Kern and Los Angeles Counties, both of which were in

non-attainment for $PM_{2.5}$ throughout the study period (Environmental Protection Agency, 2021).

Findings from the current study indicate both primary emission and secondary formation of pollutants from upstream oil and gas production activities. However, identifying specific processes that resulted in observed pollutant emissions was outside the scope of the study.

4.1. Comparison to prior studies

Using proximity as a metric of exposure to upstream oil and gas production appears to adequately capture exposures to chemical contaminants. Proximity-based methods, such as inverse distance weighting or estimating production activity within 1 km of receptors, have been used in prior population health studies to estimate acute or chronic exposure to wells. The five pollutants we examined in this study represent a subset of potential hazards associated with exposure to oil and gas wells, which may include other air pollutants as well as water and noise pollution (Adgate et al., 2014; Jackson et al., 2014). Recent studies from California have reported fugitive methane from idle and unplugged wells, as well as urban oil and gas infrastructure, which may correlate with emissions of benzene, toluene, ethylene, xylene, and other air toxics (Lebel et al., 2020; Okorn et al., 2021). To differentiate risks conferred by air pollutants, population health researchers could utilize variations in wind direction.

Prior field studies have also found emissions of pollutants from upstream oil and gas facilities. A 2018 study in Texas found high concentrations of nitrous oxides and saturated hydrocarbons associated with oil and gas production in the Eagle Ford Shale (Schade and Roest, 2018). Another recent study in Colorado, which combined in situ monitoring and cancer risk assessment, found higher exposure to benzene and other non-methane hydrocarbons (toluene, ethylbenzene, and xylene) and elevated risk of cancer and other adverse health outcomes with close proximity to oil and gas facilities (McKenzie et al., 2018). Notably, the dataset in the current study did not include toluene, ethylbenzene, and xylene. Garcia-Gonzales et al. (2019a) found higher concentrations of VOCs downwind of a well site in Los Angeles. A study in Pennsylvania found that exposure metrics used in prior epidemiological studies were poorly correlated with observed pollutant concentrations (Wendt Hess et al., 2019). However, this study assessed exposure to wells at distances greater than 10 km, where we would not expect to detect increases in pollution, and the authors did not account for meteorological factors that may affect pollutant concentrations (Buonocore et al., 2020).

In prior studies, Tran et al. (2020) and Gonzalez et al. (2020) used differing proximity metrics to assess exposure to upstream oil and gas production and adverse birth outcomes in California. For their analysis of production volume and adverse birth outcomes, Tran et al. used a similar exposure assessment method to the one we employed in the current study, assessing "high" exposure to births with >100 BOE within 1 km of the residence. In the current analysis, we modeled exposure to production volume continuously rather than categorically. We found substantial increases in concentrations of $PM_{2.5}$, NO_2, and O_3 with exposure to an additional 100 BOE within 1 km, indicating that the metrics employed by Tran et al. likely were effective in capturing aspects of air pollution near active wells. Gonzalez et al. used inverse distance-squared weighting (IDW), a different approach that relies on the assumption that both density and proximity of wells confers risk of air pollution exposures. Notably, Gonzalez et al. (2020) conducted an exploratory analysis of the association between proximity to oil and gas wells, assessed using an IDW index, and concentrations of four pollutants (NO_2, O_3, PM_{10}, and $PM_{2.5}$). For that supplemental analysis, Gonzalez et al. also used data from EPA Air Quality System for mean monthly concentrations of air pollutants and fit fixed effects linear regression models estimating the effect of "high" exposure to wells (the highest tertile of the IDW index). These authors observed substantially higher concentrations of PM_{10} and $PM_{2.5}$, lower concentrations of NO_2, and no substantial changes for O_3; for all pollutants, effects. This indicates that the IDW method may be less effective as an exposure metric for the air pollutants investigated in this study than the methods employed in the current study. Additionally, the approaches in both Tran et al. (2020) and Gonzalez et al. (2020) may not adequately capture exposure to secondary pollutants such as O_3, which in the current study had higher concentrations several km downwind of wells.

4.2. Limitations and strengths

The current study had several limitations. We relied on daily changes in wind direction as a source of exogenous variation. On days with variable wind direction, estimating mean wind direction integrated over the course of the day could lead to exposure misclassification if, for example, wind blew from multiple directions during the course of a 24-h period. Data for many pollutants that may be emitted during upstream oil and gas production operations are not routinely monitored and reported in the EPA Air Quality System. Consequently, the results of the current study likely reflect only a subset of pollutants potentially emitted from upstream oil and gas production. Population health studies referring to our estimates of chemical contaminant exposure should consider the possibility of co-exposures to additional pollutants emitted during oil and gas production. We also did not have sufficient data to investigate specific VOC constituents, which may be associated with particular health endpoints of interest. Additionally, there were relatively few monitor-days with exposure to preproduction wells within 1 km. None of the monitors that measure concentrations of $PM_{2.5}$ and VOCs were within 1 km of a preproduction well. We found evidence that drilling sites up within 1 to 3 km of air monitors increased $PM_{2.5}$ concentrations, and concentrations of $PM_{2.5}$ within 1 km of preproduction wells may be similar to or higher than our estimates for wells at 1-3 km. We did not expect to observe changes in VOC concentrations further than 1 km, as prior work has reported decay of VOCs within 100-200 m from well sites (Garcia-Gonzales et al., 2019a; Zielinska et al., 2014). Because of this, we were unable to make any inferences about the effect of preproduction activities on concentrations of VOCs.

In the primary analyses, we adjusted for exposure to wildfire smoke plumes to account for potential contributions of smoke to the pollutants of interest. Exposure was assessed as the number of overhead plumes for each monitor-day, but this method may not accurately indicate smoke conditions at ground level. A sensitivity analysis for $PM_{2.5}$ omitting smoke days from the analysis yielded similar results to the smoke-adjusted models, suggesting that our statistical adjustment for smoke plumes was sufficient.

For the analyses of wells in the production stage, data on total oil and gas production volume were available at the monthly level. Because of this constraint, in the exposure assessment we assumed that production occurred evenly throughout the month. This could lead to exposure misclassification if production was concentrated in certain days of the month. Future researchers building on these findings should consider obtaining daily production volume data, if possible. Finally, we were not able to differentiate between drilling or production methods (i.e., conventional vs. unconventional methods, such as hydraulic fracturing), so we were not able to determine whether certain unconventional methods resulted in higher emissions.

Strengths of this study include the large panel dataset, comprising over 1 million daily observations from high quality air monitors with broad geographic and temporal variation. We were able to control for unobserved potential confounders through the study design, using wind as a plausibly exogenous source of variation uncorrelated to both upstream oil production and other sources of pollution. The monitor fixed effect accounts for average differences between monitoring locations, such as from pollution sources unrelated to oil and gas. Leveraging temporal variation from oil production activities and daily changes in wind direction accounts for other nearby pollution sources that are not both spatially collocated and temporally correlated with

oil and gas production. Based on this analytic approach, we think there is unlikely to be residual confounding. Additionally, we conducted several tests to validate the robustness of the results.

5. Conclusion

We conducted a quasi-experimental study to examine whether upstream oil and gas production results in emissions of ambient air pollutants. Adjusting for geographic, meteorological, seasonal, and time-trending factors, and leveraging daily changes in wind direction as an exogenous source of variation, we observed that proximity to oil and gas wells in both preproduction and production increased concentrations of $PM_{2.5}$, CO, NO_2, O_3, and VOCs at distances up to 4 km downwind of wells. These findings indicate that proximity to wells is an appropriate metric for air pollution-related exposures in population health studies. Notably, increases in $PM_{2.5}$ concentrations near wells could be a mediating factor for previously reported increases in risk of adverse birth outcomes with proximity to wells in California (Bekkar et al., 2020; Gonzalez et al., 2020; Tran et al., 2020). Further research on hazards associated with upstream oil and gas production would improve understanding of potential health and environmental risks. Acute emissions of particular pollutants may be associated with specific steps of oil and gas preproduction or production, and more work is needed to determine if this is the case and, if so, which processes produce high emissions. Mitigating exposure to oil and gas wells would likely reduce exposure to ambient air pollutants.

Funding

This work was supported by the Ford Foundation Predoctoral Fellowship, the Vice Provost for Graduate Education at Stanford University, and the Stanford School of Earth, Energy, and Environmental Sciences. The funding sources did not have any involvement in the design, conduct, or writing of this study.

CRediT authorship contribution statement

David J.X. Gonzalez: Conceptualization, Data curation, Methodology, Formal analysis, Visualization, Writing – original draft, Writing – review & editing. **Christina K. Francis:** Data curation, Writing – original draft. **Gary M. Shaw:** Writing – review & editing. **Mark R. Cullen:** Methodology, Writing – review & editing. **Michael Baiocchi:** Methodology, Writing – review & editing. **Marshall Burke:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Data availability

Data and code used in this analysis are available at https://github.com/djxgonzalez/cal-drilling-air-quality.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We would like to thank Sam Heft-Neal and Anne Driscoll for assistance with the smoke plume data.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.scitotenv.2021.150298.

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antioxidants

Article

Ozone Pollution Alters Olfaction and Behavior of Pollinators

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Abstract: Concentration of air pollutants, particularly ozone (O_3), has dramatically increased since pre-industrial times in the troposphere. Due to the strong oxidative potential of O_3, negative effects on both emission and lifetime in the atmosphere of plant volatile organic compounds (VOCs) have already been highlighted. VOCs alteration by O_3 may potentially affect the attraction of pollinators that rely on these chemical signals. Surprisingly, direct effects of O_3 on the olfaction and the behavioral response of pollinators have not been investigated so far. We developed a comprehensive experiment under controlled conditions to assess O_3 physiological and behavioral effects on two pollinator species, differing in their ecological traits. Using several realistic concentrations of O_3 and various exposure times, we investigated the odor antennal detection and the attraction to VOCs present in the floral scents of their associated plants. Our results showed, in both species, a clear effect of exposure to high O_3 concentrations on the ability to detect and react to the floral VOCs. These effects depend on the VOC tested and its concentration, and the O_3 exposure (concentration and duration) on the pollinator species. Pollination systems may, therefore, be impaired in different ways by increased levels of O_3, the effects of which will likely depend on whether the exposure is chronic or, as in this study, punctual, likely causing some pollination systems to be more vulnerable than others. While several studies have already shown the negative impact of O_3 on VOCs emission and lifetime in the atmosphere, this study reveals, for the first time, that this impact alters the pollinator detection and behavior. These findings highlight the urgent need to consider air pollution when evaluating threats to pollinators.

Keywords: ozone; atmospheric pollution; plant-pollinator interactions; pollinators; plant VOC perception; behavioral response

Citation: Vanderplanck, M.; Lapeyre, B.; Brondani, M.; Opsommer, M.; Dufay, M.; Hossaert-McKey, M.; Proffit, M. Ozone Pollution Alters Olfaction and Behavior of Pollinators. *Antioxidants* **2021**, *10*, 636. https://doi.org/10.3390/antiox10050636

Academic Editor: Hiroko Tabunoki

Received: 24 March 2021
Accepted: 16 April 2021
Published: 21 April 2021

1. Introduction

It is widely recognized that global change due to human activities has already had major impacts on the biodiversity and on biotic interactions, including pollination, and that these impacts will be increasingly severe [1–3]. Insect pollination is a key component of biodiversity, providing a fundamental ecosystem service in natural and agricultural ecosystems [4–6]. A series of major threats to insect pollination have been identified and new political lines of action have been proposed [3,6]. Surprisingly, among these identified threats to pollination and its associated organisms, air pollution has received limited attention [7,8]. However, the concentrations of major air pollutants in the atmosphere have tremendously increased since pre-industrial times, and are predicted to further increase in some areas of the world [9]. Among widespread atmospheric pollutants, the tropospheric ozone (O_3) is one of the most harmful air pollutants to ecosystems, especially in rural

areas [2,9,10]. Ozone concentrations fluctuate in space and time [10], reaching particularly high in areas combining important human activities and a warm climate [11,12]. On a worldwide scale, baseline O_3 concentration has doubled since the pre-industrial period and is likely to increase by 2–4 folds in the next two decades, mainly due to global warming and changes in land cover [9,10,13]. Depending on climatic conditions, O_3 concentration presents local seasonal peaks, called O_3 episodes, which result in high O_3 concentrations (>40 ppb) during short time periods. Predictive models show an increased frequency of high O_3 episodes by 2050 in some areas of the world [14]. These O_3 episodes can have detrimental effects not only on human health (e.g., respiratory health problems, cognitive dysfunction) [15–18], but also on vegetation (e.g., plant damages, productivity losses) [19,20]. However, O_3 effects on biotic interactions are still poorly documented even though these interactions are essential for ecosystem functioning and services. There is especially an urgent need to characterize the direct impact of such O_3 episodes on plant-pollinator interactions, especially from the pollinator perspective [21].

Investigating the effect of O_3 episodes on pollinators requires taking into account the existing interspecific variation in terms of species ecological traits, which are known to be related to the sensitivity to environmental disturbances [22,23]. Size, dietary specialization, and degree of sociality of species may determine the extent to which abiotic and biotic conditions affect their survival and resource use. Such differential sensitivity of insects has been already investigated and highlighted in the context of pesticide use, land use, and land cover change [24–27]. One might then expect that resistance of pollinators to oxidative stress, as caused by O_3 exposure (i.e., direct effects and physiological tolerance), which may vary among species according to their ecological traits. For instance, longevity is associated with increased resistance to oxidative stress in some insect species [28,29]. Food intake is also associated with resistance to oxidative stress, with an access to dietary antioxidants, making organisms more prone to resist oxidative stress than others (i.e., non-feeding organisms or absence of antioxidants in the normal diet) [30]. All these pollinator ecological traits also mediate their interactions with plants, and are complementary to underpin the stability, structure, and complexity of pollination networks.

One crucial aspect of plant pollination by insects is how efficiently the interacting partners encounter one another. A large majority of plant-pollinator interactions are mediated by chemical communication. This type of communication may be basically summarized by the following steps: the emission of volatile organic compounds (VOCs) by flowers, which are further diffused in the ambient air, and ultimately detected and used by pollinators as a signal to locate their host-plant [31–33]. Several studies have pointed out that air pollution can potentially affect all levels of this chemical communication [21,34–38]. Ozone, due to its strong oxidative potential, has actually been shown to affect the emission rates and profiles of plant VOCs [2,37,39–41], as well as their lifetime in the atmosphere [37,42–44]. Consequently, the alteration of the floral scent chemical composition either at the emission or during their transport in the air may reduce insect success rates in locating plumes of floral scents [44]. However, research on whether the effects of O_3 on pollinator behavior and their capacity to locate their host flowers has been neglected until now [21].

Within the complex mixtures of VOCs emitted by plants, insects only use some of them, in particular proportions, as a signal to find their resource [31,45,46]. Any change in the detection of the different VOCs in a floral scent by insects can lead to the breakdown of the host recognition process and may, thus, impede pollinator foraging. In insects, the antenna is the primary organ involved in the detection of VOCs [47]. This elaborate organ hosts most of the olfactory sensory neurons (OSNs) where the chemosensory proteins implicated in VOCs detection are expressed. When OSNs membrane proteins recognize VOCs, they will trigger neurons to send electrical signals to the insect brain that will then process these sensory inputs to produce a behavioral response according to the chemical signal received [47–49]. It is likely that a powerful oxidant like O_3 may react with the antennal chemosensory proteins [16], potentially hindering VOCs detection by the individual. So far, only one study has shown that an increased level of O_3 differently affects

antennal responses in western honeybees (*Apis mellifera*) depending on the VOC tested [50]. Unfortunately, the experimental design used does not allow for distinguishing the effects of O_3 on VOCs themselves from the direct effect on insect antennal detection. Direct evidence for O_3 effects on the VOCs detection and the behavioral response of pollinators are, therefore, still missing to have a complete picture of the O_3 threat to pollination [21].

The objective of this study was to investigate the impact of O_3 episodes on both: (i) the ability of pollinators to detect VOCs from their associated plant species, and (ii) on the subsequent behavioral response to host-plant VOCs, by using two pollinator species differing in their ecological traits to control for species dependence. Our working hypotheses were that O_3 would induce an alteration of the VOCs antennal detection and a modification of their behavioral response to the stimulus. In order to test our hypotheses, we first exposed individuals to simulated O_3 episodes of different intensity and length of exposure that occurred in the Mediterranean region, which is one of the most impacted by O_3 pollution in Europe. Then, using synthetic VOCs mimicking floral scents, we tested if the exposure affected: (i) insect antenna sensitivity (by recording the electroantennogram responses to different VOCs doses), and (ii) pollinator attraction to these VOCs.

2. Materials and Methods

2.1. Model Systems

2.1.1. Fig Wasp System

As a model of short-lived species, we used the solitary and tiny fig wasp *Blastophaga psenes* L. (Hymenoptera, Agaonidae), which lives between one and two days and does not feed at the adult stage [51]. *Blastophaga psenes* is involved in a highly specific mutualism with the Mediterranean fig species *Ficus carica* (Moraceae), being intimately associated with this plant for its reproduction and being its exclusive pollinator. *Ficus carica* occurs naturally in the Mediterranean region and presents an unusual phenology with male trees flowering twice a year (i.e., in late April—early May and in late July), but female trees flowering only once a year (i.e., in early July) (see [46,52] for more details about the life cycle. *Blastophaga psenes* uses a blend of 4 VOCs [S-linalool, Z-linalool oxide (furanoid), E-linalool oxide (furanoid) and benzyl alcohol] in the proportion of 76.34%, 0.38%, 0.38%, and 22.90%, respectively, to locate receptive figs of its host and any small change in this blend proportion alters pollinator attraction [46]. All these biological properties of this fig-fig wasp association make it particularly well suited for understanding how specific plant-insect communication may be affected by atmospheric pollution.

This study was carried out with insects from natural populations collected in fig trees present at the CEFE ("Centre d'Ecologie Fonctionnelle et Evolutive") experimental garden (43°38′19″ N, 3°51′49″ E) in Montpellier, France. Newly emerging adult female wasps were collected from mature figs taken haphazardly from different individual male trees. Because of their very short lifespan outside the fig, individuals of *B. psenes* were tested shortly after their exit from their natal Figure Each day, a maximum of 25 individuals were tested per treatment. All tested wasps were naïve to the VOCs used in the experiments.

2.1.2. Bumblebee System

As a model of long-lived species, we used the buff-tailed bumblebee *Bombus terrestris* (L.) (Hymenoptera, Apidae), which is one of the most abundant and widespread bumblebee species in the western Palearctic. This social species lives about three weeks [53,54] and is highly polylectic, foraging on hundreds of different plant species belonging to numerous plant families [55–57]. As a consequence, it has a very important role as a pollinator in wild and cultivated plant communities [56,58]. However, colonies do not show equivalent development on all pollen species [59]. Host-plant recognition is then of primary importance. Although bumblebees are especially attracted to plants with blue flowers and radial nectar guides [60], plants VOCs also play an important role in attraction and host discrimination [61]. Actually, the olfactory signal is a primary cue that influences the bumblebee's foraging decision and reduces uncertainty regarding visual cues [62]. The

sensory abilities of bumblebees and their learning and memory capabilities are well known, which makes them one of the most suitable models for conducting behavioral studies [63].

Commercial colonies of *B. terrestris* are available and easy to rear so that physiological measures can be performed in the laboratory under controlled conditions. For all the experiments, bumblebee foragers were collected from three different colonies of two-day-old workers supplied by Biobest *bvba* (Westerlo, Belgium). The tested individuals were not age-marked, but they could be considered to have had similar olfactory experiences because of prior exposure to the same odors inside the colony and because they were not allowed to forage outside the nest. The colonies were fed *ad libitum* with sugar syrup (BIOGLUC®, Biobest) and pollen candies (i.e., *Salix* pollen provided by Ruchers de Lorraine) in a dark room at 27 °C and 76% relative humidity during a 30-day period. New pollen candy was provided every two days. Syrup and pollen supplies were done in the darkroom under red light in order to avoid disturbing colonies, as bees do not detect this range of the light spectrum.

2.2. Ozone Exposure

In the Mediterranean region, O_3 episodes (>40 ppb) frequently occur during the summertime, and concentrations of around 80 ppb are commonly registered for several hours. However, the maximum hourly concentration was habitually around 120 ppb and exceptionally up to 208 ppb in the last 20 years [64]. As we aimed to simulate realistic O_3 episodes of various intensities and lengths, we exposed individuals of each species for a short period (60 min) to 200 ppb (very high concentration) (i.e., highest hourly value that was recorded in the Mediterranean region [64]), and for a longer period (180 min) to 80 ppb (intermediate concentration) or 120 ppb (high concentration) (i.e., average values that may be recorded over several hours every year [13,65]). Controls with individuals exposed to 0 ppb for either 60 or 180 min were also run in parallel. The greater and more prolonged availability of bumblebees, compared to fig wasps, allowed us to conduct additional exposure treatments on this species in order to better cover the effects of O_3 on insect olfaction (see Table S1 for details about exposure conditions and sample sizes).

To conduct these exposures, pollinators were placed into a laboratory fumigation chamber held at room temperature (27 °C). Ozone was produced using the photolysis of molecular oxygen subjected to UV radiation at a wavelength of 185 nm (UV photometric Ozone Analyser with a generator option, Model 49i, Thermo Fisher Scientific™, Franklin, MA, USA). The fumigation system consisted of a glass bottle of 500 mL with a filter paper of 2 × 2 cm loaded with 200 µL of distilled water (fig wasps) or inverted sugar syrup (bumblebees) before the exposure. One side of the glass bottle was connected to the analyzer-generator in the generator mode pushing air containing different concentrations into the bottle at the flow rate of 1.5 $L.min^{-1}$. An air-zero source composed of a pump connected to an activated carbon filter to clean the air entering the system of any VOCs was used. The other extremity of the glass bottle was connected to an analyzer-generator in the analyzer mode, where air was extracted at a flow rate of 1.5 $L.min^{-1}$ to ensure that the desired O_3 concentration was present in the bottle. We used exclusively Teflon tubes to connect the pump, the VOC filter, the O_3 generator, and analyzer. Ozone was delivered continuously in a flow through the fumigation chamber and individuals were exposed to different concentrations in a randomized order.

2.3. Does O_3 Concentration Affect Pollinator Antenna Sensitivity?

Sensory input at the pollinator antenna can be monitored using electrophysiology and, more specifically, electroantennographic recordings (EAG). Electroantennograms measure the summed response of all OSNs present in the insect's antenna to a given olfactory stimulus [66]. A change in the amplitude of the depolarization in response to this stimulus indicates that some part of the antennal detection is affected. In order to evaluate if O_3 exposure could affect the sensitivity to a given VOC, EAGs were conducted with different doses of synthetic VOCs (1, 10, 100, and 1000 µg). Previous studies reported that the

overall intensity of floral scent produced by one inflorescence (or flower) is approximately 0.1 µg.min^{-1} for *F. carica* [46]. Similar intensities to this measured for *F. carica* have been found in two plants species pollinated by *B. terrestris* [67,68]. Based on the results of previous studies, we selected synthetic versions of VOCs that are detected by the antenna of our insect species and mediate the attraction toward their host-plants: the monoterpenes linalool (in racemic mixture [S and R forms, 50:50]) and linalool oxides (Z and E forms furanoid, 50:50) and the benzenoid benzyl alcohol in the specialist fig wasp [46], and the monoterpene R-linalool, the benzenoid benzaldehyde, and the alkyl aldehyde nonanal in the generalist bumblebee [69,70] (see Table S2 for providers and purity of the different compounds). Linalool mixture was used in our study of fig wasps because S-linalool alone is not available commercially. All VOCs were used 100-fold diluted (v/v) using paraffin (Uvasol®, Merck, Darmstadt, Germany) as a diluting agent. A piece of filter paper (Whatman No. 1, 1 × 2 cm) impregnated with 10 µL of each stimulus solution was inserted into a glass Pasteur pipette (15 cm in length) and used as a stimulus cartridge.

After exposure of pollinators to an ozone-rich environment, samples for EAG were prepared. For fig wasps, the head was cut at the base and, for bumblebee workers, the right antenna was cut after cold-anesthesia. For fig wasps, we used either the right or left antenna. On the contrary, for bumblebee workers, we exclusively used the right antenna owing to asymmetrical performance favoring this antenna, as compared to the left one, in responding to learned VOCs in this species [71]. The head (head base and the tip of one antenna) or antenna was then mounted between glass capillary tubes filled with insect Ringer's solution ($NaCl/KCl/CaCl_2/NaHCO_3$, Na^+ 131 mmol.L^{-1}, K^+ 5 mmol.L^{-1}, Cl^- 111 mmol.L^{-1}, $C_3H_5O_3^-$ 29 mmol.L^{-1}), and connected to the silver electrodes of an EAG Kombi Probe PRG-3 (SYNTECH®, Kirchzarten, Germany). The antenna was positioned in the middle of a continuous flow of purified and humidified air blowing through a tube for stimulation (435 mL.min^{-1}). The tip of a Pasteur pipette odor cartridge was inserted into a small hole on the continuous airflow tube. Stimulus was released by a pulse of purified air through the odor cartridge with a pulse duration of 0.5 s and a flow of 890 mL.min^{-1} regulated by a CS-55 Stimulus Controller (Syntech, Kirchzarten, Germany). Data were recorded by a two-channel universal serial bus acquisition controller (Syntech IDAC-2, Kirchzarten, Germany) and analysed using the software GcEad 1.2.5 (Syntech, Kirchzarten, Germany). Each antenna was exposed to four stimulus sequences, in which each sequence consisted of all the selected compounds (i.e., three for the bumblebees, four for the fig wasps) at a given dose and paraffin controls. The sequence doses were always presented to the antenna in ascending order (i.e., 1, 10, 100, and 1000 µg, respectively). For each sequence, the compounds were used in a randomized order. Paraffin controls were used for the first and last measurements in a sequence. For quantifying the EAG response amplitude, the mean response to the control was subtracted for each sequence.

2.4. Does O_3 Concentration Affect the Attraction of Pollinators to VOCs?

We used synthetic VOCs rather than scents from real flowers in order to eliminate any possible variability due to the odor source among the tests. For fig wasps, a blend of VOCs mimicking the odor of the fig host and shown to elicit pollinator attraction was used (S-linalool, Z-linalool oxide, E-linalool oxide, and benzyl alcohol in the proportion of 76.34%, 0.38%, 0.38%, and 22.90%, respectively [46]). For bumblebees, benzaldehyde alone was used as it was the VOC eliciting the highest electroantennographic response and whose detection was the most affected by O_3, according to our EAG experiments. Behavioral assays were carried out in a dynamic airflow glass Y-tube olfactometer to evaluate preferences for odor against clean-air control (i.e., dual-choice scenario) following a protocol similar to that used by Proffit et al. [46]. The odor diffuser released VOCs, on average, at 65.92 ng.min^{-1} for the fig wasp mix and 270 ng.min^{-1} for benzaldehyde. After exposure to O_3 (see Table S3 for details about exposure conditions and sample sizes), pollinators were introduced into the stem of the Y-tube, tested individually, and used only once.

Due to behavioral differences between fig wasps and bumblebees owing to their different ecological traits, behavioral assays were adapted for each model. For fig wasps, the behavioral assays were carried out in a dark room using a light source (18 lumens light intensity) above the olfactometer and above the glass containers containing the odor source. Each trial stopped after the fig wasp had entered one of the arms and went to the top of the chosen arm. We considered that wasps did not choose when they stayed motionless for ten minutes in the departure section and/or the central arm before the bifurcation of the olfactometer. These individuals were then discarded and not taken into account in the statistical analyses. For the bumblebees, the behavioral assays were performed under red light and recorded for 10 min using a USB HD 720p camera (Logitech, Lausanne, Switzerland). The number of bouts toward the far end of each of the arms of the Y-tube was counted (i.e., complete bouts). Incomplete bouts (i.e., entering an arm but not going to the far end) were not taken into account. The workers performed between 3 and 45 complete bouts per assay.

2.5. Statistical Analyses

All analyses were performed in R version 3.4.0 [72].

2.5.1. Pollinator Antenna Sensitivity

To test for differences in the antennal response among O_3 exposures, linear mixed models were computed for each compound with O_3 treatment and VOC dose as fixed effects and individual (nested in colony for bumblebees) as a random factor (R-package "nlme", [73]). Data were log-transformed to achieve normality of residuals. Contrasts between regressions were then performed to determine whether antennal response to a specific VOC dose differed according to the O_3 treatment (R-package "contrast"; [74,75]). The same analyses were performed on datasets for both the fig wasps and the bumblebees.

2.5.2. Attraction of Pollinators to VOCs

Choice by fig wasps between clean-air control and odor source in the Y-tube olfactometer was analysed for each O_3 exposure using two-sided binomial tests to investigate whether the wasp distribution differed from 50:50. Regarding bumblebee behavior, we compared the number of complete bouts in each arm for each O_3 exposure, by using paired-samples Wilcoxon signed-rank tests. We then tested for differences in a behavioral response among O_3 exposures using general linear models with O_3 treatment as a fixed effect and colony as a random factor (R-package "lmerTest", [73]). We used a binomial model with the number of complete bouts toward the benzaldehyde (successes) and the number of complete bouts toward the clean-air control (failures) as a bivariate response after checking for overdispersion. When a significant effect was found, multiple pairwise comparison tests were performed using Tukey contrasts and FDR adjustment to determine which O_3 treatments significantly differed from each other (R-package "multcomp", [76]).

3. Results

3.1. Does O_3 Concentration Affect Pollinator Antenna Sensitivity?

3.1.1. Fig Wasp System

The electroantennographic recordings show different antennal responses depending on O_3 exposures and the VOCs tested. After 60 min or 180 min of O_3 exposure, we detected significant changes compared to the control in the amplitude of antennal response for at least one of the tested doses of each VOC used, except for the linalool oxides, where no significant changes were detected (Figure 1, Table S4). After 60-min exposure to 200 ppb O_3, a significant difference from the control was found for benzyl alcohol at 1000 µg, with an increased antennal response after O_3 exposure. For the other doses of the VOCs tested, the EAG responses were not significantly different from the control. In contrast, the effect of 180-min O_3 exposure led to a decrease of the antennal response of fig wasps, depending on the O_3 level and the VOC dose, except for the linalool oxides, where no significant

changes were detected (Figure 1). Responses to benzyl alcohol and linalool mixture were all significantly lower after O_3 exposure (either at 80 ppb, 120 ppb or both), for at least one of the tested VOC doses.

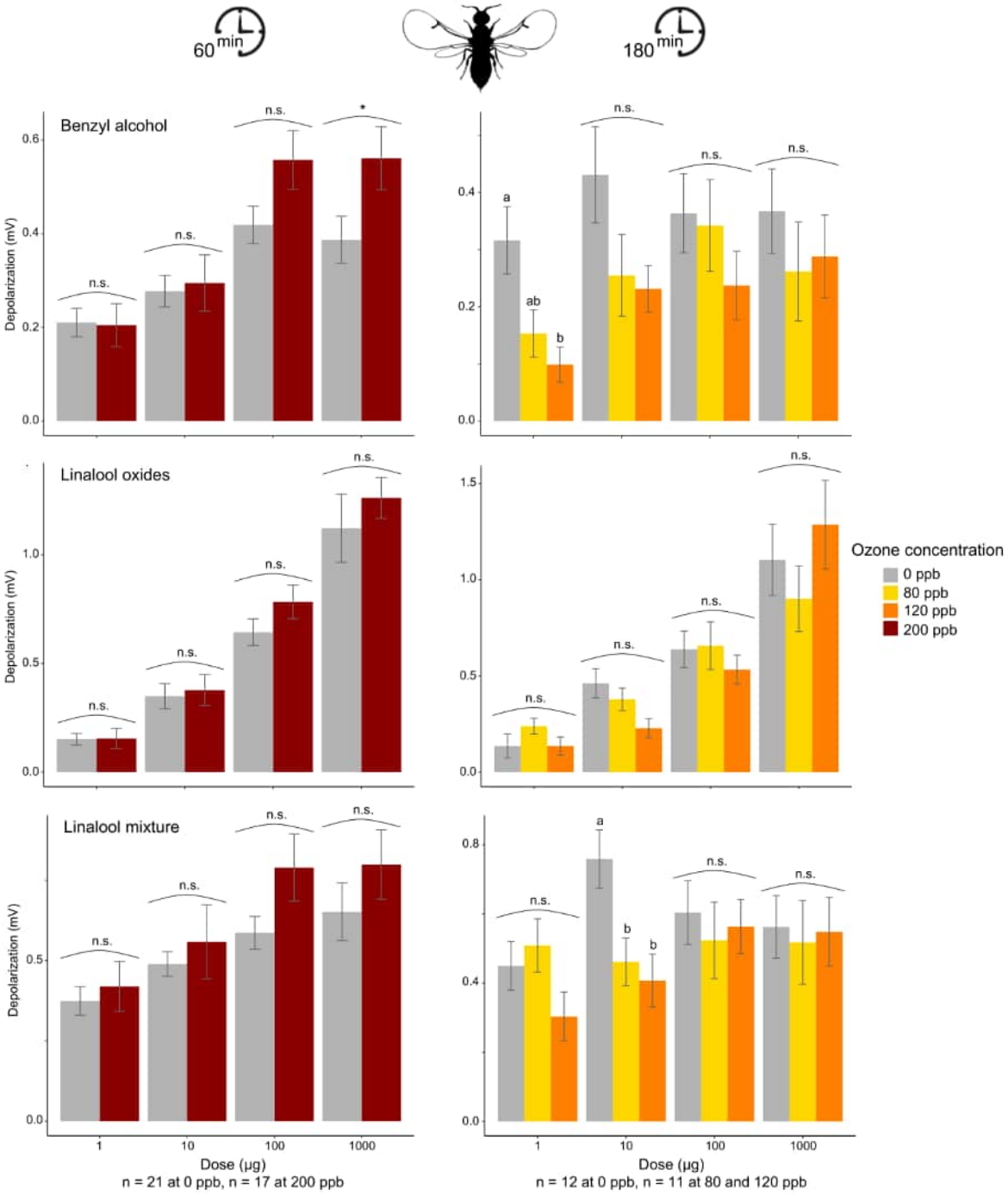

Figure 1. The effect of O_3 exposure on the electroantennographic (EAG) responses (mean ± SE) of fig wasps to different doses of four synthetic volatile compounds (n, number of specimens tested). Prior to the EAG recording, wasps were exposed to different O_3 concentrations for 60-min or 180-min. Different letters (n.s. $p > 0.05$) or asterisks (* $p < 0.05$) indicate significant differences in the EAG response to one compound at a given dose between O_3 treatments based on contrasts.

3.1.2. Bumblebee System

The electroantennographic recording revealed that O_3 decreased the antennal response for all three VOCs in some of the tested conditions. The exact quantitative effect of O_3

concentration, and whether this decrease depended on the duration of O_3 exposure, varied depending on the VOC tested and its dose (Figure 2, Table S5). After 60 min, the antennal response overall decreased with increasing exposure to O_3, when VOCs were presented at high doses (100 µg and 1000 µg), with the exception of benzaldehyde. For this latter, at doses of 10, 100, and 1000 µg, the antennal response of workers decreased after exposure at 80 and 120 ppb O_3 while it slightly re-grew after 200 ppb exposure (i.e., U-shaped response, Figure 2). Impact of O_3 exposure seemed to be less marked on insects that were exposed for 180 min. In these cases, a significant decrease in an antennal response was found for only two VOCs, at doses of 100 and 1000 µg.

3.2. Does O_3 Concentration Affect the Attraction of Pollinators to VOCs?

3.2.1. Fig Wasp System

The orientation of the fig wasps toward the blend mimicking host odor was affected after both 60 min and 180 min exposure to O_3 for at least one of the O_3 concentrations. At 0 and 80 ppb O_3, individuals significantly preferred the VOC blend, mimicking the odor of receptive figs over the clean air (0 ppb, 60-min exposure, $p = 0.015$, 0 ppb, 180-min exposure, $p = 0.033$, 80 ppb, 180-min exposure $p = 0.015$, Figure 3). At 120 ppb O_3, fig wasps had no preference for either side of the Y-tube (60-min exposure, $p = 0.480$, 180-min exposure, $p = 0.888$) while they significantly preferred the clean air over the VOC mix when exposed to 200 ppb O_3 (60-min exposure, $p = 0.044$) (Figure 3).

3.2.2. Bumblebee System

The orientation responses of naive bumblebee foragers to benzaldehyde were significantly affected by O_3 exposure ($\chi^2 = 10.086$, df = 3, $p = 0.018$, Figure 4). The number of bouts toward the benzaldehyde was significantly higher than the number of bouts toward the clean air for the control treatment (0 ppb) ($V = 80.5$, $p = 0.003$). When exposed to O_3, whatever the O_3 concentration tested, the foragers lost their preference for the benzaldehyde and oriented as frequently toward the synthetic volatile compound as to clean air ($p > 0.05$, Figure 4).

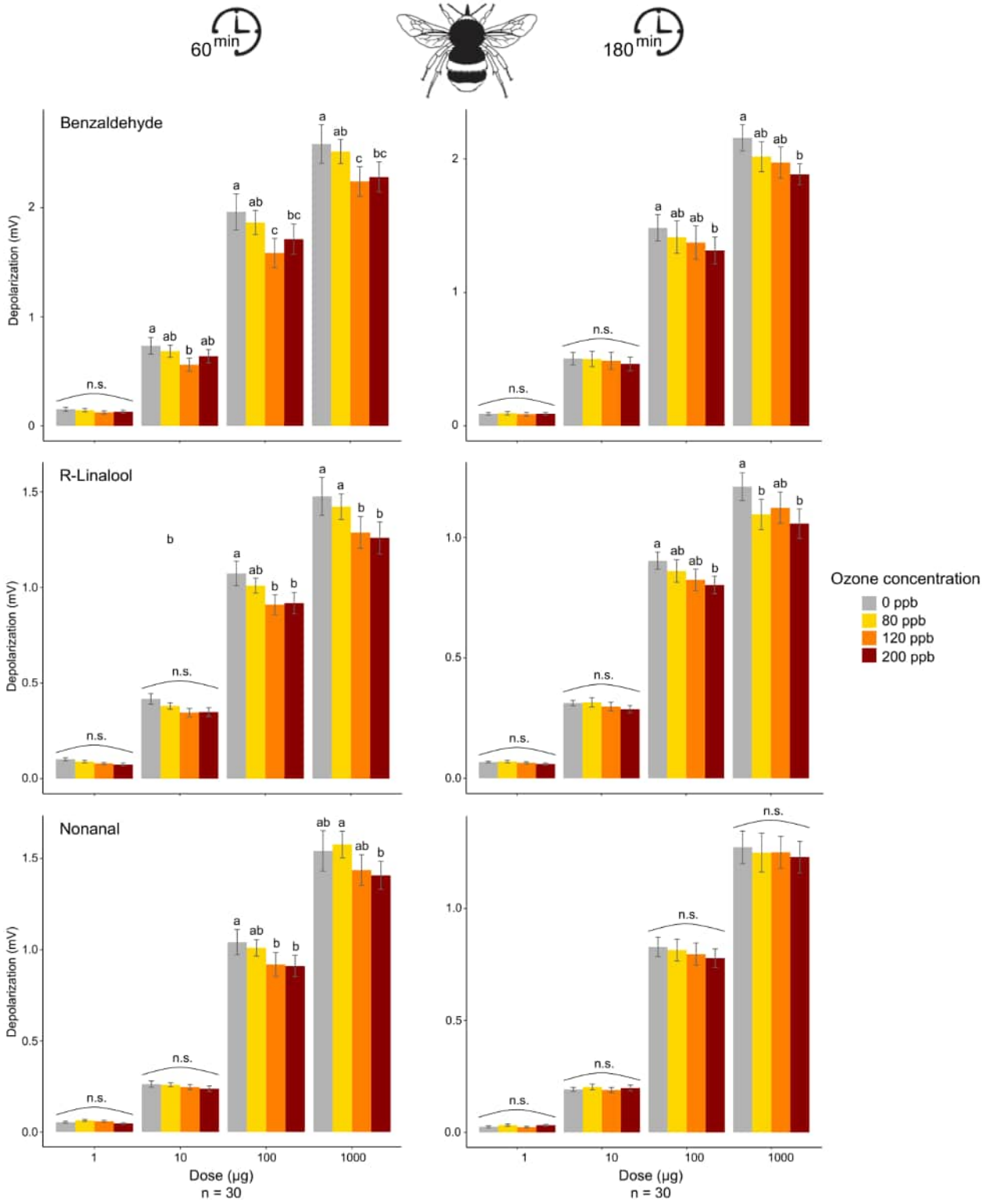

Figure 2. Effect of O_3 exposure on the electroantennographic (EAG) responses (mean ± SE) of bumblebee foragers to different doses of three synthetic compounds (n, number of specimens tested). Prior to the EAG recording, bumblebees were exposed to different O_3 concentrations for 60-min or 180-min. Different letters (a and b) indicate significant differences ($p < 0.05$) in the EAG response to one compound at a given dose between O_3 concentrations based on contrast analysis.

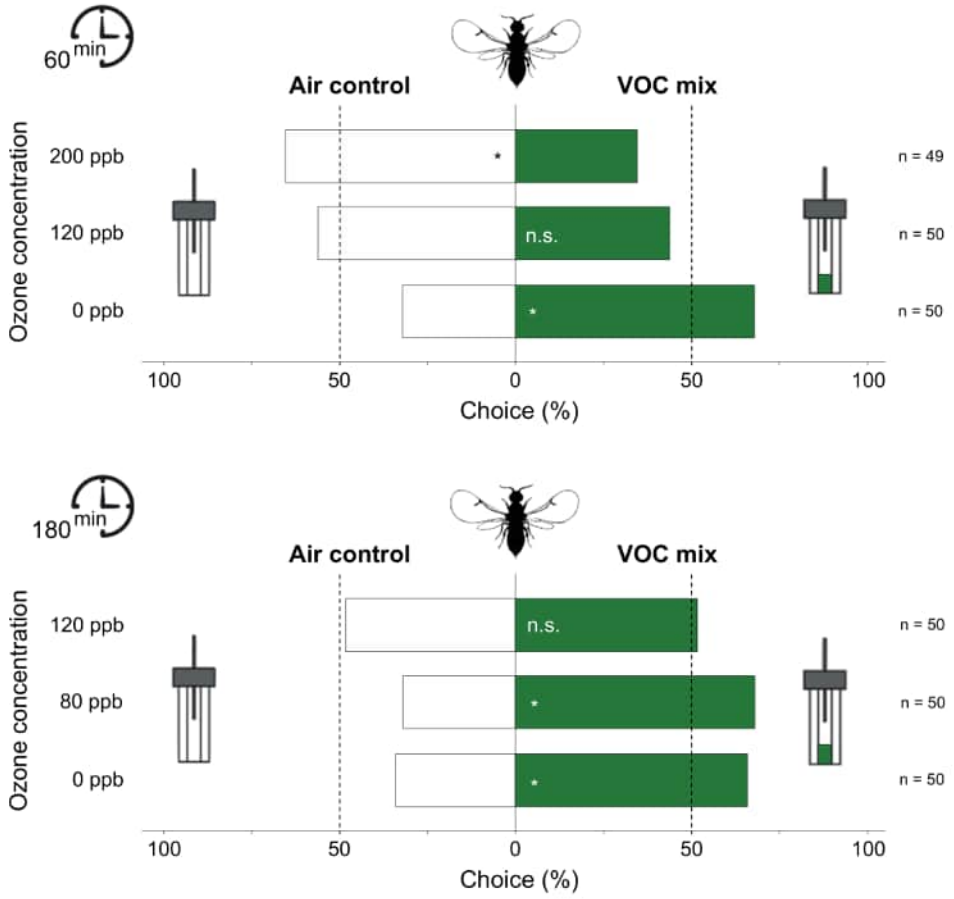

Figure 3. Effect of O_3 exposure on the attraction of fig wasps to the VOC mix mimicking fig odor or clean air in Y-tube olfactometers (n, number of specimens tested). Prior to the behavioral test, wasps were exposed to different O_3 concentrations for 60-min or 180-min. Asterisks indicate a significant preference based on two-sided binomial tests (* $p < 0.05$).

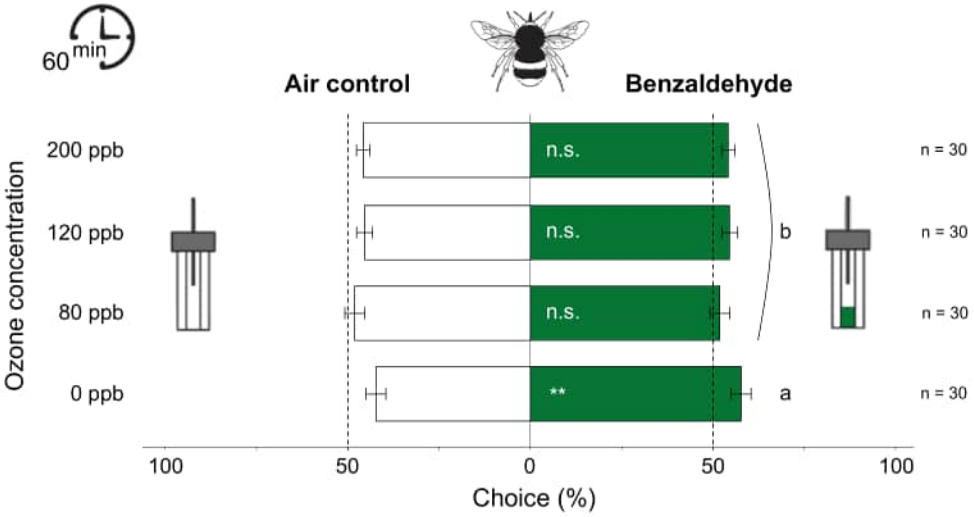

Figure 4. Effect of 60-min O_3 exposure on the attraction (mean ± SE based on the percentage of bouts) of bumblebee foragers to benzaldehyde or clean air in Y-tube olfactometers (n, number of specimens tested). Asterisks indicate a preference, according to the paired Wilcoxon signed-rank tests (** $p < 0.01$), and different letters indicate a significant difference in choice among O_3 treatments, according to the multiple pairwise comparisons based on the binomial model ($p < 0.05$).

4. Discussion

In two pollinator species differing in their ecological traits, this study revealed an effect of exposure to high O_3 concentration on their ability to detect and react to VOCs contained in floral scents of their associated plants. Effects of O_3 pollution on the emission of VOCs by plants and on their lifetime in the atmosphere have already been demonstrated [37,42–44], but without testing the possible additional effects on the pollinator itself [21]. Our findings provide new information on the impact of air pollution on plant-pollinator chemical communication and underline an additional threat for pollination of entomogamous plant species.

The electrophysiological experiments revealed that an increase in O_3 concentrations affects VOC detection by the antenna to different substances depending on exposure duration, VOC identity, and its dose, with some patterns in the antennal responses differing between the two insect species tested. For bumblebee workers, with the increase of the O_3 concentration, there was a progressive reduction in the amplitude of antennal response to most VOCs tested, when these were present at their higher doses (i.e., 100 and 1000 µg), with a more pronounced effect after 60 min of O_3 exposure compared to 180 min. For fig wasps, both times of exposure showed an impact on antennal response but with contrasted effects. After 180 min of exposure to intermediate and high concentrations, the antennal detection decreased progressively with increasing O_3 concentration for most VOCs but mainly for their lower doses (i.e., 1 and 10 µg). In contrast, after 60 min of exposure to a very high O_3 concentration, the antennal responses clearly increased compared to the control for most VOCs, but mainly for their higher doses (i.e., 100 and 1000 µg). On the other hand, in both species, the antennal detection of some VOCs seemed not to be affected by O_3 exposure. These complex and unpredictable observations emphasize the need to increase our knowledge of the mode of O_3 action on insect antenna.

Although the underlying mechanisms of O_3 action on the perception of VOCs by the insect antenna have not been investigated in this study, some hypotheses can be proposed. It is already known that O_3 reacts with proteins (e.g., oxidation of the polypeptide backbone, peptide bond cleavage, protein-protein cross-linking, and modifications of amino acid side chain), altering their structure and their functional properties [77]. Ozone may, thus, oxidize proteins involved in olfaction [78], affecting the insect's sensitivity to VOCs. Such effects of significant damage to the peripheral olfactory system have been reported in the case of exposure to high doses of insecticide. For instance, in honeybees, high doses of some insecticides strongly increased OSN repolarization time by prolonging sodium channel opening [79] and delaying signal termination. Such phenomena should lead to an increased amplitude of the EAG response. Regarding the U-shaped pattern observed in the antennal response of bumblebees to some VOCs (i.e., a decrease at intermediate-high concentrations followed by a re-increase at a very high concentration), it could be partly explained by an endocrine regulation of antioxidative reactions [80–83].

Since the effect of O_3 on VOC detection varies with both the different VOCs (VOC-varying effect) and their concentration (dose-varying effect), it should change the insect's overall perception of the odor blend. As the relative proportions of the various VOCs constitute the authentic scent cue and is crucial for pollinator attraction [46], such a differential change could disrupt the orientation of pollinators to their host plants. Accordingly, the results of the behavioral assays showed that exposure to high and very high O_3 concentrations reduced the ability of pollinators to orient toward an odor source attractive in control conditions for both pollinator species. In addition, exposure to intermediate O_3 concentration also affects the attraction of bumblebees to benzaldehyde. Most intriguingly, we showed that an initially attractive VOC blend might even be avoided by the fig wasp after exposure to realistic but very high O_3 concentration. This might be due to an important alteration of the antennal OSNs or other physiological features. Exposure of pollinators to O_3 may induce other damages such as oxidation of non-antennal proteins, lipid peroxidation, and damage to DNA, but also deregulation of intracellular signal transduction, which could disrupt the entire organism and lead to death (reviewed in Reference [84]).

The combined effects of O_3 on (i) the signal sending (direct effects on plant volatile emission, e.g., [41]), (ii) the degradation and dispersion of VOCs (reactions in the atmosphere; e.g., [43]), and (iii) the ability of pollinators to detect and respond to volatiles cues (direct effects on receiver organisms, present study) could have a significant impact on the efficiency of plant-pollinator interactions and then on fitness of both partners [21]. Our study showed that O_3 pollution exposure does not impact all pollinator species equally (i.e., detection abilities and behavioral responses). Especially, the fig wasps appear to be less resilient than the bumblebees to O_3 exposure, with a higher impact on the behavioral response. Such difference in species vulnerability is likely associated with their ecological traits (e.g., size, longevity, and feeding behavior). Compared to the fig wasps that cannot feed at the adult stage, bumblebees may benefit from a protective effect of dietary antioxidants as well from energy intake to activate endogenous antioxidant defenses that are costly for the organism [85–87]. This advantage will likely give them an extra chance to recover from the oxidative stress triggered by O_3 exposure. Moreover, fig wasps have a limited possibility of recovery given their reduced lifespan that should likely not allow the activation of the endogenous antioxidant machinery that is likely to take time [88].

Evidence is that O_3 can affect all levels of the volatile-mediated interaction between plants and pollinators. Future research should adopt an approach that integrates mechanistic studies to elucidate the mode of O_3 action on insect antenna, the physiological response of insects (endogenous antioxidant defense mechanisms), and the possibility for nutritional resilience (exogenous dietary antioxidant intake). For completing the picture, future research should also consider the diversity of ecological traits of species as well as the diversity of natural conditions (spatial and temporal dynamics) to understand how O_3 can affect ecosystem functioning, and to reduce the impact of anthropogenic oxidants on plant-pollinator systems through pertinent conservation actions.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/antiox10050636/s1. Table S1: Conditions of O_3 exposure and sample sizes for electrophysiological experiments. Table S2: Provider, CAS (Chemical Abstracts Service) number, and purity of the synthetic VOCs used during the experiments. Table S3: Conditions of ozone exposure and sample sizes for behavioral assays. Table S4: Statistical outputs (p-values) regarding the impact of O_3 exposure on antennal sensitivity in fig wasps. Table S5: Statistical outputs (p-values) regarding the impact of O_3 exposure on antennal sensitivity in bumblebee workers.

Author Contributions: M.P., M.V., M.D., M.H.-M., and B.L. designed the study. M.V., B.L., M.B., M.O., and M.P. collected the data. M.V., B.L., and M.P. analyzed the data. M.V. wrote the first draft of the manuscript, and all authors contributed substantially to revisions. All authors have read and agreed to the published version of the manuscript.

Funding: This work is a contribution to the French National Research Program for Environmental and Occupational Health of ANSES (2018/1/138), and was partly funded by the International Research Project (IRP)-CNRS-MOST and by the French National Research Agency (ANR) under the program "Investissements d'avenir" (reference ANR-16-IDEX-0006).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: We thank D. Evrard for his valuable help during the experiment, Biobest for providing the bumblebee colonies, B. Buatois and N. Barthès from the Platform for Chemical Analysis in Ecology (PACE, LabEx CeMEB, ANR under the program "Investissements d'avenir") at the CEFE (Centre of Functional and Evolutionary Ecology, Montpellier, France), D. McKey (native speaker) for English proofreading, and C. Violle, D. Carrasco and five anonymous referees for their constructive comments on the manuscript.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study, in the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

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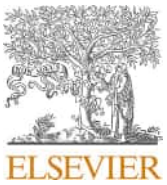
Anthropogenic air pollutants reduce insect-mediated pollination services

Ryalls, J. ORCID: https://orcid.org/0000-0003-2015-3605, Langford, B., Mullinger, N., Bromfield, L., Nemitz, E., Pfrang, C. and Girling, R. ORCID: https://orcid.org/0000-0001-8816-8075 (2022) Anthropogenic air pollutants reduce insect-mediated pollination services. Environmental Pollution, 297. 118847. ISSN 0269-7491 doi: https://doi.org/10.1016/j.envpol.2022.118847 Available at https://centaur.reading.ac.uk/102263/

Environmental Pollution 297 (2022) 118847



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Environmental Pollution

journal homepage: www.elsevier.com/locate/envpol

Anthropogenic air pollutants reduce insect-mediated pollination services☆

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ARTICLE INFO

Keywords:
Air pollution
Diesel exhaust
Tropospheric ozone
Floral odor cues
Insect pollinators
Ecosystem services

ABSTRACT

Common air pollutants, such as nitrogen oxides (NO_x), emitted in diesel exhaust, and ozone (O_3), have been implicated in the decline of pollinating insects. Reductionist laboratory assays, focused upon interactions between a narrow range of flowering plant and pollinator species, in combination with atmospheric chemistry models, indicate that such pollutants can chemically alter floral odors, disrupting the cues that foraging insects use to find and pollinate flowers. However, odor environments in nature are highly complex and pollination services are commonly provided by suites of insect species, each exhibiting different sensitivities to different floral odors. Therefore, the potential impacts of pollution-induced foraging disruption on both insect ecology, and the pollination services that insects provide, are currently unknown. We conducted *in-situ* field studies to investigate whether such pollutants could reduce pollinator foraging and as a result the pollination ecosystem service that those insects provide. Using free-air fumigation, we show that elevating diesel exhaust and O_3, individually and in combination, to levels lower than is considered safe under current air quality standards, significantly reduced counts of locally-occurring wild and managed insect pollinators by 62–70% and their flower visits by 83–90%. These reductions were driven by changes in specific pollinator groups, including bees, flies, moths and butterflies, and coincided with significant reductions (14–31%) in three different metrics of pollination and yield of a self-fertile test plant. Quantifying such effects provides new insights into the impacts of human-induced air pollution on the natural ecosystem services upon which we depend.

1. Introduction

Insect pollination facilitates approximately 7–8% of the total value of agricultural food production worldwide (Potts et al., 2016a) and 70% of all crop species rely upon insect pollination (Klein et al., 2007). However, there have been sustained declines in insect pollinator abundance and diversity over the past century, resulting from a combination of environmental pressures (Potts et al., 2016b; Powney et al., 2019; Vanbergen and the Insect Pollinators Initiative, 2013). Recent research suggests that common tropospheric pollutants, including nitrogen oxides (otherwise known as NO_x, comprised of nitric oxide (NO) and nitrogen dioxide (NO_2)) from diesel exhaust, and ozone (O_3), may contribute to pollinator declines through: i) direct effects on insect pollinator health (Reitmayer et al., 2019) and; ii) potential reductions in pollinator foraging efficiency (Farré-Armengol et al., 2016; Fuentes et al., 2016; Girling et al., 2013; McFrederick et al., 2008).

In foraging for a flower, odor plumes are an important stimulus for many pollinating insect species. Each flower species' plume is comprised of a unique combination of chemicals, known as volatile organic compounds (VOCs), and an insect's success in locating a flower can depend on the presence, concentration and/or ratio of these VOCs within a plume (Riffell et al., 2014; Wright and Schiestl, 2009). These plume characteristics will be altered by atmospheric pollutants (NO_x and O_3 in particular), or by the products of these pollutants' reactions within the troposphere (especially hydroxyl radicals; McFrederick et al., 2008), either through direct reaction with the plume (Jamieson et al., 2017) or masking of its components (Riffell et al., 2014). Such changes could have consequences for the foraging efficiency of insects that use these cues. Validation of this prediction is currently based upon laboratory behavioral studies (e.g. Farré-Armengol et al., 2016; Girling et al., 2013;

☆ This paper has been recommended for acceptance by Admir Créso Targino.

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https://doi.org/10.1016/j.envpol.2022.118847
Received 10 September 2021; Received in revised form 8 January 2022; Accepted 10 January 2022
Available online 18 January 2022

Lusebrink et al., 2015), and atmospheric chemistry modelling (e.g. Fuentes et al., 2016; McFrederick et al., 2008), which are focused on a narrow range of pollinator species and on individual pollutants in isolation. Therefore, the ecological impacts remain unclear (Jamieson et al., 2017).

We investigated whether exposure to diesel exhaust (particularly NO_x) and elevated O_3, individually and in combination, affected the ability of naturally occurring pollinating insects to: i) locate floral resources, and ii) provide pollination services. NO_x and O_3 commonly occur together in the troposphere, therefore sequential or simultaneous exposure of air pollutants, rather than exposure to individual pollutants in isolation, is considered an essential requirement when investigating how such pollutants modify the interactions between plants and the biotic communities they reside with (Li et al., 2016; Papazian and Blande, 2020). Globally, many of the newly approved diesel vehicles sold continue to exceed emission limits, ensuring diesel exhaust emissions will remain a problem for many decades (the average lifespan of a passenger vehicle varies between countries (9–23 years; Oguchi and Fuse, 2015), with diesel vehicles lasting up to 30 years) (ACEA, 2019; Brand, 2016). Increasing urbanization and traffic congestion is likely to result in higher NO_x in peri-urban and rural areas, increasing the potential exposure of neighboring agricultural land and intensifying pollen limitation (Bennett et al., 2020). Moreover, global tropospheric background O_3 concentrations are rising and regular weather-induced episodic increases continue to occur (Hansen et al., 2019; Turnock et al., 2019). Depending on whether the region is VOC- or NO_x-limited, reductions in NO_x emission sources may also increase O_3 formation, and vice versa (Bae et al., 2020; Wang et al., 2019), which may influence the foraging behavior of pollinating insects (Blande, 2021). To experimentally investigate the ecological effects of simultaneous pollutants at field-scale, we designed a novel Free-Air Diesel and O_3 Enrichment (FADOE) facility, which allowed emission of regulated quantities of NO_x (emitted in diesel exhaust) and O_3.

2. Materials and methods

2.1. Free-Air Diesel and Ozone Enrichment (FADOE)

The FADOE facility consisted of eight 8 m-diameter octagons; two octagons were assigned to each of four treatments: i) diesel exhaust (D), ii) O_3, iii) diesel exhaust and O_3 combined (D + O_3), and iv) control ambient air (Fig. 1A). The aim was to maintain fumigation levels of NO_x and O_3 within the pollution treatment octagons at field-realistic doses, i.e. below 120 ppb (based on average concentrations adjacent to major UK roadways and urban areas; Ares and Smith, 2017) and 90 ppb (based on peak concentrations recorded in rural European sites in 1990–2012; Colette et al., 2016), respectively. The combined (D + O_3) treatment octagons were maintained at the same maximum concentration as those set for each pollutant octagon individually. The FADOE system configuration is visualised in Fig. S1. The centre of each FADOE octagon was positioned 50 m from the centre of a field (51.482853° N 0.897749° W in 2018 and 51.482374° N 0.895855° W in 2019) in an octagonal formation, such that each octagon was separated by a distance of at least 30 m. A diesel generator (Hyundai, DHY8000SELR 7.2 kVA, Genpower Ltd, UK) and two ozone generators (CD1500P, ClearWater Tech, USA) positioned in the centre of the field were used to deliver elevated levels of diesel exhaust and ozone to the octagons via 50 mm (ID) heavy duty conduit connected to vacuum-blower pumps (R4110-2, Gast, USA). Octagons of the same treatment were positioned opposite each other within the field to minimise spatial effects. One-hundred and twenty 5 mm-diameter holes were drilled (20 cm apart) in the pipes surrounding each octagon, which provided a diffuse plume of pollutant (or ambient air in the case of the Control treatment octagons) directed towards the centre of the octagon. The concentrations of NO, NO_2, NO_x (i.e. NO + NO_2) and ozone (O_3) at the centre of each octagon were monitored sequentially (every 120 s) via an automated switching system coupled to O_3 (Model 49i, Thermo Scientific, USA) and NO_x (Model 42C, Thermo Scientific, USA) analysers. Three-way mixing valves (VRG131 connected to ARA600 proportional actuators, ESBE, Sweden) and UV-light controllers (CD1500P 4–20 mA control board) altered the quantities of diesel exhaust and O_3 released into the octagons. In-line filter units (G057502, Donaldson, Czech Republic) with a RS3954 filter (Baldwin, USA) were used to remove soot deposits from the pipes before reaching the pumps and excess diesel exhaust was directed through conduit pipes away from the field site (100 m north-east or downwind; Fig. S2). The diesel exhaust was passed through metal conduit pipe directly from the generator to dissipate heat before entering a mixing barrel where collected water vapour was dispensed from a tap (three times weekly). Generators were turned on for up to 17 h each day (between 4.30 a.m. and 9.30 p.m.) to ensure that pollution treatments were applied during times of peak daily pollinator activity for all insect pollinators recorded. Wind speed and wind direction were recorded continuously from four A100R anemometers and W200P potentiometer windvanes (Vector Instruments, UK), positioned north, east, south and west of the field to ensure consistency in prevailing wind direction throughout data collection (south-westerly; Fig. S2). The FADOE octagons were positioned within a field of winter wheat (*Triticum aestivum* cv. Skyfall, sown in November 2017 at a seeding rate of 300 seeds m^{-2} and a row spacing of 166 mm) at the University of Reading's Sonning farm, UK. The wheat acted as a non-insect pollinated (i.e. non-flowering) buffer, limited plant diversity and maximised weed control. Winter wheat was re-sown in November 2018 in an adjacent field, where the FADOE facility was reassembled for a second year. Octagons were fumigated during two summer seasons (May–September 2018 and 2019).

2.2. Plant material

In May each year (2018 and 2019), 192 black mustard plants (*Brassica nigra* cv. Abyssinica) were grown from seed (Heirloom & Perennial Ltd., Cornwall, UK) in netted 100 mL seed wells in an open

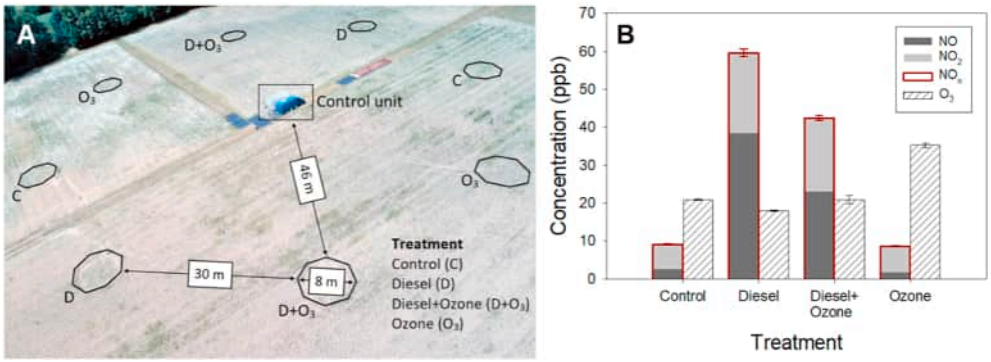

Fig. 1. Free-Air Diesel and Ozone Enrichment octagon layout during 2018 (A) and mean concentrations (±SE) of nitrogen oxides (NO_x = NO + NO_2) and ozone (O_3) within treatments (B). Octagons were distributed in an octagonal formation within a field of wheat (drone image by UoR SAGES UAV; A), which acted as a non-flowering buffer. In B, red bars (NO_x concentrations) include stacked concentrations of nitric oxide (NO) and nitrogen dioxide (NO_2). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

glasshouse (24.5 °C ± 2.4 SD). This self-fertile variety, with a two- to three-month flowering period, was used as a model flowering plant based on mechanistic evidence from laboratory studies that O_3 degrades its floral signal and changes its attraction to bumblebees (Farré-Armengol et al., 2016; Saunier and Blande, 2019). Four-week-old plants were transferred to 18 cm diameter pots containing 2.7 kg of vegetable topsoil (Quality Garden Supplies Ltd., Staffordshire, UK) and placed in a polytunnel covered with insect mesh for one week until the seedlings had established. At five weeks old (ca. one week before flowering), 24 plants were distributed evenly in each octagon and dug into the ground within the wheat crop, such that the lip of each pot was flush with the surface of the soil. These plants remained in the octagons until they had finished flowering (2–3 months) and were fumigated for the entire duration.

2.3. Insect visitation assessments

Insect visitation to flowers of *B. nigra* was recorded on days conducive to insect activity (dry, >15 °C, between 10:00 and 17:00). The number of insect visits to a focal patch (observation unit) of six adjacent plants (containing an average of 73 flowers) within each FADOE octagon were recorded for up to 10 min. The selection of six plants per observation unit enabled a clear view of the flowers upon which visits were counted (Reitan and Nielsen, 2016). The Order and group of visitor (Hymenoptera (honey bees, bumble bees, solitary bees and parasitic wasps), Lepidoptera (moths and butterflies), Diptera (hoverflies and other flies), Coleoptera (beetles) and Hemiptera (true bugs)) were recorded, along with the number of flowers that were visited by individual insects (bees, moths, butterflies and hoverflies only) and the total number of flowers within the observation unit. A visit was classified as a landing, or an attempt to feed on or collect pollen and/or nectar (Nuttman and Willmer, 2003). Observers (two field researchers trained in pollinator observation) stood a minimum of 1 m away from the observation unit and remained still during the observation period. For each day of sampling, observers were assigned, at random, to an observation unit within each octagon and the eight octagons were observed in a randomised order. Insect abundances (i.e. the number of individuals recorded on flowers for all insect pollinator groups) and flower visits (i.e. the number of flowers visited by each individual bee, hoverfly, moth and butterfly) were scaled according to the number of flowers in the observation unit and survey duration to give insect counts flower^{-1} h^{-1} and flower visits flower^{-1} h^{-1}, respectively.

2.4. Accounting for spatial changes and direct impacts on pollinator foraging

2.4.1. Control experiment 1 – Accounting for spatial differences in pollinator foraging within the field

For one week (12–19 July 2019), plants and treatments were rotated between the different FADOE octagons so that control octagons became diesel exhaust-polluted octagons and ozone octagons became combined-treatment octagons (and vice versa). This enabled the quantification of the level of spatial variation associated with changes in pollinator foraging behaviour among treatments.

2.4.2. Control experiment 2 – Determining the direct effects of air pollution on pollinator flight activity when floral cues were absent

Triple pan traps (i.e. brightly coloured visual stimuli that superficially resemble flowers), containing 20% propylene glycol, were placed in the FADOE octagons for 72 h at the beginning and end of each field season (when no *Brassica nigra* plants were present) to record background pollinator numbers and determine whether air pollutants had a direct effect on pollinators entering the octagons. Potential insect pollinators within pan traps were identified to Genus or the most precise taxonomic resolution possible, which included seven Genera (Sphecodes, Tachina, Lasioglossum, Andrena, Apis, Halictus, Hylaeus), 14 Families (Anthomyiidae, Calliphoridae, Muscidae, Sarcophagidae, Syrphidae, Tachinidae, Vespidae, Halictidae, Acartophthalmidae, Apoidea, Bibionidae, Pieridae, Tenthredinidae, Tephritidae) and one Order (Lepidoptera).

2.5. Yield assessments

2.5.1. Experimental plants

After plants stopped flowering, they were removed from the FADOE octagons, and left to mature in an insect mesh-covered polytunnel before being harvested. Once mature, the number of developed and undeveloped pods were counted on the third raceme up from the main stem of each plant. Pod development was calculated using equation (1).

$$\text{Pod development } (\%) = \left(\frac{\text{Number of developed pods}}{\text{Number of developed pods} + \text{Number of undeveloped pods}}\right) \times 100 \quad (1)$$

For each plant, ten random pods were removed from adjacent racemes, before being oven dried (at 70 °C) and weighed. Their seeds were removed, counted, and weighed. The aboveground part of the plant was cut to ground level, oven dried and weighed, before being threshed to separate seeds, which were subsequently counted and weighed. 1000-seed mass was calculated for each plant using equation (2).

$$1000 \text{ seed mass } (\text{g}) = \left(\frac{\text{Total mass of seeds } (\text{g})}{\text{Total number of seeds}}\right) \times 1000 \quad (2)$$

2.5.2. Control experiment 3 – Quantifying the direct effects of air pollution on plant yield

In 2019, 10 additional *B. nigra* plants were netted (using 75 cm × 100 cm organza bags to exclude pollinators) and distributed evenly within each FADOE octagon. These plants acted as yield control (YC) plants to determine whether pollution treatments had a direct impact on *B. nigra* yield. They were therefore cross-pollinated with each other by hand twice weekly to ensure maximum pollination rates for all YC plants. Yield metrics were measured in the same way as the experimental plants. By separating the direct and indirect effects of air pollution on plant yield we were able to establish whether any air pollution-mediated changes in pollinator foraging would be associated with any changes in plant yield metrics.

2.6. Statistical analyses

All analyses were performed using the R statistical interface v4.0.2. General (LMM) and generalized linear mixed effect models (GLMM) using the R package *lme4* (Bates et al., 2014) were used to determine the effects of air pollution treatments on NO_x and O_3 concentrations (LMM), insect pollinator visitation (total number of insects that landed on a flower within the observation unit and individual flower visits flower^{-1} h^{-1}; GLMM), yield metrics (number of seeds per pod, pod mass, % pods developed, 1000-seed mass and plant dry mass; LMM), abundances of individual insect groups (GLMM) and background pollinator numbers recorded from triple pan traps (GLMM). 'Octagon location' nested

within 'Year' were included as random effects in mixed models to minimise issues associated with pseudo-replication and account for spatial and seasonal differences. 'Observer ID' was also included as a random effect in abundance and flower visitation models to account for any bias associated with differences in identification and recording skills between individuals (Westphal et al., 2008). Negative binomial models were used for pollinator abundance and flower visitation. Models for background pollinator numbers and individual insect groups were run using a poisson error distribution. Negative binomial GLMM were also used to determine whether octagon location within the field impacted pollinator abundance and flower visitation frequencies using data collected 6–24 July 2019 (one week either side of the octagon rotation inclusive; Control experiment 1). 'Rotation' (i.e. rotated vs unrotated octagons) and 'Treatment', and their interaction, were included as fixed effects, with 'Octagon location' as a random effect to account for repeated measures. Contrasts of fixed effects (t-statistics based on Satterthwaite's approximation) from model summaries using the R package *lmerTest* (Kuznetsova et al., 2017) were provided for NO_x concentrations, O_3 concentrations, NO:NO_2 and background pollinator numbers to clarify their responses to the elevated pollution treatments relative to the control treatment.

3. Results and discussion

3.1. Pollutant concentrations within Free-Air Diesel and Ozone Enrichment octagons

Fumigation in the single pollutant octagons resulted in significant increases of O_3 to 35.2 ± 0.6 ppb ($P < 0.001$) and of NO_x to 59.6 ± 1.0 ppb (NO = 38.5 ± 0.8 ppb, NO_2 = 21.2 ± 0.3 ppb; $P < 0.001$), relative to the control octagons (values are means (±SE) over the entire experimental period during the two summer seasons of 2018 and 2019; Fig. 1B). These levels were well below the current United States Environmental Protection Agency's National Ambient Air Quality Standards (O_3 = 70 ppb averaged over 8 h, NO_2 = 53 ppb averaged annually, values for NO are not stipulated), which specify the maximum outdoor pollutant levels for public health and environmental safety (EPA, 2021). In the combined pollutant octagons, the same amount of each pollutant was emitted as for the single pollutant octagons, yet O_3 concentrations achieved were equivalent to those in the control octagons. Moreover, NO_x concentrations decreased in the combined pollutant octagons compared with the diesel exhaust-only octagons, associated with a significant reduction in NO:NO_2 (Fig. 1B; statistical results in Table S1). NO_x and O_3 in the troposphere commonly react with each other and, depending on local quantities of NO_x, VOCs and O_3 catalysts (in particular reactive hydrogen species such as hydroxyl and hydroperoxyl radicals), NO_x emissions can lead to both the formation and destruction of O_3. O_3 is typically lower in urban areas or next to busy roads because it reacts with NO_x from vehicle exhaust emissions (Bae et al., 2020). For example, mean hourly concentrations of NO_x and O_3 next to the M25 motorway in Staines, UK were recorded as 84.5 and 12.5 ppb, respectively, and those recorded in an M25 motorway tunnel were 479.9 and 1.5 ppb, respectively (Sayegh et al., 2016). In the current study, it appears that the reaction between NO_x and O_3 in the combined treatment resulted in a decrease in the ratio of NO to NO_2 compared with the diesel exhaust-only treatment because O_3 reacts with NO to produce NO_2 (Richmond-Bryant et al., 2017), which also explains why O_3 concentrations were depleted in the combined treatment relative to the O_3-only treatment. This complex interplay between oxidative pollutants is likely to alter the fate of biogenic VOCs and, in turn, influence the behavior of odor-dependent insects, highlighting the importance of using realistic pollution concentrations and combinations when investigating the

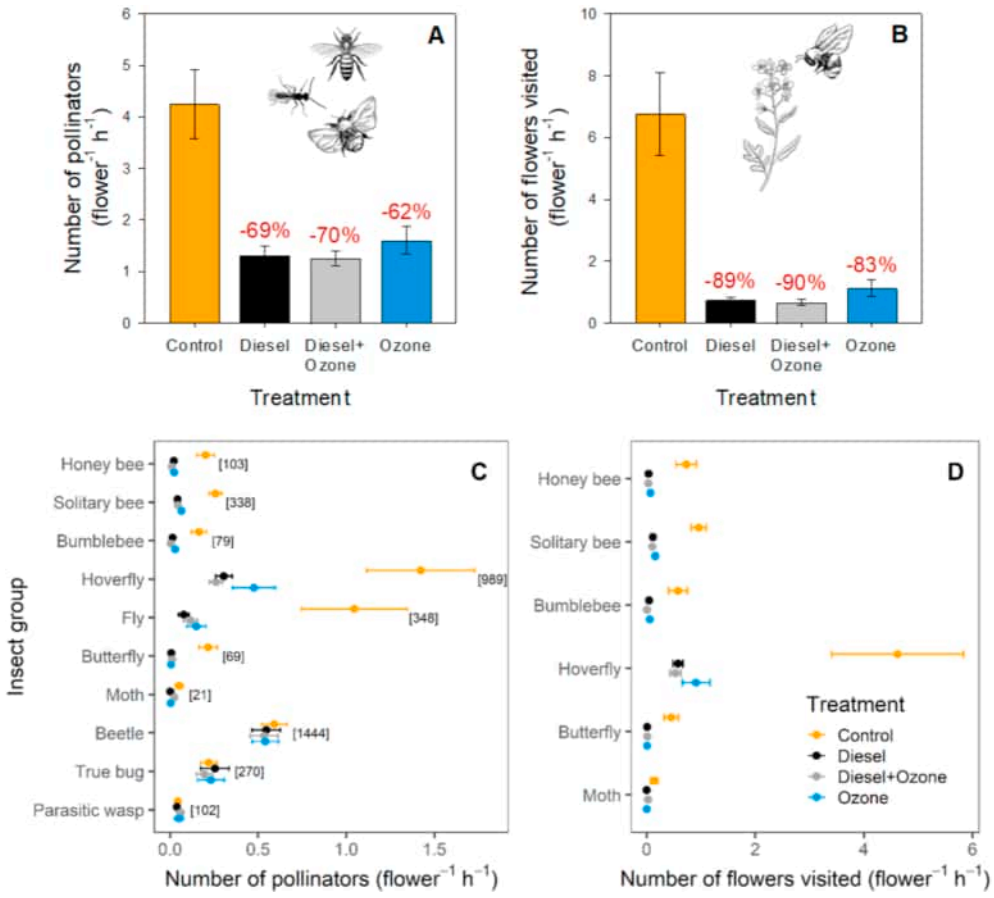

Fig. 2. The effects of diesel exhaust and ozone pollution on pollinator foraging behavior. Means (±SE) of pollinator abundance (A), flower visitation frequencies (B), abundances per insect group (C) and flower visits per insect group (D) were scaled according to the number of flowers within each observation unit and survey duration. For part C, numbers in square brackets represent the total number of individuals counted for each group. If an insect landed on a flower within the observation unit, that insect was counted as '1' for abundance. If that same insect landed on five flowers within the observation unit, the number of flower visits was recorded as '5'. Flower visitation (B and D) was recorded for bees, hoverflies, butterflies and moths only.

effects of air pollution on plant–insect communication processes (Blande, 2021).

3.2. Air pollution effects on insect pollinator abundance and flower visitation

In both diesel exhaust and O_3 treatments, individually and in combination, we recorded dramatic reductions in pollinator numbers ($\chi^2_{3,8} = 21.52$, $P < 0.001$, $N_{obs} = 352$) and flower visitation ($\chi^2_{3,8} = 35.74$, $P < 0.001$, $N_{obs} = 352$), by more than 62% (Fig. 2A) and 83% (Fig. 2B), respectively. Differences in pollinator and flower visitation frequencies between octagons remained consistent when pollutants were rotated between octagons (Treatment:Rotation $\chi^2_{3,11} = 0.36$, $P = 0.949$ and $\chi^2_{3,11} = 1.30$, $P = 0.729$, respectively; Control experiment 1), indicating that placing the octagons opposite each other in the field was sufficient to account for spatial changes in insect pollinator activity. Abundances of background pollinators (i.e. those attracted to only visual stimuli when *B. nigra* were not present in the octagons; Control experiment 2) did not vary significantly between treatments (Table S2), providing no evidence to suggest that pollinating insects were inhibited from entering the pollution octagons when floral odor cues were not a factor. While this control does not rule out the potential for air pollution to directly impair pollinator health (Leonard et al., 2019; Reitmayer et al., 2019; Thimmegowda et al., 2020) or for higher short-term (peak) concentrations to directly impair motility (Vanderplanck et al., 2021), it suggests that the observed changes in pollinator foraging behavior between treatments were most likely to be associated with changes in their attraction to plant-emitted VOCs, including floral odors, providing field-based validation and quantification of studies previously limited to laboratory conditions (Farré-Armengol et al., 2016; Girling et al., 2013; McFrederick et al., 2008).

3.3. Responses of insect pollinator groups to air pollution

To assess the impacts of air pollution on ecological processes and natural capital, it must be understood how pollutants affect different insect groups and species at field scales (Jamieson et al., 2017; Pinto et al., 2010). We found differing responses to air pollution between insect groups (Fig. 2C and D; Table S3). Air pollution treatments reduced the abundance of seven pollinator groups, which included all bees (i.e. honey bees, solitary bees and bumblebees), all flies (i.e. hoverflies and other flies), butterflies and moths. These seven groups were responsible for driving the air-pollution mediated decreases in total pollinator abundance and each group showed similar responses to air pollution, with significantly higher abundances observed in unpolluted (control) octagons (Fig. 2C). Similar effects were observed for the number of flowers visited by bees, hoverflies, butterflies and moths (Fig. 2D). In contrast, the abundances of three groups, including beetles (the vast majority of which were pollen beetles, *Meligethes* spp.), true bugs and parasitic wasps, were not significantly affected by pollution treatments (Fig. 2C; Table S3). Such differences between groups, and likely between different species, are to be expected, because each will utilize a unique combination of different senses and stimuli during foraging. For example, those hoverfly species that possess smaller eyes and, as a result, a greater reliance on odor cues, are likely to be more negatively affected by air pollution than those hoverfly species that rely more on visual stimuli and less on the olfactory environment (McFrederick et al., 2009; Nordström et al., 2017). Furthermore, responses may differ between generalist and specialist species (McFrederick et al., 2009; Verheggen et al., 2008; Whittaker, 2001).

In general, some insect groups or species may be less reliant on those plant VOCs that are more reactive with air pollutants (Fuentes et al., 2016; Khaling et al., 2016; Nordström et al., 2017; Sprayberry, 2018) and a laboratory study has suggested that the tobacco hawkmoth, *Manduca sexta*, may have the capacity to learn to associate air pollution-altered floral odor blends with a food resource (Cook et al., 2020), which, if translated to the field, could potentially mitigate the negative effects of air pollution on pollinator foraging over time. Alternatively, polluted environments may release some groups from competitive constraints and/or increase the abundance of their prey species (Khaling et al., 2016; Verheggen et al., 2008). The variations in response by the different insect groups that we observed demonstrates that in order to elucidate the ecological impacts of air pollution, research in this field needs to investigate the effects of air pollution on community ecology, and move beyond studies focusing only on single species, bi- or tri-trophic interactions, using such studies instead as a tool to elucidate mechanisms once field-scale ecological effects have been identified.

The foraging behaviors of pollinating insects such as bees and hoverflies are likely to be most affected at times of peak pollution levels, such as on hot summer days and at times of peak daily traffic adjacent to major roads or in urban areas. Phillips et al. (2021), for example, demonstrated lower densities of insect pollinators closer to roads, which is also where concentrations of pollutants are greatest. High concentrations of NO_x next to major roads tend to return to background concentrations at approximately 100 m away from the road (Bignal et al., 2007). While fresh emissions of NO_x can slow the formation of O_3, emitted NO_x can also lead to O_3 formation later and further downwind (Bae et al., 2020; Sayegh et al., 2016), which as a result may deleteriously affect some insect species or communities, but not others. Therefore, further studies incorporating wider spatial scales across landscapes will be important to facilitate predictions of how insect communities respond to field-realistic concentrations of air pollution. Such landscape-scale studies will face additional challenges because it will be difficult to account for spatial and temporal variation, but they have the potential to provide more realistic measurements of insect foraging that could help to identify potential ecological risks. Therefore, coupling these wider field-based approaches with more controlled field studies

Table 1
The effects of diesel exhaust and ozone pollution on yield metrics of *Brassica nigra*. Statistical values in brackets represent pollution treatment effects on yield control (YC) plants. Values in bold indicate statistical significance ($P < 0.05$). $N_{obs} = 383$ and 80 for experimental plants and YC plants, respectively. Random models include 'Year/Octagon location' ($N = 16$) for experimental plants and 'Octagon location' for YC plants ($N = 8$).

Response variable	Treatment				Statistical analysis	
	Control	Diesel	Diesel+Ozone	Ozone	$\chi^2_{3,7(3,6)}$	P
Seeds per pod	9.49 ±0.28	6.74 ±0.21	6.59 ±0.22	7.36 ±0.24	**15.05** (3.27)	**0.002** (0.352)
Pod mass (g)	0.058 ±0.003	0.041 ±0.002	0.042 ±0.002	0.043 ±0.002	**11.13** (1.96)	**0.011** (0.581)
Pods developed (%)	51.46 ±1.40	43.92 ±1.10	42.59 ±1.19	44.51 ±1.11	**16.76** (1.53)	**< 0.001** (0.676)
1000-seed mass (g)	2.40 ±0.08	2.50 ±0.08	2.44 ±0.08	2.29 ±0.08	4.04 (0.95)	0.258 (0.814)
Plant dry mass (g)	14.31 ±0.45	12.93 ±0.50	12.98 ±0.77	12.88 ±0.70	0.71 (2.48)	0.870 (0.478)

(such as the current study) and mechanistic laboratory studies, which can identify behaviorally-important VOCs that different species or groups rely on, will be essential for developing a complete understanding of how ecosystems respond to air pollution as we shift away from NO_x emission sources.

3.4. Air pollution effects on yield metrics of a self-fertile plant

Reductions in flower visitation under pollution treatments coincided with significant decreases in *B. nigra* seed metrics (Table 1). *Brassica nigra* is an O_3-tolerant plant (Saunier and Blande, 2019) that is commonly found alongside major roadways and has been used as a model species for investigating plant–insect responses to multiple environmental stressors (Papazian and Blande, 2020 and references therein). The self-fertile variety used in this study was not reliant on pollination for seed development, yet we observed a 14–31% reduction in some seed metrics under pollution treatments. This suggests that plant species more reliant on insect pollination, and especially those that are ecologically specialized on a single pollinator taxon (Bennett et al., 2020), may be even more severely affected. Seed metrics of 'yield control' *B. nigra*, i.e. those plants placed in each octagon that were netted and hand-pollinated to ensure maximum pollination (Control experiment 3), did not vary significantly between treatments (Table 1). This indicates that being in a polluted environment was not the cause of the reductions in seed metrics observed in experimental plants and that reductions were almost certainly a result of changes in pollination rates. Air pollution can directly impact the health of many plant species, including some food crops, which can cause reduced yields (Papazian and Blande, 2020) and these results suggest that air pollution can further reduce yields through reduction of insect-mediated pollination.

4. Conclusions

Our study indicates that air pollutants, at levels currently deemed by legislation to be safe for the environment, can cause significant reductions in flower visitation, by key insect pollinator groups, resulting in significant changes in metrics of plant yield. That is to say, air pollutants reduce insect-provided pollination services. Our results imply that these changes are caused by the reactions of floral VOCs with air pollutants, altering pollinating insect species' perceptions of these floral VOC profiles, supporting and validating the findings of previous laboratory investigations. However, VOCs are used ubiquitously by plants and insects for communication and for perception of their environments. Therefore, the implications of our findings are anticipated to extend beyond effects on pollinators and pollination services, and future studies should prioritize investigations into the broader ecological and economic consequences of VOC-communication disruption by common tropospheric pollutants. Our findings indicate that there is an urgent need for research that investigates the wider potential of air pollutants to disrupt the many insect-mediated ecological processes and ecosystem services upon which humans and nature rely.

Funding

This research was funded by a Natural Environment Research Council grant awarded to RDG (NE/P002404/1) and EN (NE/P001971/2).

Data availability

Data are available at the EIDC repository (https://doi.org/10.5285/d2e0cf65-010c-4206-8302-195449d0acba).

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We thank Richard Casebow, Caroline Hadley, Kaan Alkan, Tom Staton and Fiona Gierer for help with FADOE construction, and AMOF for the loan of NO_x and O_3 analyzers.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.envpol.2022.118847.

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nature communications

Article

https://doi.org/10.1038/s41467-024-49729-5

Air pollution disproportionately impairs beneficial invertebrates: a meta-analysis

Received: 29 November 2023

Accepted: 18 June 2024

Published online: 11 July 2024

Check for updates

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Air pollution has the potential to disrupt ecologically- and economically-beneficial services provided by invertebrates, including pollination and natural pest regulation. To effectively predict and mitigate this disruption requires an understanding of how the impacts of air pollution vary between invertebrate groups. Here we conduct a global meta-analysis of 120 publications comparing the performance of different invertebrate functional groups in unpolluted and polluted atmospheres. We focus on the pollutants ozone, nitrogen oxides, sulfur dioxide and particulate matter. We show that beneficial invertebrate performance is reduced by air pollution, whereas the performance of plant pest invertebrates is not significantly affected. Ozone pollution has the most detrimental impacts, and these occur at concentrations below national and international air quality standards. Changes in invertebrate performance are not dependent on air pollutant concentrations, indicating that even low levels of pollution are damaging. Predicted increases in tropospheric ozone could result in unintended consequences to global invertebrate populations and their valuable ecological services.

Many of the essential ecosystem services that nature provides, including nutrient cycling, pest control, pollination, and the maintenance of soil structure and fertility, are reliant on the actions of invertebrate species[1]. However, globally, invertebrate populations are fundamentally threatened by a range of human activities including land use change, the introduction of alien invasive species, and air pollution[2]. Common air pollutants, derived from anthropogenic origins, can cause significant reductions in invertebrate fitness[3–7]. Air pollutants can have direct impacts by inducing changes at physiological and molecular levels[8–11]. They can also have indirect impacts by inducing changes to the nutritional status of host plants, or by disrupting odor-mediated navigation and communication[7,12–15] through chemical reactions that modify odor cues and signaling compounds (volatile organic compounds [VOCs]). To-date, research on the impacts of air pollution on invertebrates has focused on either individual species or the interactions between two species in controlled laboratory or field studies, with little understanding of wider landscape-scale impacts. While previous meta-analyses have synthesized the effects of a number of air pollutants on invertebrates[3,16–21], no studies have identified how we could effectively predict the broad impacts of air pollution across invertebrate communities. Relative to other factors contributing to the decline of invertebrate populations, this knowledge gap highlights a significant lack of understanding about the extent and consistency of air pollution impacts across all invertebrate groups. This means that it is not yet possible to estimate the potential impacts of air pollution on insect-provisioned ecosystem services and disservices.

Air pollutants that are elevated as a result of anthropogenic activity, including ozone (O_3), sulfur dioxide (SO_2), nitrogen oxides (NO_x, comprising nitric oxide [NO] and nitrogen dioxide [NO_2]) and respirable suspended particulate matter (PM), can all alter the abundance, health, and distribution of invertebrates[3–7,21,22]. Concentrations

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of tropospheric O_3, produced in photochemical reactions between NO_x and VOCs[23], have more than doubled from pre-industrial times and the frequency of high-O_3 episodes is projected to increase in the coming decades[24,25]. Nitrogen oxides are emitted predominantly by combustion engine vehicles and, despite legislation and a transition towards electric vehicles, will continue to be an important air pollutant due to the long average lifespans of combustion engine vehicles (>20 years)[26]. SO_2 is primarily released from the burning of fossil fuels, especially coal, for energy generation and domestic heating[27]. Complex reactions of chemicals, including SO_2 and NO_x, form fine particles respirable by humans, or PM, which are most prevalent in industrial, urban, and high-traffic areas[28]. Elevated levels of PM have also been linked to an increase in wildfires as a result of human-induced climate change, with significant repercussions for rural areas[29]. Studies have investigated the effects of each of these pollutants on the performance of a range of invertebrate species (Supplementary Data 1), but without comparisons of impacts between groups, it is difficult to predict which are most at risk.

Here, we conduct a multi-level meta-analysis to identify simple and generalizable ways to understand the variation in how invertebrate performance responds to air pollution. Understanding what can be generalized is essential because knowledge of the diversity of responses of invertebrate groups to air pollutants globally remains limited. Functional trait-based approaches (i.e. identifying characteristics shared between species) facilitate holistic predictions into how invertebrate communities respond to environmental change, but they are underutilized in general, especially in the context of air pollution[30–32]. We quantify the effects of air pollution on invertebrate performance (with respect to individual species, populations, and communities of invertebrates), defined broadly as invertebrate abundance, feeding efficiency, growth/development, survival, searching efficiency, diversity, and reproduction, by calculating the ratio of invertebrate performance in control conditions and in elevated pollutant conditions. This allows us to combine the results of experimental studies across 120 publications (Supplementary Data 1, Supplementary Fig. 1), four air pollutants, over forty invertebrate families, and a total of 877 effect sizes across 19 countries (Fig. 1). We compare the extent to which different predictors explain variation in the effects of air pollution on invertebrate performance; these predictors include different levels of invertebrate taxonomic classification, different ways of measuring their functional characteristics, and the plant species that the invertebrates were interacting with in each experimental study (Tables 1 and 2, Supplementary Note 3). For example, the category 'pest status' comprises of beneficial invertebrates (i.e. those providing ecological and economic benefits to humans in the form of decomposition, pollination, and pest control services), significant pest invertebrates (i.e. those appearing in at least one of three global databases of economically important plant pests) and other herbivores (i.e. those not included in these databases and not considered economically beneficial). See the "Methods" section for full details on classifications. We focus on invertebrate responses to individual air pollutants because interactions between pollutants are complex, and only a handful of empirical studies[13,15,32–36] exist on invertebrate responses to mixtures of pollutants. We also explore whether the effects of air pollutants on invertebrate performance vary with pollutant concentration, to understand the potential role of mitigation strategies. This study offers insights into the complex interactions between air pollution and different invertebrate groups, the results of which can inform future policies to regulate air pollution and the development of management plans to mitigate the effects on those most vulnerable invertebrate groups. We show that beneficial invertebrates, such as pollinators and natural pest regulators, which are essential for food security, are adversely affected by air pollution. Conversely, air pollution has no impact on herbivore pest invertebrates. Of the four pollutants, tropospheric ozone has the most detrimental effect on beneficial invertebrates, impairing their performance even at low concentrations.

Results

Effects of air pollution on invertebrates

Elevated concentrations of air pollution (i.e. all pollutants considered together) reduced the performance of beneficial invertebrates by 31.3% compared with control conditions (confidence interval (CI) = 22.2–39.3%, $P < 0.001$) while, in contrast, the performance of significant pest invertebrates (CI = −8.3% to 8.4%, $P = 0.924$) and other herbivores (CI = −6.7% to 14.0%, $P = 0.435$) was unaffected by air pollution (Fig. 2A).

Detritivores, pollinators, and parasitoids were all negatively affected (21–39% reductions in performance) while all herbivorous guilds were either unaffected or responded positively to air pollution (Fig. 3A). These relatively simple predictors (i.e. pest status and feeding guild; see methods and Supplementary Note 3 for detailed classifications) explained 10% and 15% of variation in the response of invertebrates to elevated concentrations of air pollution across the different

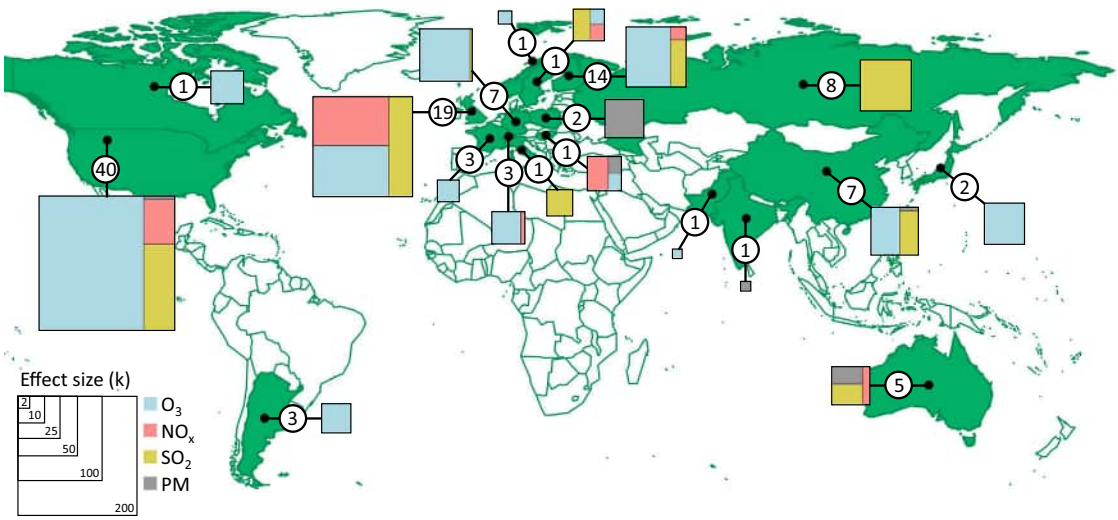

Fig. 1 | Geographical distribution of studies included in the meta-analysis. For each included country (highlighted green), the total number of publications (circled) is shown. Map and centroids (points) for each country used the Natural Earth data set with the R package 'maps'. The treemaps (produced by the R package 'treemap') shown for each country are scaled by the total number of effect sizes and indicate the proportion of effect sizes per pollutant.

https://doi.org/10.1038/s41467-024-49729-5

Table 1 | Summary of predictors (moderators) of responses of invertebrate performance to elevated concentrations of air pollution (i.e. overall effects of all four air pollutants: Ozone, nitrogen oxides, sulfur dioxide and particulate matter)

Moderator	Categories	df	LRT	*P*	R^2
Pest status	Beneficial, Significant pest. Other herbivore	3, 860	25.60	<0.0001*	0.103
Feeding guild	Borer/miner, Cell-feeder (includes phloem-feeders), Chewer, Detritivore, Pollinator, Parasitoid, Predator	7, 814	39.11	<0.0001*	0.146
Invertebrate Order	Acari, Astigmata, Chilopoda, Coleoptera, Collembola, Diplopoda, Diptera, Haplotaxida, Hemiptera, Homoptera, Hymenoptera, Lepidoptera, Mesostigmata, Orbatida, Orthoptera, Prostigmata, Psocoptera, Thysanoptera, Trombidiformes	19, 795	40.71	0.0017*	0.167
Invertebrate Family	See Supplementary Information for full list	37, 721	59.35	0.0085*	0.176
Lifestage	Adult, Egg, Larva, Multiple, Nymph, Pupa	6, 746	2.04	0.844	0.007
Winged	No, Yes, Both	3, 711	3.81	0.149	0.015
Diet specialization	Generalist, Specialist	2, 693	1.66	0.198	0.011
Plant Order	Asterales, Brassicales, Caryophyllales, Cucurbitales, Dipsacales, Fabales, Fagales, Gentianales, Lamiales, Magnoliales, Malpighiales, Malvales, Pinales, Poales, Polypodiales, Rosales, Sapindales, Solanales	19, 701	21.96	0.234	0.104
Plant Family	See Supplementary Information for full list	20, 700	23.57	0.213	0.102
Annuality	Annual, Biennial, Perennial	3, 689	1.80	0.408	0.011
Plant type	Monocot (Angiosperm), Dicot (Angiosperm), Gymnosperm	3, 718	2.15	0.342	0.014

Statistics presented are likelihood ratio test comparisons between a uni-moderator model and a nested null model containing only random effects and marginal R^2 of the uni-moderator model. Significance indicated by *$P < 0.05$.

Table 2 | Summary of predictors (moderators) of responses of invertebrate performance to elevated concentrations of four individual air pollutants: Ozone (O_3), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and particulate matter (PM)

Moderator	O_3			NO_x			SO_2			PM		
	df	*P*	R^2	df	*P*	R^2	df	*P*	R^2	df	*P*	R^2
Pest status	3,468	<0.0001*	0.113	3,86	0.016*	0.140	3,242	0.041	0.079	3,55	0.091	0.162
Feeding guild	7,446	<0.0001*	0.171	4,65	0.0009*	0.374	5,217	0.176	0.087	2,50	0.620	0.012
Invertebrate Order	11,441	0.032*	0.119	5,60	0.071	0.341	15,224	0.083	0.233	5,53	0.216	0.154
Invertebrate Family	25,399	0.005*	0.225	5,57	0.012*	0.363	18,200	0.456	0.141	5,49	0.199	0.069
Lifestage	4,422	0.912	0.004	4,85	0.475	0.051	6,177	0.116	0.106	4,50	0.807	0.008
Winged	3,379	0.364	0.018	3,83	0.497	0.031	3,185	0.540	0.028	3,55	0.734	0.052
Diet specialization	2,388	0.685	0.002	2,48	0.309	0.042	2,198	0.150	0.028	–	–	–
Plant Order	17,423	0.212	0.138	8,63	0.082	0.441	7,157	0.422	0.100	3,42	0.011*	0.491
Plant Family	18,422	0.080	0.172	8,63	0.082	0.441	6,158	0.308	0.100	3,42	0.011*	0.491
Annuality	3,403	0.634	0.008	2,69	0.140	0.143	2,168	0.752	0.002	2,43	0.125	0.011
Plant type	3,432	0.972	0.001	3,68	0.891	0.002	3,167	0.125	0.074	2,43	0.184	0.106

Statistics presented are likelihood ratio test comparisons between a uni-moderator model and a nested null model containing only random effects and marginal R^2 of the uni-moderator model. Significance indicated by *$P < 0.05$.

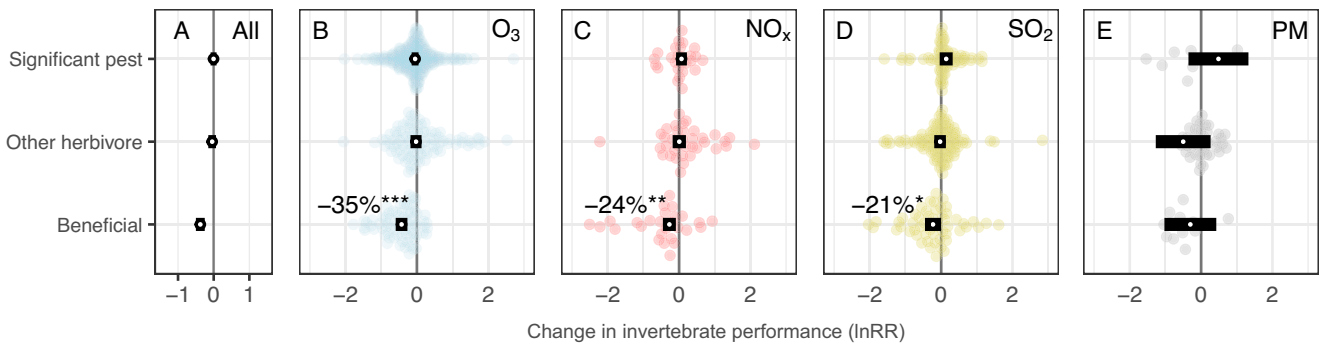

Fig. 2 | The effects of air pollution on pest and beneficial invertebrate performance. Orchard plots of meta-analytic mean effect sizes (ln RR; log response ratio) for each of three levels of invertebrate pest status. White points represent meta-analytic means and black rectangles represent the 95% confidence intervals from a model across all pollutants (**A**) or individual pollutants (**B**–**E**; ozone (O_3), nitrogen oxides (NO_x), sulfur dioxide (SO_2) and particulate matter (PM), respectively). Points to the left of zero indicate negative impacts and points to the right indicate positive impacts. 95% confidence intervals overlapping the zero line indicate the mean estimate is not significantly different from zero ($P < 0.05$). Significant effects of O_3, NO_x, and SO_2 are indicated by ***$P < 0.0001$, **$P = 0.004$ and *$P = 0.046$, respectively. Number of effect sizes for significant pests, other herbivores, and beneficial invertebrates (top to bottom): All (415, 282, 166), O_3 (302, 95, 74), NO_x (26, 36, 27), SO_2 (80, 111, 54), PM (7, 40, 11). Source data are provided as a Source Data file.

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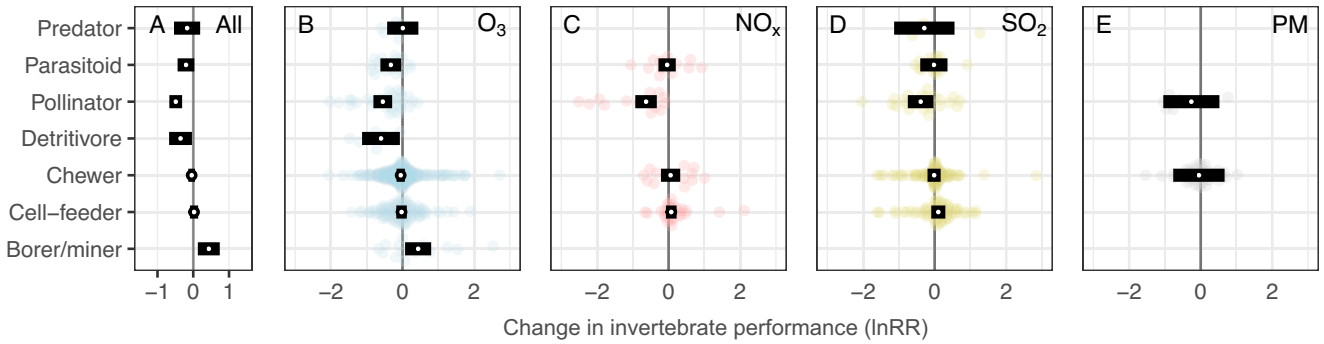

Fig. 3 | The effects of air pollution on the performance of invertebrates from different feeding guilds. Orchard plots of meta-analytic mean effect sizes (lnRR; log response ratio) for up to seven invertebrate feeding guilds. Model estimates for each feeding guild calculated from less than three studies were not included. White points represent meta-analytic means and black rectangles represent the 95% confidence intervals from a model across all pollutants (**A**) or individual pollutants (**B**–**E**; ozone (O_3), nitrogen oxides (NO_x), sulfur dioxide (SO_2) and particulate matter (PM), respectively). Points to the left of zero indicate negative impacts and points to the right indicate positive impacts. 95% confidence intervals overlapping the zero line indicate the mean estimate is not significantly different from zero ($P < 0.05$). Number of effect sizes from top to bottom: All (10, 47, 80, 24, 428, 210, 22), O_3 (5, 18, 34, 7, 263, 111, 15), NO_x (12, 14, 12, 31), SO_2 (4, 17, 25, 108, 68), PM (7, 45). Source data are provided as a Source Data file.

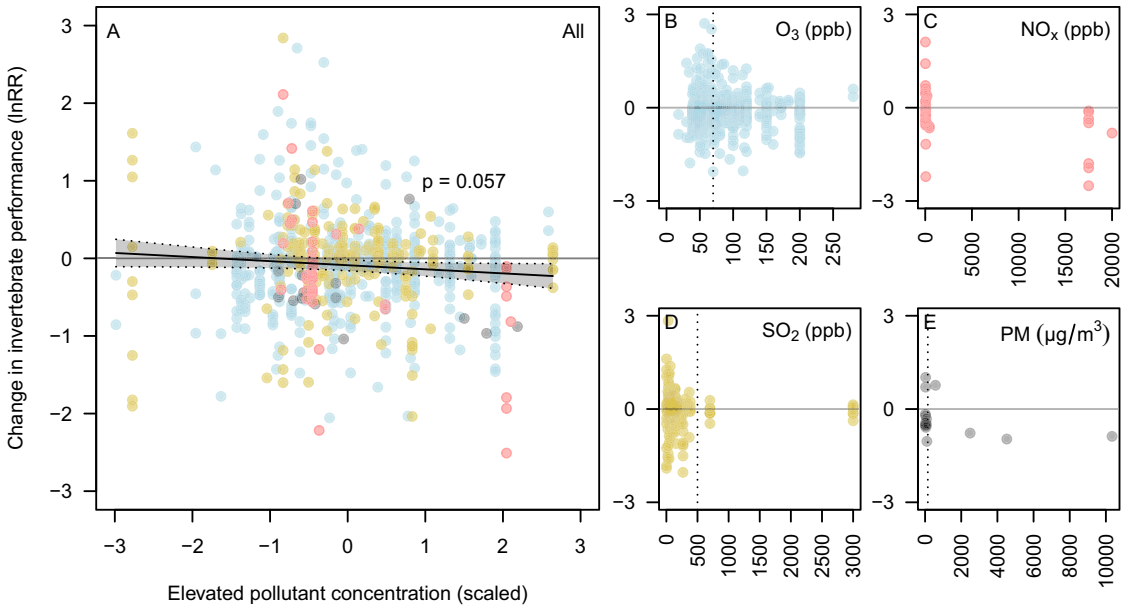

Fig. 4 | The relationship between air pollutant concentration and changes in invertebrate performance. Panel **A** line shows the relationship between the change in invertebrate performance in control and elevated treatments (log response ratio, ln RR) and the scaled concentration of pollution in the elevated treatment (z-transformed within each pollutant type) from meta-regression model. Shaded area shows a 95% confidence interval and *P*-value is for the slope. **B**–**E** Scatter plots showing the relationship between ln RR and the (unscaled) concentration of elevated pollutant treatment for each pollutant. NO_x panel combines NO, NO_2, and NO_x. Dashed vertical lines illustrate the highest National Ambient Air Quality Standards (NAAQS) per pollutant set by the United States Environmental Protection Agency. Levels for NO_x ($NO + NO_2$) are not stipulated, but the NAAQS hourly daily maximum concentrations for NO_2 is 100 ppb. Source data are provided as a Source Data file.

pollutants tested (marginal R^2 see ref. 37; Table 1). Searching efficiency was the most negatively affected aspect of invertebrate performance across all pollutants and was reduced by a third on average when invertebrates were exposed to elevated air pollution treatments (CI = 20–44% reduction, $P < 0.001$; Supplementary Fig. 2A). The diversity of invertebrates was also significantly reduced across all pollutants ($P = 0.024$).

Effects of individual pollutants

The effects of air pollution on invertebrate performance varied between pollutants, with O_3 and NO_x having the greatest negative impacts; reducing the performance of all invertebrates by an average of 10.4% and 11.1%, respectively, in comparison to 1.6% and 18.6% reductions following exposure to SO_2 and PM. These differences between pollutants increased when considering their divergent impacts on pests and beneficial invertebrates, with O_3 having the most detrimental impacts on those invertebrates that provide ecological and economic benefits to humans (Fig. 2B–E).

Over half of the available effect sizes measured the response of invertebrates to O_3 (number of effect sizes: $O_3 = 478$, $SO_2 = 245$, $NO_x = 96$, and PM = 58). Pest status and feeding guild ($R^2 = 11\%$ and 17%, respectively; Table 2) were important predictors of invertebrate responses to elevated concentrations of O_3 (Figs. 2B and 3B). Ozone reduced the performance of beneficial invertebrates by 35% ($P < 0.001$) but had no impact overall on significant pests ($P = 0.292$) or other herbivores ($P = 0.740$). Breaking down the responses by feeding guild,

O_3 reduced the performance of pollinators ($P < 0.001$), parasitoids ($P = 0.027$), and detritivores ($P = 0.025$) by 42%, 28%, and 45%, respectively, while having no significant effect on predators, chewers or cell-feeders. In contrast, the performance of invertebrate borers/miners increased by 55% (Fig. 3B). Less generalizable predictors, including invertebrate families ($R^2 = 23\%$), and the plant species they were associated with during exposure ($R^2 = 17\%$), explained more variation in response to O_3, but we note that these predictors have 25 and 18 levels, respectively (Table 2). O_3 pollution affected searching efficiency most negatively, reducing it by 34% compared to control treatments ($P < 0.001$). Ozone pollution also had significant negative effects on invertebrate reproduction (17%, $P = 0.013$) and abundance (14%, $P = 0.034$) (Supplementary Fig. 2B).

The performance of beneficial invertebrates was reduced by an average of 24% ($P = 0.004$) following exposure to NO_x, while significant pests and other herbivores were unaffected ($P = 0.375$ and 0.945, respectively; Fig. 2C). More than 40% of the variation in the response of invertebrates to NO_x was explained by the plant Order or plant Family they were associated with at the time of exposure (Table 2). Moreover, the experimental method by which invertebrates were exposed to NO_x also changed the response ($P = 0.037$, df = 4,92; $R^2 = 0.27$), with the controlled field free-air enrichment (FAE) method tending to show a more negative impact compared with field, laboratory (lab) and open top chamber (OTC) methods (Supplementary Note 4). NO_x pollution had greater negative effects on invertebrate survival than other aspects of invertebrate performance, reducing survival by 90%, although there was large uncertainty in this estimate (CI = 35–98%, $P = 0.016$). NO_x pollution also negatively affected searching efficiency, reducing this by 44% on average ($P = 0.002$; Supplementary Fig. 2C).

Pest status had a weak significant effect ($P = 0.041$) on the performance of invertebrates exposed to SO_2 (Table 2), whereby beneficial invertebrate performance decreased by 21% ($P = 0.046$) compared with significant pests ($P = 0.130$) and other herbivores ($P = 0.714$). In general, responses to SO_2 were highly variable, making it difficult to explain variation in these responses with generalizable predictors; the predictors with the most explanatory power for SO_2 impacts were invertebrate Order and Family ($R^2 = 23\%$ and 14%, respectively) but these factors have 15 and 18 levels and did not significantly improve model explanatory power (Table 2). SO_2 had a marginally significant negative effect on the diversity of invertebrates, reducing this by 26% ($P = 0.043$), but did not cause significant changes in other aspects of invertebrate performance (Supplementary Fig. 2D).

We found no evidence that beneficial invertebrates were disproportionately affected by PM (Fig. 2E) or any differences in response between feeding guilds (Fig. 3E; Table 2) but it is important to note the comparatively small number of effect sizes available for PM. Our results indicate that the effects of PM are driven by the plant Order or Family that the invertebrates are associated with (Table 2; values for plant Order and plant Family are identical for PM because these have the same levels).

Effects of pollutant concentration

Air pollution exerted detrimental impacts of a similar magnitude regardless of the concentration to which the pollutants were elevated; we found only a weak and marginally significant relationship between the concentration of elevated pollutant treatments and change in invertebrate performance relative to control conditions (Fig. 4; overall slope across pollutants $P = 0.057$, or 0.045 if imputed ambient concentrations were excluded from 9 studies; Supplementary Note 6). This was maintained when considering the relationships between concentration and effect size separately for significant pests, other herbivores, and beneficial invertebrates (e.g. an interaction term between elevated concentration and pest status, $P = 0.882$, or 0.537 when excluding imputed studies) and for individual pollutants. Likewise, we found no difference in the effect of elevated pollutant concentrations or in the overall effect size between studies that used a filtered air (zero pollution) control and those that used an ambient control (Supplementary Note 5). Many publications did not report information about the concentrations of air pollution tested, with 85 and 107 effect sizes missing information for elevated and control conditions, respectively.

Discussion

Oxidizing air pollutants impair beneficial invertebrates

Our study identified disproportionate impacts of O_3, NO_x, and SO_2 on those beneficial invertebrates that provide the essential ecosystem services of pollination, pest control and nutrient cycling to human society. The potential threats to food security from these impacts are accentuated because, in contrast, we found no evidence that invertebrate pest species are negatively impacted by these or other air pollutants. Pollination services account for 5–8% (US$235–577 billion in 2015) of the total global value of agricultural food production[38], and more than 70% of all crop species benefit from pollination by invertebrates[39]. The economic importance of natural pest control (i.e. trophic regulation of pest populations) and nutrient cycling services is more poorly understood, but the former was valued in 2006 at ~$6 billion annually in the US alone[40]. Air pollution has not previously been considered an important driver of declines in beneficial invertebrates, which face a range of environmental pressures (e.g. agricultural intensification, climate change, and introductions of invasive species[41,42]). However, our synthesis of previously disparate evidence implicates air pollution as a significant and overlooked contributor to these declines.

Air pollution impacts on invertebrate performance are not concentration-dependent

Of significant concern is that even moderate levels of air pollution impaired the performance of beneficial invertebrates; we found only a weak (and marginally significant) relationship between the change in invertebrate performance and the concentration of pollution that was applied in the elevated treatment. We did not identify an effect of concentration when we modeled responses separately for significant pests, other herbivores, and beneficial invertebrates for the different pollutants individually, or when we accounted for the level of pollution in the control (baseline) treatment. This corroborates our previous findings in a field experiment with NO_x and O_3, in which we demonstrated significant reductions in flower visitation even with relatively minor increases in pollutant concentration[13]. Beneficial invertebrate populations and the services they provide are, therefore, likely to continue to decline if the current trends of air pollution persist[43]. Any future reductions in NO_x in urban environments and polluted rural areas (e.g. those next to major roads), as a result of policy changes and shifts away from combustion engine vehicles, may result in increased O_3 concentrations due to a reduction in O_3 quenching by NO_x[23,44]. This interaction between pollutants is of concern because our analysis suggests that O_3 is particularly detrimental to the performance of beneficial invertebrates, and consequently, this is likely to affect the services they provide. While our results provide clear conclusions as to the impacts of individual pollutants applied in experimental settings, there are currently few studies into the effects of co-occurring air pollutants[13,15,32–36], and how these pollutants interact at the different mixing ratios that could result from current and future emissions scenarios. Regardless of whether the decrease of some pollutants (e.g. NO_x) may exacerbate others (e.g. O_3) in the short term (see ref. 45), all three oxidizing air pollutants impaired the performance of beneficial invertebrates, demonstrating the need to reduce air pollutant concentrations and fossil fuel dependence.

Mechanistic insights into air pollution-mediated changes in invertebrate groups

We deliberately defined invertebrate performance broadly within our study so as to incorporate different aspects of invertebrate services or

disservices, including invertebrate abundance, reproductive rate, feeding efficiency, and searching efficiency. While we found largely consistent impacts across these measures of performance, there were greater negative effects on searching efficiency (the rate at which an invertebrate can locate food and/or host resources), particularly by O_3 and NO_x pollution. Similarly, we found that beneficial invertebrates and those feeding guilds with a high dependence upon VOCs for food and host location were particularly impacted by air pollution. Air pollutants can chemically alter VOCs, resulting in reductions in foraging success, as demonstrated in previous modeling-, lab- and field-based studies[13,15,46–48]. They can also modify the biosynthetic pathways of plant secondary metabolites, resulting in changes to VOC emissions by plants[49]. There is also emerging evidence that they can cause physiological changes to invertebrate antennae that reduce their sensitivity to VOC cues[10,11]. The majority of parasitoids and pollinators in our study are aerial invertebrate foragers, which, whilst using a combination of senses to locate food resources, often rely on VOC cues for host and patch location, particularly at greater distances[50]. Parasitoids, particularly hymenopteran wasps that forage for an invertebrate host for offspring to develop in, commonly have significant plasticity in their capacity to learn, memorize, and use VOC cues to locate their herbivore hosts[51]. At the same time, predators, which forage for food, tend to be less sensitive to VOCs than parasitoids[21], which may explain the differences in impact that we measured between parasitoids and predatory invertebrates.

Disproportionate impacts of air pollution on the performance of different feeding guilds have the potential to alter community structure, with larger scale impacts upon ecosystem service provision than is captured in studies measuring individual species responses. This is particularly the case where species can have multiple roles in a community; we categorized species into feeding guilds, but this can vary with the composition of the community and over time; the larvae of some pollinators are predators (e.g. some hoverfly species) or pests (e.g. some moths and butterflies). Species-level differences, in combination with a scarcity of data, may explain why we found no significant impacts of NO_x and SO_2 on natural enemies. A recent field study[36] demonstrated that NO_x-mediated effects on parasitoid attraction to plant-released volatiles can be Family- or even species-specific. Some species may be better able to offset air pollution-mediated disruption to navigation than others; for example, the nocturnal pollinator *Manduca sexta* can learn to associate air pollution-altered VOCs with their floral nectar resource[52]. Previous reviews and meta-analysis studies have demonstrated no effects[16–19] or positive effects of air pollution on the performance of herbivores, especially aphids[3,20,21]. In our study, the performance of boring/mining herbivores increased under air pollution (O_3 in particular), likely because they are able to exploit stress-induced increases in plant metabolites or decreases in plant resistance[32,53,54], but we found no overall effect, and significant variation in the performance of the two most abundant feeding guilds: cell-feeding and tissue-chewing herbivores. These classifications incorporate a broad range of species and a non-significant impact at feeding guild scale could be masking species-scale impacts and corresponding changes in community structure due to air pollution. Responses of herbivores to air pollution are known to be complex and highly variable, for example, air pollution can result in stress-related increases of plant secondary metabolites, which herbivores may take advantage of[55,56] or be impaired by[3].

Invertebrate responses to PM are uncertain

Literature on the effects of airborne PM on invertebrates was particularly scarce compared with studies using O_3, NO_x, and SO_2. Airborne PM is often associated with other pollutants (e.g. NO_x), and its chemical components, size, and spatial distribution depend on the source of the particles, making it challenging to quantify[57]. Airborne PM can result in direct negative consequences on pollinator learning, memory and survival[8,10] and recent studies have indicated that PM deposition on the surface of plants negatively affects the feeding efficiency of tissue-chewing herbivores, which may be dependent on the type and quantity of PM accumulation on the plant surface[58,59]. Geographically, studies with PM are focused in Australia but are generally lacking, and there is a scarcity of studies on all pollutants across Africa, SE Asia, and South America (as indicated in Fig. 1). We, therefore, advocate for air pollution studies in these regions to gain a more comprehensive global understanding of how air pollutants, especially PM, affect insect populations.

Summary

Our findings indicate that air pollutants disproportionately impair the performance of beneficial invertebrates. These negative impacts appear to stem from the disruption of VOC-mediated food or host location by these species. The impacts of air pollution do not appear to vary with pollutant concentration; even moderate levels of O_3 and NO_x adversely affect beneficial invertebrates, which indicates that the threats posed by air pollution are likely to remain or worsen without particularly severe and draconian changes to policy. Ozone pollution, in particular, appears to be a significant concern. Therefore, while the results of this analysis provide further evidence that reducing emissions of all air pollutants should be a priority, they indicate that an increased focus on reducing, or at least restricting, increases in ozone could be particularly advantageous for beneficial invertebrate species. Likewise, our evidence suggests that air pollution detrimentally impacts pollinators. Air pollution-mediated reductions in flower visitation by pollinators are likely to result in a higher proportion of economic losses than is currently predicted, especially if O_3 levels continue to increase unabated[13,60]. As such, our results demonstrate that air pollution needs to be carefully considered alongside other threats in management plans and policies aiming to safeguard these beneficial invertebrates.

Methods

Study selection and classification of predictors

We searched Web of Science (all databases) following the approach by Bishop and Nakagawa[61] to identify relevant publications for our meta-analysis, using the terms 'air pollution' 'terrestrial invertebrate/insect/arthropod' in combination with terms indicative of the four individual air pollutants (NO_x, O_3, SO_2, and PM). See Supplementary Note 1 for a full list of search terms used. Our search includes articles published on or before 10 November 2022. We screened the 1446 unduplicated records by title and abstract and identified 231 publications of potential relevance (1215 studies did not include a measure of invertebrate performance and/or the target pollutants). Our criteria for inclusion in the analysis was that the publication must present a measure of invertebrate performance in either ambient air pollution conditions or a control air pollution treatment, and at elevated air pollution conditions or in an elevated air pollution treatment. A total of 120 publications (Supplementary Data 1) met our inclusion criteria. Further details are provided in a PRISMA diagram (Supplementary Fig. 1).

Where possible, we extracted pollutant concentrations for the control and elevated air pollution treatments. Several semi-field (i.e. open-top chamber or free-air enrichment) and field studies reported an elevated concentration but no control pollutant concentration ($N = 5$ publications and 34 effect sizes for O_3, 4 publications, and 21 effect sizes for SO_2). We imputed these values using the mean control concentration across all other field studies (30 ppb O_3 and 10 ppb SO_2). We extracted numerical data from graphical figures using WebPlotDigitizer.

The 120 publications that satisfied our inclusion criteria for the meta-analysis included a total of 877 effect sizes; some studies tested responses to more than one air pollutant or measured several aspects

of invertebrate performance. While some data here are available for combined pollutants (25 effect sizes from 5 studies for interactions between O_3 and other pollutants, 10 effect sizes from 1 study for interactions not involving O_3), there were too few to include them in the analysis, so we included only effect sizes where pollutants were applied individually. We extracted the mean values, standard deviations (SD), and sample sizes (N) for each effect size comparing invertebrate performance between the two air pollution treatments. We extracted data for both direct and indirect (e.g. plant-mediated) invertebrate performance responses, which are often challenging to disentangle from one another[62]. Performance metrics included abundance, feeding efficiency, growth/development, reproduction, searching efficiency, survival, and diversity (see Supplementary Note 6 for testing suitability as a proxy for invertebrate population performance). Where studies did not report SDs but presented data for more than one comparison (e.g. multiple genotypes or multiple years), a single value was obtained by aggregating raw data at the largest scale to avoid nonindependence, as in ref. 63. Where SDs were missing and not able to be calculated by combining multiple data points ($N = 1$ publication, 4 effect sizes), they were imputed by averaging those from other effect sizes from the same performance metric, invertebrate Family and air pollutant[64].

Defining categories. Significant pests were defined as invertebrate species that were listed in the Centre for Agriculture and Bioscience International (CABI) Distribution Maps of Plant Pests (DMPP) and/or the European and Mediterranean Plant Protection Organization (EPPO) Alert (A1) list or Pest Risk Analyses (PRA) databases. Other herbivores include non-beneficial invertebrates that were not defined in these CABI or EPPO databases but include plant pests that are non-commercially important to food and commodity crops, as well as minor pests and non-pest herbivores. The most common Families of both 'significant pests' and 'other herbivores' were Aphididae and Chrysomelidae. Invertebrate feeding guilds were defined based on the predominant mode of feeding for the specific life stage recorded. The majority of beneficial invertebrates were nectar or pollen feeders (classified as pollinators for brevity) but also included the feeding guilds 'predators', 'parasitic wasps (i.e. parasitoids)' and 'detritivores' (see Supplementary Note 3 for details). The most common Families of beneficial invertebrates were Apidae and Braconidae. Any species that undergoes outbreaks that are known to result in significant economic or ecological damage at some stage in their life cycle (according to CABI's DMPP and/or EPPO's A1/RDA databases) were considered a significant pest for the purposes of this study. As such, in two studies, adult moths (*Plutella xylostella* and *Manduca sexta*) that were nectar- and/or pollen-feeders but were listed in the CABI and/or EPPO databases were defined as significant pests.

Calculating effect sizes

To quantify the effect of air pollution on invertebrate performance (the effect size), we used the natural log of the response ratio (ln RR), which is the log proportional change in performance between invertebrates exposed to elevated pollution and ambient or control conditions. This converts to the percentage loss or increase in invertebrate performance in elevated air pollution using the formula 1−exp(ln RR) *100 for negative values and exp(ln RR)−1*100 for positive values, respectively.

Multi-level meta-analysis models

Random effects. Effect sizes and sampling variances from the same publication and country are likely to be correlated (clustered), which invalidates model assumptions of independence[65]. We used multi-level meta-analytic models with random effects and variance–covariance (VCV) matrices to account for the dependence of effect sizes and sampling variances, respectively, the latter specifically resulting from effect sizes that shared a common control treatment[61,63]. We identified the optimal random effects structure by comparing the Akaike Information Criteria (AIC) of different candidate models. These candidate models included all 877 effect sizes across all air pollutant treatments. The random effects tested were an individual effect size identifier (infoID; unique per effect size, necessary to estimate residual heterogeneity), a publication identifier (studyID; year nested within the publication), country (i.e. country in which experiments were reported in a publication were conducted), extractor (the person who initially extracted each datapoint, each of which was checked by an alternative extractor) and a multiple outcome cluster identifier (indicating where more than one performance metric is reported for the same individual or group of invertebrates for each study). The optimal random effects structure contained identifiers for individual effect sizes, multiple outcome clusters, and publications; for further details and R code, refer to Supplementary Note 2.

Fixed effects (moderators). We compared uni-moderator models to the optimal random effect model to determine which variables or functional groups explained the most variation in air pollution-mediated changes in invertebrate performance. We first did this on the whole dataset, including all pollutants (Table 1), and then on separate datasets for each pollutant type (O_3, NO_x, SO_2, and PM; Table 2) to explore whether impacts varied between pollutants. We conducted these analyses separately rather than modeling interaction terms between moderators and pollutant types in the overall model because there were many missing levels for different moderators within individual pollutant types (e.g. Fig. 3). We assessed the explanatory power of each moderator by conducting a likelihood ratio test (LRT) comparing a candidate model containing a single moderator to a (null) model containing only random effects. The number of effect sizes included in these models varied between moderators, because several moderators contained missing values for some effect sizes where we were unable to categorize them when extracting the data from publications. We ranked the moderators by the LRT P-value to determine which had the greatest explanatory power. If $P > 0.05$, we concluded that the moderator did not explain variation in the air-pollution-mediated changes in invertebrate performance[66]. The 13 moderators we tested (based on previous classifications[30,32]) are reported in Table 1 and Supplementary Note 3. We conducted all model comparisons using models fit with maximum likelihood (ML), while we report model estimates in the manuscript from models fitted with restricted maximum likelihood (REML).

Associations of pollutant concentration and invertebrate performance. Multi-level meta-analysis models with the same error structure were used to determine how the effect of air pollution on invertebrate performance varies with the concentration of the pollutants. This was determined for studies reporting concentrations of NO_x (i.e. NO + NO_2, reported if the paper did not differentiate between NO and NO_2; $N = 10$), NO_2 only (reported if the paper did not also report NO; $N = 10$), O_3 ($N = 74$) and SO_2 ($N = 28$). We converted the concentration of elevated pollution treatments to a common scale, first by log-transforming them, and then by scaling them within each pollutant type using z-scores. We tested this scaled concentration of elevated pollution treatment as a moderator across all pollutants. We tested whether this relationship varied between pollutant types (interaction between scaled concentration and pollutant type) and between significant pests, other herbivores, and beneficial invertebrates (interaction between scaled concentration and pest status). We also tested whether the air pollutant concentration in the control treatment, which was typically either filtered air (0 ppb for NO_x, O_3, and SO_2, and 0 $\mu g/m^3$ for PM) or ambient concentration, explained variation in the effect size. Please see the 'defining categories' section above for a full definition of the three pest status levels.

Publication bias and sensitivity analysis

Publication bias was assessed using a funnel plot from a model including the two most significant moderators[67] and funnel asymmetry was tested using Egger's regression[68]. A significant slope for standard error would indicate statistically significant funnel asymmetry after controlling for all other variables in the model. In the absence of bias, the funnel plot forms a symmetrical inverted funnel centered on the mean effect. Using these methods, we did not identify evidence of publication bias ($z = -1.49$, $P = 0.135$; Supplementary Fig. 3).

Comparisons between effect sizes and year of publication were made to determine the presence of any time-lag bias (i.e. a change in the magnitude of the effect over time) by including 'year' as a moderator in multi-level models[69]. The negative effects of air pollution have become more pronounced over time across all pollutants, (Supplementary Fig. 4), apparently driven by significant reductions in performance over time with O_3 and NO_x pollution (Supplementary Fig. 5A and B; Supplementary Note 6).

Leave-one-out analysis was also used to determine whether our mean effect size estimates were robust to the exclusion of individual publications. Our sensitivity analyses indicate that our results were not unduly influenced by findings of individual experiments; the effects of air pollutants on significant pests, other herbivores, and beneficial invertebrates were stable when we excluded the results of each study individually in leave-one-out analyses (Supplementary Figs. 6–8). Alluvial plots were used to visualize the degree of overlap between categories (i.e. within-moderator levels) for different pairs of moderators (Supplementary Fig. 9).

Reporting summary

Further information on research design is available in the Nature Portfolio Reporting Summary linked to this article.

Data availability

The data that support the findings of this study are available in Supplementary Data 1. Source data for figures generated in this study can be found in the Source Data file. Source data are provided with this paper.

Code availability

The code for data analysis that supports the findings of this study is integrated into the Supplementary Information file and is available from Open Science Framework[70] (https://doi.org/10.17605/OSF.IO/UEQP7).

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Acknowledgements

This work was supported by a Leverhulme Trust Early Career Fellowship (ECF-2020-017) awarded to J.M.W.R., a Natural Environment Research Council grant (NE/P002404) awarded to R.D.G, a Finnish Cultural Foundation Grant (00201238, 00212495) awarded to A.O.M., and

University of Reading's National Institute for Research into Dairying Trust Fund.

Author contributions

Conceptualization: J.M.W.R. and R.D.G. Methodology (extraction): J.M.W.R., L.M.B., and A.O.M. Methodology (statistical analysis): J.M.W.R., J.B., and S.N. Visualization: J.M.W.R., J.B., and S.N. Writing—original draft: J.M.W.R. and J.B. Writing—review, and editing: J.M.W.R., A.O.M., L.M.B., J.B., and R.D.G.

Competing interests

The authors declare no competing interests.

Additional information

Supplementary information The online version contains supplementary material available at https://doi.org/10.1038/s41467-024-49729-5.

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Peer review information *Nature Communications* thanks Mayra Vidal and the other, anonymous, reviewer(s) for their contribution to the peer review of this work. A peer review file is available.

SECTION VI

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CALIFORNIA RESOURCES CORPORATION

Kern County Board of Supervisors Advance CRC's Carbon TerraVault I Project

Board Approval Represents Major Step for California's First CCS Project, Critical to Achieving State's Carbon Neutrality Goal

October 21, 2024 17:00 ET | Source: California Resources Corporation

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LONG BEACH, Calif., Oct. 21, 2024 (GLOBE NEWSWIRE) -- California Resources Corporation (NYSE: CRC) and its carbon management business, Carbon TerraVault, today announced the Kern County Board of Supervisors' unanimous approval of the conditional use permit for the Carbon TerraVault I (CTV I) carbon capture and storage project. This permit authorizes the construction activities necessary for the development of the project, which would be the first of its kind in California. This decision follows the Kern County Planning Commission's recommendation in September and marks a key milestone in CRC's efforts to develop its first carbon capture and storage project.

"We are pleased the Board of Supervisors approved the conditional use permit for CTV I," said Francisco Leon, CRC President and Chief Executive Officer. "This is a significant step forward for Kern County and CRC in supporting energy transition in California. We believe that carbon capture technology will lead to the creation of new energy jobs and improve air quality in Kern County."

Release Summary

Kern County Board of Supervisors unanimously approve the conditional use permit for CRC's Carbon TerraVault I carbon capture and storage project.

Company Profile

California Resources Corporation

California Resources Corporation (CRC) is an independent energy and carbon management company committed to energy transition. CRC is committed to environmental stewardship while safely providing local, responsibly sourced energy. CRC is also focused on maximizing the value of its land, mineral... view more

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dioxide (CO_2) storage. Once operational, the CTV I project is expected to be capable of injecting and storing over 1 million metric tons of CO_2 per year, equivalent to the annual emissions of approximately 200,000 passenger vehicles. In addition to being California's first carbon capture and storage project, CTV I will be the first in the nation to utilize a depleted oil and gas reservoir for CO_2 sequestration. The California Energy Commission recognizes the Elk Hills Field as "one of the premier CO_2 sequestration sites in the U.S.," making it an optimal location for the permanent storage of CO_2. The California Air Resources Board also identifies carbon capture and storage as a critical greenhouse gas reduction measure.

CRC is committed to the health, safety, and wellbeing of our communities. The company recently announced a Community Benefits Plan for CTV I that commits a portion of its investments in CTV I to local programs and partnerships with labor, community organizations and academic institutions.

More information on CTV I can be found here.

About Carbon TerraVault

Carbon TerraVault (CTV) is CRC's carbon management business and is developing services to capture, transport and permanently store CO_2 for its customers. CTV is engaged in a series of CCS projects that will inject CO_2 captured from industrial sources into depleted underground reservoirs and permanently store CO_2 deep underground. For more information, visit carbonterravault.com.

About California Resources Corporation

California Resources Corporation (CRC) is an independent energy and carbon management company committed to energy transition. CRC is committed to environmental stewardship while safely providing local, responsibly sourced energy. CRC is also focused on maximizing the value of its land, mineral ownership, and energy expertise for decarbonization by developing carbon capture and storage and other emissions-reducing projects. For more information, please visit crc.com.

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Tags

California | Carbon Capture | Carbon Storage | Kern County | Energy | Energy Transition | CRC | CTV | Net Zero | Decarbonize

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ADDENDUM

#1

KERN COUNTY PLANNING AND NATURAL RESOURCES DEPARTMENT

Planning Commission

STAFF REPORT

Date: October 10, 2024

FILE: ZCC #4, Map 51; ZCC #3, Map 74;
ZCC #4, Map 75; CUP #9, Map 51;
CUP #7, Map 74; CUP #7, Map 75;
CUP #9, Map 96; CUP #10, Map 51;
CUP #9, Map 74; CUP #11, Map 75
S.D.: #4 - Couch

TITLE: (a) Amendment of Zoning Map 51, Zone Change Case No. 4; (b) Amendment of Zoning Map 74, Zone Change Case No. 3; (c) Amendment of Zoning Map 75, Zone Change Case No. 4; (d) Conditional Use Permit Case No. 9, Map 51; (e) Conditional Use Permit Case No. 7, Map 74; (f) Conditional Use Permit Case No. 7, Map 75; (g) Conditional Use Permit Case No. 9, Map 96; (h) Conditional Use Permit Case No. 10, Map 51; (i) Conditional Use Permit Case No. 9, Map 74; (j) Conditional Use Permit Case No. 11, Map 75: CarbonFrontier Carbon Capture and Storage (CCS) Project by Aera Energy, LLC

PROPOSAL: The proposed **CarbonFrontier CCS Project** would facilite the construction and operation of a Carbon Capture and Storage (CCS) facility for permanent underground storage of up to 40 million metric tons of carbon dioxide (CO_2) in the storage space (referred to as the 64 Zone reservoir) on approximately 12,362 surface acres in the North and South Belridge oilfield in unincorporated Kern County and the related initial source for the capture of of CO_2. Implementation of the proposed proejct includes the followinng requests:

(1) Changes in Zone Classifications from Zone Change Cases: (ZCC No. 4, Map 51 and ZCC No. 3, Map 74) from A-1 (Limited Agriculture) to A (Exclusive Agriculture), or a more restrictive district on approximately 1,738 acres and (ZCC No. 4, Map No. 75) from NR (20) (Natural Resources – 20 acre min) to A (Exclusive Agriculture), or a more restrictive district on approximately 80 acres.

(2) Conditional Use Permits (CUP No. 9, Map 51; CUP No. 7, Map 74; CUP No. 7, Map 75; and CUP No. 9, Map 96) to allow for the construction and operation of a CCS facility on approximatley 12,362 surface acres in the A (Exclusive Agriculture) Zone District with site installation of nine (9) Class VI UIC injection wells, up to eight (8) CO_2 monitoring wells, and one (1) downhole seismic monitoring station.

(3) Conditional Use Permits (CUP No. 10, Map 51; CUP No. 9, Map 74; CUP No. 11, Map 75) for the construction of the approximately 15 miles of facility pipeline for the transportion of CO_2.

APPLICANT: Aera Energy, LLC (PP23402)

PROJECT SIZE: 12,362 acres

LOCATION: Located within the Central Valley portion of unincorporated Kern County, directly west of State Route 33, within the administrative boundaries of both the North and South Belridge oilfields on approximately 12,362 surface acres

GENERAL PLAN DESIGNATION/ZONE CLASSIFICATION: 8.1 (Intensive Agriculture), 8.3 (Extensive Agriculture), 8.4 (Mineral and Petroleum), 8.1/2.5 (Intensive Agriculture – Flood Hazard Overlay), 8.3/2.5 (Extensive Agriculture – Flood Hazard Overlay), 8.4/2.5 (Mineral and Petroleum – Flood Hazard Overlay) / A (Exclusive Agriculture), A-1 (Limited Agriculture, NR (20) (Natural Resources – 20-acre minimum).

SURROUNDING LAND USE/ZONING: North – Oil and Gas Exploration and Production / A (Exclusive Agriculture). East – Agriculture / A (Exclusive Agriculture). South – Oil and Gas Exploration and Production / A (Exclusive Agriculture). West – Oil and Gas Exploration and Production, Undeveloped Land / A (Exclusive Agriculture); A-1 (Limited Agriculture).

PROJECT ANALYSIS: The project before your commission was originally scheduled to be considered at the September 12, 2024, Planning Commission hearing and was continued by your Commission before being considered due to time constraints. Staff then received the attached correspondence from the project applicant, Aera Energy, LLC. requesting a postponement of the October 10, 2024, Planning Commission hearing date to provide time to engage with community members and discuss the project.

Staff has provided your Commission all public comments received since the end of the Draft Environmental Impact Report comment. No analysis or other response is being provided at this time. While public testimony is required to be taken by your Commission, staff will not be presenting a full staff report presentation or recommendation and will be unable to answer any questions or provide any responses about the project.

Based on the lack of recommendations, findings, or other necessary documentation in this staff report at this hearing, your Commission is limited to either continuing the matter to one of the last remaining hearings in 2024 (October 24, 2024, November 14, 2024, or December 12, 2024), for which staff will be, again, unable to provide the necessary information, or referring it back to staff for noticing at a future Planning Commission hearing date. A hearing schedule for 2025 has not been established and is not available to your Commission at this time.

Staff therefore recommends this matter be referred back to staff. Staff provided a letter to all parties on the notification list for this project indicating staff's intent to refer the project back at tonight's hearing. Future hearings on this matter will require a new public notice to the mailing list maintained by the department for this project.

PUBLIC INQUIRY OR CORRESPONDENCE: Aera Energy, LLC./California Resources Corporation; Kern County Planning and Natural Resources Department; Kern County Public Works; California Department of Transportation; Lost Hills in Action Committee; Center for Biological Diversity and Central Environmental Justic Network; Southern California Gas Company; National and Local Sierra Club; Community Action Partnership of Kern County; 51 Support Letters.

CEQA ACTION: Environmental Review: Environmental Impact Report

DEPARTMENT RECOMMENDATION: Refer back to Staff

LHO:KA:cc

Attachments

CORRESPONDENCE

CALIFORNIA RESOURCES CORPORATION | CARBON TERRAVAULT

1 WORLD TRADE CENTER, SUITE 1500
LONG BEACH, CALIFORNIA 90831

September 20, 2024

County of Kern
Planning and Natural Resources Department
Lorelei Oviatt, Director, Kern County Planning and Natural Resources Department
2700 M Street, Suite 100
Bakersfield, CA 93301

RE: Aera Energy CarbonFrontier CCS Project

Dear Ms. Oviatt,

Aera Energy, a wholly owned subsidiary of California Resources Corporation (CRC), would like to request that the Planning Commission hearing for the proposed CarbonFrontier project, currently scheduled for October 10, 2024, be postponed to a later date. As a dedicated community partner, Aera would welcome the opportunity to engage directly with community members, address concerns and incorporate valuable stakeholder feedback into the proposed project. We believe this collaborative approach will lead to a community-aligned proposal before it goes before the Planning Commission for review and decision making.

We are incredibly excited for the opportunities that CarbonFrontier would create for the County and the State of California, and we commend the County for its substantial efforts in leading the project's environmental review process. We eagerly anticipate resuming the process soon.

Please contact Beau Gentry at (661) 665-5000 or by email (bjgentry@aeraenergy.com) if you have any questions pertaining to this request.

Sincerely,

Signed by:
Chris Gould
5C9D99AB330A458...

Chris Gould
Executive Vice President, Chief Sustainability Officer

cc: Mr. Keith Alvidrez, Planner II – Advanced Planning Division

Lorelei H. Oviatt, AICP, Director
2700 "M" Street, Suite 350
Bakersfield, CA 93301-2323
Phone: (661) 862-8800
Fax: (661) 862-8801 TTY Relay 1-800-735-2929
Email: planning@kerncounty.com
Web Address: https://kernplanning.com/

PLANNING AND NATURAL RESOURCES DEPARTMENT

Planning
Community Development
Administrative Operations

September 27, 2024

FILE: ZCC No. 4, Map 51; ZCC No. 3, Map 74;
ZCC No. 4, Map 75; CUP No. 9, Map 51;
CUP No. 10, Map 51; CUP No. 7, Map 74;
CUP No. 9, Map 74; CUP No. 7, Map 75;
CUP No. 11, Map 75; CUP No. 9, Map 96.
S.D. #4 – Couch

TO: Interested Parties

RE: CarbonFrontier CCS Project by Aera Energy, LLC. – October 10, 2024 Kern County Planning Commission – Applicant Requested Postponement

Dear Interested Parties:

The project proponent, Aera Energy, LLC. (part of California Resources Corporation) has submitted the attached letter for the CarbonFrontier CCS Project requesting that the Planning Commission hearing for the project be postponed.

Staff will be recommending that the project be referred back to Staff at the October 10, 2024 Planning Commission hearing. There will be no staff presentation or recommendation provided for consideration to the Commission.

A new public notice will be provided for any future Planning Commission hearing on the CarbonFrontier CCS Project by Aera Energy, LLC., which is required before the project may be considered by the Board of Supervisors.

If you have any questions about the Planning Commission hearing on October 10, 2024 or the project, please do not hesitate to contact me at (661) 862-5015 or via email at AlvidrezK@kerncounty.com.

Sincerely,

Keith Alvidrez

Keith Alvidrez, Planner II
Planning and Natural Resources Department

Attachment: CarbonFrontier CCS Project Applicant Request

August 9, 2024

To: Lorelei Oviatt, Director
Planning and Natural Resources Department
Keith Alvidrez, Planner II

From: Jeremy M. Brock, County Surveyor
By: Andres Arias, Engineering Support Supervisor Phone: 28959

Subject: Draft Environmental Impact Report for the CarbonFrontier CCS Project by Aera Energy, LLC. (PP23402).

I have reviewed the above noted Draft of EIR and recommend the following conditions be placed on the Conditional Use Permits:

1. Prior to issuance of a building or grading permit: All survey monuments shall be tied out by a Licensed Land Surveyor. A corner record for each monument or record of survey shall be submitted to the County Surveyor for review and processing, per Section 8771 of the Professional Land Surveyor's (PLS) Act.

2. Prior to Final Inspection: All survey monuments that were destroyed during construction shall be re-set or have a suitable witness corner set. A post construction corner record for each monument re-set or a record of survey shall be submitted to the County Surveyor for processing, per Section 8771 of the Professional Land Surveyor's Act.

3. Upon completion of project: All survey monuments shall be accessible by a Licensed Land Surveyor or their representatives, with prior notice, per Section 8774 of the PLS Act and Civil Code 846.5 (a).

Thank you for the opportunity to review and comment on this project. Should you have any questions please contact me.

Office Memorandum

To: Lorelei Oviatt, Director
Planning and Natural Resources Department
Attn: Keith Alvidrez, Planner II

August 26, 2024

From: Cesar Ayon, Engineering Manager CA
Public Works Department/Development Review Division

Subject: 7-5.3 Carbon Capture & Storage - Aera Energy
Located within the Central Valley portion of unincorporated Kern County, directly west of State Route 33. It is within the administrative boundaries of both the North and South Belridge oilfields on approximately 12,362 surface acres; Supervisorial District 4 – Couch.

Development Review Division

This Division has reviewed the subject project and has no comment.

Thank you for the opportunity to comment on this project. If you have any questions or comments, please contact Rodd Parke of this Department at (661) 862-8848.

Sewer and Water Division

This Division has reviewed the subject project and has no comment.

Thank you for the opportunity to comment on this project. If you have any questions or comments, please contact Kyle Perez of this Division at (661) 862-8852.

CSA Division

This Division has reviewed the subject project and has no comment.

Thank you for the opportunity to comment on this project. If you have any questions or comments, please contact Miguel Munoz of this Division at (661) 862-8908.

Floodplain Management Division

Thank you for the opportunity to comment on this project. If you have any questions or comments, please contact Brian Blaise of this Division at (661) 862-5098.

From: Evans, Marcus B@DOT
To: Keith Alvidrez
Subject: Caltrans has reviewed KER - 33 - 49.378 - Carbon Capture - ZCC #4, Map 51; ZCC #3, Map 74; Map 75; CUP #9, Map 51; CUP #7, Map 74; CUP #7, Map 75; CUP #9, Map 96; CUP #10, Map 51; CUP #9, Map 74; Cup #11, Map 75,
Date: Thursday, August 22, 2024 2:43:23 PM

Caltrans has reviewed KER - 33 - 49.378 - Carbon Capture - ZCC #4, Map 51; ZCC #3, Map 74; Map 75; CUP #9, Map 51; CUP #7, Map 74; CUP #7, Map 75; CUP #9, Map 96; CUP #10, Map 51; CUP #9, Map 74; Cup #11, Map 75, which proposes construct and operate a carbon capture and storage facility for underground storage of carbon dioxide, at a location at South West side of SR 33, from Brown Material Road south to 7th Standard Road, north of the city of McKittrick and finds this will have no impact to Caltrans ROW.

12 de Agosto, 2024

Keith Alvidrez
Planner II
Kern County Planning and Natural Resources Department
2700 M St. Suite 100
Bakersfield, CA 93301
Submitted via email to Alvidrez@Kerncounty.com

RE: Comentario sobre el borrador del EIR para el proyecto CarbonFrontier CCS de Aera Energy, LLC, SCH 2023060293

Estimado Mr. Alvidrez,

En nombre de Comité Lost Hills En Acción, presentamos los siguientes comentarios sobre el Borrador del Informe de Impacto Ambiental (DEIR) para el Proyecto de Secuestro de Captura de Carbono, CarbonFrontier, de Aera Energy, LLC (PP23402) (en adelante, el Proyecto). El Proyecto propone capturar dióxido de carbono (CO2) del campo petrolífero de South Belridge, transportarlo a lo largo de 14 millas de tuberías de CO2, e inyectarlo en hasta nueve pozos de inyección en el campo de North Belridge a solo 5 millas de Lost Hills.

Nos gustaría que el condado de Kern esté al tanto de las preocupaciones de la comunidad asociadas con el Proyecto. Estas preocupaciones deben tenerse en cuenta antes que la Ciudad prepare sus DEIR para el proyecto de CarbonFrontier. Es por eso que le exigimos al Condado que:

- Escuchen a las preocupaciones de la comunidad y tomen a cabo más audiencias públicas
- Prepare y distribuya un DEIR revisado
- Rechacen el Proyecto de Aera.

Nos preocupan los impactos potenciales de la contaminación del aire y la amenaza de una fuga de dióxido de carbono mortal. Nuestra región ya está siendo afectada por la mala calidad del aire y nuestra comunidad sufre impactos de salud por las operaciones de petróleo y gas, pesticidas, y incendios de agricultura. La contaminación adicional que traerá este Proyecto dañaría aún más a nuestras familias.

El aire de Lost Hills huele horrible por las operaciones de petróleo y gas que se trabajan día y noche todos los días. Los malos olores del campo petrolífero de North Belridge llegan hasta nuestras casas. Cuando hay fugas de gas en los campos petrolíferos los responsables duran semanas en limpiar y arreglar esos pozos. No podemos confiar en compañías de petróleo. Una fuga de gas de dióxido de carbono concentrado podría contaminar nuestra agua y envenenar el aire de nuestra comunidad. La captura de carbono es una mentira y no ayudará al medio

ambiente ni a nuestra comunidad a combatir la contaminación del aire. La contaminación va a seguir aquí si permitimos estos proyectos.

El Proyecto pondrá en peligro a las personas que trabajen cerca del Proyecto. El DEIR explicó que los trabajadores de la operación de paneles solares de Wonderful Nut Farms pueden ser expuestos a una concentración de CO2 que puede resultar en muertes. Esto también podría aplicar para las personas que trabajan en la planta peladora de Wonderful, situada en la Brown Material Rd que está a 2 millas del sitio de inyección. Entonces, ¿qué se espera para los residentes de Lost Hills que solo quedamos a 5 millas del Proyecto propuesto? Nadie ha mencionado estos riesgos a los residentes de Lost Hills, ni a los trabajadores cercanos. El alcance de Aera se ha centrado en los numerosos puestos de trabajo que posiblemente generará este Proyecto. Este Proyecto solo tendrá 10 trabajos, que seguramente no serán para los residentes de Lost Hills.

El Condado debe analizar estos impactos y sugerir alternativas y mitigaciones para disminuir estos daños antes de seguir acabó con el proyecto de CarbonFrontier. El Condado debe incluir en cada paso a los residentes de la comunidad que son los que van a llevar la carga más grande.

Respetuosamente escribimos para dar a conocer nuestras preocupaciones y apreciamos la oportunidad de enviar estos comentarios. Para fines de seguimiento, comuníquese con Ileana Navarro vía correo electrónico: ileana.navarro@ccejn.org . Gracias por su consideración.

Atentamente,

x Saul Ruiz-martinez
Saul Ruiz-martinez

x Irma Medina de Ruiz

x Ana Maria Diaz
Ana Maria Diaz

x Humbertina Salgado
Humbertina Salgado

x Mora de Rz

August 12th, 2024

Keith Alvidrez
Planner II
Kern County Planning and Natural Resources Department
2700 M St. Suite 100
Bakersfield, CA 93301
Submitted via email to Alvidrez@Kerncounty.com

RE: Comment on Draft EIR for CarbonFrontier CCS Project by Aera Energy, LLC, SCH 2023060293

Dear Mr. Alvidrez,

On behalf of the Lost Hills In Action Committee, we submit the following comments on the Draft Environmental Impact Report (DEIR) for the CarbonFrontier Carbon Capture Sequestration Project by Aera Energy, LLC (PP23402) (hereinafter, the Project). The Project proposes to capture carbon dioxide (CO2) from the South Belridge oil field, transport it along 14 miles of CO2 pipelines, and inject the CO2 into up to nine injection wells in the North Belridge field just 5 miles from Lost Hills.

We would like Kern County to be aware of community concerns associated with the Project. These concerns should be taken into account before the City prepares its DEIR for the CarbonFrontier project. That is why we require the County to:

- *Listen to community concerns and hold more public hearings*
- *Prepare and distribute a revised DEIR*
- *Reject the Aera Project.*

We are concerned about the potential impacts of air pollution and the threat of a deadly carbon dioxide leak. Our region is already being affected by poor air quality and our community suffers health impacts from oil and gas operations, pesticides, and agricultural fires. The additional pollution this Project will bring would further harm our families.

The air in Lost Hills smells horrible from the oil and gas operations that operate day and night every day. The bad smells from the North Belridge oil field reach our homes. When there are gas leaks in the oil fields, the companies responsible take weeks to clean and fix those wells. We can't trust oil companies. A leak of concentrated carbon dioxide gas could contaminate our water and poison our community's air. Carbon capture is a lie and will not help the environment or help our community combat air pollution. Air pollution will continue here if we allow these projects.

The Project will endanger people working near the Project. The DEIR explained that workers at Wonderful Nut Farms' solar panel operation may be exposed to a concentration of CO2 that can

result in fatalities. This could also apply to people who work at Wonderful Huller & Shelling facility, located on Brown Material Rd which is 2 miles from the injection site. So what's in store for Lost Hills residents who are only 5 miles from the proposed Project? No one has mentioned these risks to the Lost Hills residents, or to the nearby workers. Aera's outreach has focused on the many jobs this project will possibly bring. This project will only have 10 jobs, which will most likely not be for Lost Hills residents.

The County must analyze these impacts and suggest alternatives and mitigations to lessen these damages before moving forward with the CarbonFrontier project. The County must include residents in every step of the process as they will be the ones to bear the greatest burden.

We respectfully write to make our concerns known and appreciate the opportunity to provide these comments. For follow-up purposes, please contact Ileana Navarro via email: ileana.navarro@ccejn.org. Thank you for your consideration.

Sincerely,

CENTER for BIOLOGICAL DIVERSITY Because life is good.

Sept. 9, 2024

Kern County Planning Commission
Kern County Board of Supervisors

Submitted via email to planning@kerncounty.com and AlvidrezK@kerncounty.com

Re: Consideration of Final EIR for CarbonFrontier CCS Project by Aera Energy, LLC, SCH 2023060293

The Center for Biological Diversity and the Central California Environmental Justice Network are writing in advance of the Planning Commission and Board of Supervisors' consideration of the Final Environmental Impact Report (FEIR) for the CarbonFrontier Carbon Capture Sequestration Project by Aera Energy, LLC (the Project). The Project proposes capturing, transporting, and injecting millions of tons of CO_2 to up to nine injection wells in the North Belridge oilfield.

We urge the Planning Commission and Board of Supervisors to:

1) delay the vote to approve the Project's FEIR until after the Project's nine CO_2 injection permits are released, likely in late 2024;

2) order revision of the FEIR once the crucial CO_2 injection permits are made available; and

3) ultimately reject the Project because of its detrimental impacts to air quality, public health and safety, greenhouse gas emissions, and energy use, among others.

It is important that the Planning Commission and Board of Supervisors know that the Project's CEQA review is proceeding out-of-sync with EPA Region 9's review of the Project's CO_2 injection permits. This contravenes CEQA.

The CO_2 injection permits, known as Class VI permits, are fundamental pieces to the Project. Because the draft Class VI permits for this Project are still undergoing iterative technical review, the County's CEQA analysis is based on incomplete and unstable information about Project and its impacts. The County took a different (and more rational) approach with the Carbon TerraVault I Elk Hills CCS Project. Syncing up review allowed the public to understand the whole of the Project and enabled public hearings with both Kern County and EPA. The same should happen here.

EPA's website indicates that the Project's nine draft Class VI permits will be released for public comment sometime in late 2024.[1]

[1] EPA, UIC Class VI Permit Tracker, https://www.epa.gov/system/files/documents/2024-07/class-vi-permit-tracker_7-24-24.pdf (last updated July 19, 2024).

By advancing its CEQA process ahead of obtaining crucial project information, the County is contravening the law. For one, CEQA requires an "accurate, stable, and finite" project description.[2] An inaccurate or truncated project description is prejudicial error because it fails to "adequately apprise all interested parties of the true scope of the project."[3]

EPA's review of Class VI permits is a technical and iterative process, whereby the agency goes back-and-forth with the project proponent with questions and answers. The County cannot provide a truly accurate project description until EPA issues the draft Class VI permits. For example, while the Project's EIR includes a copy of the CarbonFrontier Class VI application from April 2024, already that is out of date. EPA Region 9's website updated the pre-draft CarbonFrontier application on July 9, 2024.[4] In another example, the EIR claims that the CO_2 plume's spread is "fully characterized."[5] But as recently as April 2024, Aera responded to EPA's technical review questions about the CO_2 plume (and other issues) with 17 pages of updated modeling.[6] There is no indication whether EPA has accepted Aera's answers as final, or whether there will be follow-up questions. The EIR therefore rests on shifting sands and cannot be more stable until the Class VI permits are released.

Conclusion

It is imperative that the County pause its consideration and approval of the CarbonFrontier EIR until the Project's nine CO_2 injection permits are issued, likely in late 2024. After that, the EIR must be revised and recirculated for public comment. Finally, we urge the County to reject the CarbonFrontier project because it will emit large amounts of air pollution and climate-harming greenhouse gases (GHGs), endanger local residents and workers, account for 3% of the County's energy use, and cause other detrimental impacts, as detailed in our groups' comment letters in the record.[7]

Thank you,

Victoria Bogdan Tejeda
Staff Attorney, Center for Biological Diversity
Climate Law Institute
vbogdantejeda@biologicaldiversity.org

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[2] *Cnty. of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193.
[3] *City of Santee v. Cnty. of San Diego* (1989) 214 Cal.App.3d 1438, 1454-55.
[4] EPA Region 9, UIC Injection Permits, https://www.epa.gov/uic/r9-uic-permits (last visited Sept. 9, 2024).
[5] CarbonFrontier DEIR at 1-8.
[6] Letter from Beau Gentry, Aera Energy LLC, to David Albright, EPA Region 9, Re: Request for Additional Information (April 9, 2024), available at EPA Region 9, UIC Injection Permits, https://www.epa.gov/uic/r9-uic-permits.
[7] *See* Center for Biological Diversity et al., comment on the DEIR for CarbonFrontier (Aug. 12, 2024), submitted to the County and attached to this email for reference.

ATTACHMENT A:

Screenshot from EPA Region 9, timeline of review for CarbonFrontier Class VI permits

Available here: https://www.epa.gov/uic/current-class-vi-projects-under-review-epa

Aera Energy, LLC: CarbonFrontier

EPA Region: 9 State: California Well Applications: 9	Current Status: *In Technical Review*

Application Received:	1/19/2023
Completeness Review:	3/21/2023
Technical Review:	9/21/2024*
Applicant Requested Hold:	-
Prepare Draft Permit:	11/20/2024*
Public Comment Period:	12/20/2024*
Final Permit Decision:	3/20/2025*

* = estimated date

ATTACHMENT B:

Center for Biological Diversity et al., comment on the CarbonFrontier DEIR (Aug. 12, 2024)
Attached in email

August 12, 2024

Keith Alvidrez
Planner II
Kern County Planning and Natural Resources Department
2700 "M" Street, Suite 100
Bakersfield, CA 93301
Submitted via email to AlvidrezK@kerncounty.com

Re: Comment on Draft EIR for CarbonFrontier CCS Project by Aera Energy, LLC, SCH 2023060293

Dear Mr. Alvidrez,

The Center for Biological Diversity, Central California Environmental Justice Network, and the Central Valley Air Quality Coalition submit the following comments on the Draft Environmental Impact Report (DEIR) for the CarbonFrontier Carbon Capture Sequestration Project by Aera Energy, LLC (PP23402) (hereinafter, the Project). The Project proposes capturing carbon dioxide (CO_2) from oil field (and possibly other outside) sources in the South Belridge oil field and transporting it over 14 miles of CO_2 pipelines to up to nine injection wells in the North Belridge oilfield.

The Project's DEIR suffers from the following deficiencies:

1. The County inexplicably is performing CEQA review out-of-sync with the EPA Region 9's review of the Project's Class VI CO_2 injection permits. Because the draft Class VI permits for this Project are still undergoing iterative technical review, the County's CEQA analysis is incomplete and unstable. The County took a different (and more rational) approach with the Carbon TerraVault I Elk Hills CCS Project. Syncing up review allowed the public to understand the whole of the Project and enabled public hearings with both Kern County and EPA. The same should happen here.
2. The DEIR's project description and objectives fail to match reality. For example, the applicant names as its objective reducing the "carbon intensity of Aera Energy's produced oil and gas by capturing CO_2" from oil field sources. Elsewhere, however, the DEIR notes that oil field sources will not fulfill the Project's CO_2 capture capacity and that outside sources are necessary. The County must revise the DEIR to capture the whole of the project's objectives and foreseeable future activities.

3. The DEIR's analysis of alternatives is flawed because of the failed project description and objectives, as noted above. Further, the alternatives analysis, including of the "no project" alternative, is hindered by an inadequate analysis of Project impacts.
4. The DEIR admits that "fatalities" at the nearby Wonderful Nut Farms solar project could result from a CO_2 leak, but the County offers no mitigations to address this. Alarmingly, the County does not even propose notifying workers at Wonderful Nut Farms should a CO_2 leak occur. The DEIR also unlawfully defers creation of a CO_2 leak emergency response plan, when instead this plan must be offered now for public input.
5. The GHG emissions of the Project are astounding, yet downplayed and largely ignored by the County. The Project's construction emissions alone would be the equivalent to burning 30.8 million pounds of coal, based on EPA's equivalencies calculator. The Project's GHG emissions for operational years 1-7 are *net positive*, even with CCS, and are the same as burning 4.1 million pounds of coal or operating 10 separate natural gas-fired power plants for one year. The County's GHG analysis section is also flawed for other reasons related to information disclosure and enforceable CO_2 capture rates.
6. The Project's energy use will amount to *nearly 3%* of the County's total annual electricity demand. But rather than mitigate this or offer enforceable limits, the County requests only a toothless annual report on energy use and offers the unsupported conclusion that the Project will nonetheless be efficient and necessary.
7. The DEIR's Biological Resources section unlawfully defers mitigations and ignores expert agency recommendations, including the legal requirement that the County must undergo Endangered Species Act consultation with the U.S. Fish and Wildlife Service *before* any ground-disturbing activity takes place.

Finally, as a foundational matter, our organizations disagree with the premise that carbon capture and storage (CCS) should play a role in achieving our state's goal of reaching near-zero emissions by midcentury in order to limit global warming to 1.5°C. CCS regularly over-promises and under-delivers on its carbon capture benefits all while keeping dirty industries like fossil fuels alive, making it a false solution that diverts attention and resources from transitioning to clean, renewable energy. Instead of approving carbon storage, the County should phase out fossil fuel development to prevent catastrophic climate change and environmental injustice. We detail the support for this position in our earlier comment submitted on this Project's Notice of Preparation.

For these reasons, we urge the County to re-do its DEIR for the Project, prepare and circulate a revised DEIR (as well as hold hearings), and ultimately reject the Aera CarbonFrontier Project.

I. The County Must Pause Review of the Project Until EPA Issues the Project's Draft Class VI CO_2 Injection Permits.

EPA Region 9 is conducting technical review of the Project's nine Class VI CO_2 injection well permits.[1] EPA's Class VI permit tracker indicates that the draft permit will be released for public comment sometime in early 2025.[2] The County must pause review of the Project under CEQA until EPA issues those draft Class VI permits.

The County properly aligned its CEQA review with the release of most of EPA's draft Class VI permits for the Carbon TerraVault Elk Hills CCS project (SCH 2022030180). Doing so enabled the public to review the land use and injection portions of the Elk Hills project together, as well as attend meetings with both County and EPA officials. There is no reason for the County to do anything different here. In fact, proceeding with CEQA review of the Project before EPA preliminarily approves the injection wells not only prevents the public from understanding the whole of the Project, but risks making the CEQA review inaccurate.

First, under CEQA, a "project" is defined as the *whole* of an action that has the potential to cause direct or indirect physical changes to the environment.[3] Here, it is impossible for the County to disclose, analyze, and mitigate the impacts of the Class VI wells because they are still in flux. Before EPA releases the draft permits, the Project's Class VI wells may undergo big changes with cascading implications for environmental review. For example, Aera may request additional wells, EPA or Aera may change the wells' locations (thus changing the location and miles of pipeline), etc.

Second, because the Class VI wells may change in any number of ways, proceeding out-of-step with this critical Project component undermines the DEIR's project description. CEQA requires an "accurate, stable, and finite" project description.[4] An inaccurate or truncated project description is prejudicial error because it fails to "adequately apprise all interested parties of the true scope of the project."[5] Right now the County cannot provide a truly accurate project description until EPA issues the draft Class VI permits.

Third, the DEIR is plainly misleading in some of its language concerning the status of the injection permits and the County's reliance on the Project's pre-draft Class VI application. For example, the County asserts that "Aera Energy has fully characterized the EPA Area of Review, which will become the EPA-Approved Storage Area."[6] Modeling the Area of Review (AoR) is part of an applicant's task when seeking a Class VI well, since the

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[1] EPA Region 9, UIC Injection Permits, https://www.epa.gov/uic/r9-uic-permits (last visited July 30, 2024) (indicating that the "CarbonFrontier/Aera Energy LLC" Class VI application is "in technical review").
[2] EPA, UIC Class VI Permit Tracker, https://www.epa.gov/system/files/documents/2024-07/class-vi-permit-tracker_7-24-24.pdf (last updated July 19, 2024).
[3] CEQA Guidelines § 15378(a); Cal. Pub. Res. Code § 21065.
[4] *Cnty. of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193.
[5] *City of Santee v. Cnty. of San Diego* (1989) 214 Cal.App.3d 1438, 1454-55.
[6] CarbonFrontier DEIR at 1-8.

AoR critically "includes the area where the injected plume and its associated pressure front may impact pore fluids."[7] EPA, however, does not unquestioningly accept a permit applicant's model AoR. EPA's technical review is an iterative process, whereby the agency goes back-and-forth with the project proponent with questions and answers. For CarbonFrontier, this technical review is ongoing (see above). As recently as April 2024, Aera responded to EPA's technical review comments for the site characterization and AoR modeling.[8] Aera's response to EPA is 17 pages long, and there is no indication whether EPA has accepted Aera's answers on the AoR as final, or whether there will be follow-up questions. It is therefore inaccurate for the County to assert in the DEIR that Aera has "fully characterized" the AoR.

Similarly, the DEIR admits that its analysis of Geology and Soils is based in part on Aera's Class VI application.[9] Since the Class VI permits are undergoing ever-changing technical review, this creates shifting sands upon which the DEIR's analyses rest. It is irrational to rely on pre-draft permits that change every few months, when instead the County must wait for EPA's approved draft permits to be released.

Fourth, it will be difficult for the County to keep up with all of the technical review updates to the Class VI permit. This speaks to why the County must sync its CEQA review with that of EPA's. For example, the DEIR includes a copy of the CarbonFrontier Class VI application from April 2024. Already that is out of date. EPA Region 9's website updated the pre-draft CarbonFrontier application on July 9, 2024.[10]

II. The DEIR's Project Objectives and Description Do Not Accurately Reflect CarbonFrontier's Activities.

As with the section above, the DEIR's project description concerning Project objectives and sources of CO_2 mislead the public and do not reflect the true scope of Project activities.

The applicant's objectives in the project description include reducing "the carbon intensity of Aera Energy's produced oil and gas by capturing CO_2 from produced gas (pre-combustion) and stationary sources (post-combustion)."[11] But the DEIR acknowledges that "operations related to oilfield" activities will not provide enough CO_2 to reach the "maximum injection capacity" of 3.3 million metric tons per year and "additional existing

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[7] EPA, Class VI Wells, https://www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-carbon-dioxide (last visited July 30, 2024).

[8] Letter from Beau Gentry, Aera Energy LLC, to David Albright, EPA Region 9, Re: Request for Additional Information (April 9, 2024), available at EPA Region 9, UIC Injection Permits, https://www.epa.gov/uic/r9-uic-permits. For the County's convenience, we are also attaching a copy of that letter when submitting this comment.

[9] CarbonFrontier DEIR at 4.7-1 ("The analysis in this section is largely based on . . . the U.S. Environmental Protection Agency Class VI Permit Application Narrative for the Aera CarbonFrontier Project . . . .").

[10] EPA Region 9, UIC Injection Permits, https://www.epa.gov/uic/r9-uic-permits (last visited July 30, 2024).

[11] CarbonFrontier DEIR at 3-8.

and new CO_2 sources . . . would need to be permitted and conveyed . . . for permanent underground storage."[12] The DEIR lists "future project sources" such as cement, steel, and direct air capture.[13] Clearly none of these future sources match the project objective of reducing the carbon intensity of Aera's oil and gas. Instead, adding future sources *changes* and *enlarges* the Project objectives in a way that is not reflected in the DEIR. This is an error that implicates both the project description and analysis of alternatives.

Further, the DEIR provides nothing more than the name, location, type, and status of potential future sources of CO_2, and concludes with:

> [T]hese projects are not required to be analyzed further in either the CTV I EIR or this EIR as approval of either Project does not compel approval, nor presume completion, of any other of the contemplated projects, no applications of these other projects are pending before the county, and there is not otherwise sufficient information available to allow for meaningful environmental review of the other projects at this time.[14]

A CEQA project description and analysis must include "future action" that is "a reasonably foreseeable consequence of the initial project" and would "be significant in that it will likely change the scope or nature of the initial project or its environmental effects."[15] The DEIR's project description fails in both aspects with regard to sources of CO_2. Because Aera Energy, LLC merged with California Resources Corporation (CRC),[16] we refer the County to Section I, subsection A of the July 18, 2024 comment letter from Earthjustice, et al. to the County on the Recirculated DEIR for CRC's Carbon TerraVault I project for a description of why the potential future sources for CarbonFrontier are not so speculative as to evade analysis.[17]

III. The DEIR Fails to Analyze Adequate Alternatives.

The DEIR fails to properly put forward, describe, and analyze a reasonable range of alternatives. Under CEQA, a proper analysis of alternatives is essential to comply with the Act's mandate that significant environmental impacts be avoided or substantially lessened where feasible. The analysis of alternatives lies at the "core of an EIR," and an EIR must "ensure that all reasonable alternatives to proposed projects are thoroughly assessed by the responsible official."

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[12] *Id.* at 3-32. (Note that the text says additional sources would need to be "conveyed to CTV I", but this is a typographical error, since the County appears to mean "conveyed to CarbonFrontier.")
[13] *Id.* at 3-32, 33.
[14] *Id.* at 3-34.
[15] *Laurel Heights*, *supra*, 47 Cal.3d at 396.
[16] *See* CarbonFrontier DEIR at 3-33.
[17] Comment from Earthjustice, et al. to Kern County Planning and Natural Resources Department, Re: Comments on the Recirculated Draft Environmental Impact Report for Carbon TerraVault I (July 18, 2024). We have attached that comment letter with our materials submitted for this comment period for the County's convenience.

The DEIR's alternatives discussion is flawed for at least the following reasons: (1) it relies on an inadequate project description; (2) it relies on an inadequate set of project objectives; (3) it fails to properly or coherently discuss the "no project" alternative and compare it to the Project. The County must revise the DEIR to address these flaws.

First, the DEIR's alternatives section is flawed because it is not based on a stable, accurate project description, as demonstrated above. Without a proper project description, it is not possible to effectively develop alternatives or compare Project impacts with alternatives in a way that is coherent and supported by substantial evidence.

Second, without a proper description and set of project objectives, it is impossible to adequately assess alternatives to the Project in a way that complies with CEQA. As noted above, the current project objectives artificially convey a purpose of only capturing CO_2 from Aera's onsite oil and gas operations.[18] This is at direct odds with the County's plan to approve the whole of the CO_2 storage reservoir and the foreseeable "need" to add future, outside CO_2 sources.[19] A proper statement of the lead agency's project objectives is essential to the development of an adequate alternatives analysis.[20] CEQA Guidelines section 15124(b) notes that a "clearly written statement of objectives will help the lead agency develop a reasonable range of alternatives to evaluate in the EIR and will aid the decision makers in preparing findings or a statement of overriding considerations, if necessary." That statement of the lead agency's objectives, in informing the lead agency's reasonable range of alternatives to a proposed project, cannot simply be delegated to a project proponent. A range of alternatives that is based exclusively on "the applicant's project objectives,"—as is the case here—does not comply with CEQA.[21]

Third, the DEIR's "no project" alternative discussion is flawed. The CEQA Guidelines require that the no project analysis discuss "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services."[22] This discussion must provide a "factually based forecast of the environmental impacts of preserving the status quo."[23] Here, the no project discussion is only a few cursory narrative paragraphs, with no supporting evidence or analysis. Also, statements like the following ignore the fact that

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[18] CarbonFrontier DEIR at 3-8.
[19] *Id.* at 3-32.
[20] *North Coast Rivers Alliance*, *supra*, 243 Cal. App.4th at 666 (citing Pub. Resources Code, §21001(g) (internal quotation omitted)); see also CEQA Guidelines, §15124(b) (stating an EIR requires a statement of the objectives sought by the proposed project).
[21] CEQA Guidelines, § 15124(b); see *Preservation Action v. San Jose* (2006) 141 Cal.App.4th 1336, 1351–52 ("Since CEQA charges the agency, not the applicant, with the task of determining whether alternatives are feasible, the circumstances that led the applicant in the planning stage to select the project for which approval is sought and to reject alternatives cannot be determinative of their feasibility. The lead agency must *independently* participate, review, analyze and discuss the alternatives in good faith." [citing *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 736]).
[22] CEQA Guidelines, § 15126.6(e)(2).
[23] *Ctr. for Biological Diversity v. Dept. of Fish & Wildlife* (2015) 234 Cal.App.4th 214, 253.

phasing out oil field operations altogether would meet State climate goals, whereas approving CO_2 storage capacity only perpetuates operations and enables outside, additional sources of emissions:

> Moreover, the No Project Alternative would not result in up to 40 million metric tons of concentrated CO2 storage capacity. The No Project Alternative also would not support California's Executive Order B-55-18 for California to achieve carbon neutrality by 2045 and net-negative emissions thereafter.[24]

This statement also plainly ignores the DEIR's own finding that the Project would generate 33.3 million tons of CO_2/e through 2045, and have *positive* greenhouse gas (GHG) emissions from anywhere between 108,000-1.1 million metric tons CO_2/e during Project years 1-7.[25] Proper analysis of a no project alternative would include this information.

Further, the Project's total emissions will produce significant air emissions and harm County residents. The DEIR says that emissions will "exceed the [Air District] thresholds for NO_X, PM_{10}, and $PM_{2.5}$, for which the Project region is nonattainment," exposing sensitive receptors to "substantial pollutant concentrations."[26] The cumulative air pollution impacts of the Project will also be "significant and unavoidable." The County must not approve a Project that *worsens* air quality when it already suffers some of the worst air quality in the country. The analysis of alternatives does not take air pollution into account, and the County must evaluate how alternatives could improve, rather than degrade, air quality.

IV. The DEIR's Analysis of Impacts and Mitigations Are Insufficient.

Discussion of a proposed project's environmental impacts is an essential component of an EIR.[27] The fundamental purpose of CEQA is to "inform the public and its responsible officials of the environmental consequences of their decisions *before* they are made."[28] To do so, an EIR must contain facts *and* analysis, not just an agency's bare conclusions.[29] CEQA also requires an EIR to describe and adopt all feasible mitigation measures to address a project's significant environmental impacts.[30] Mitigation measures must be "fully enforceable through permit conditions, agreements, or other legally binding instruments."[31]

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[24] CarbonFrontier DEIR at 1-20.
[25] *Id.* at 4.8-33.
[26] *Id.* at 1-11, 12.
[27] CEQA Guidelines, § 15126.2(a) ("An EIR *shall* identify and focus on the significant effects of the proposed project on the environment.") (emphasis added).
[28] *Laurel Heights Improvement Assn. v. Regents of Univ. of Cal.*, 6 Cal.4th 1112, 1123.
[29] *Citizens of Goleta Valley*, *supra*, 52 Cal.3d at 568.
[30] Pub. Resources Code, § 21002; CEQA Guidelines, § 15126.4(a)(1).
[31] CEQA Guidelines, § 15126.4(a)(1)(B), (a)(2).

The DEIR's analysis for several issue areas is incomplete or flawed. Further, a number of the County's mitigation measures are either insufficient or unlawfully deferred.

A. Safety, Emergency Response, and CO_2 Hazards

Troublingly and bewilderingly, despite the County acknowledging the immense risks of CO_2 ruptures and leaks—including possible fatalities—the DEIR characterizes the Project's impacts on safety and CO_2 hazards as "less than significant."[32] This appears to be based on flawed and unsupported reliance on various mitigations, including measures that have yet to even be formulated. But potential fatalities of Kern County residents, workers, and others must not be so easily brushed aside and left to chance. The County must amend its analyses and mitigations to fully address the Project's deadly risks.

Fatality risk to workers at Wonderful Nut Farms

The DEIR notes that Wonderful Nut Farms, which operates a solar panel area near the Project,[33] "may be exposed to a concentration of CO_2 greater than 4 percent, which may result in fatalities."[34] Depending on the wind direction, CO_2 concentrations may exceed 7 percent up to 1,200 feet from the release.[35] This is alarming. What is also alarming, though, is that there is no mitigation measure to address the proximity of these workers to the Project, nor is there any measure to *even notify* Wonderful Nut Farms about a CO_2 leak.

Mitigation Measure 4.9-4 requires notification to "surface landowner[s] and sensitive receptors located *within 300 feet* of any hazardous materials/waste release, ***other than CO_2***, immediately upon discovery."[36] This mitigation measure does nothing to reduce the fatality risk of Wonderful Nut Farm workers: it is an inadequate distance (300 feet, versus the 1,200 feet modeled for a fatal CO_2 cloud), and does not even apply to CO_2. Mitigation measure 4.9-12, requiring that in the case of "emergencies or releases, this information shall be communicated . . . to the Kern County Fire Marshall" and other County officials "within 24 hours"[37] also does not address the immediate need for people in the vicinity of the Project to either shelter in place or try to evacuate to escape the harms of a CO_2 leak.

There is no other mitigation that requires notification of nearby receptors when a CO_2 leak occurs. It is imperative that the County require notification to all landowners, residents, and sensitive receptors within *at least* 1200 feet of the Project that there could

[32] *See* CarbonFrontier DEIR at 1-52 to 1-61 (describing direct and cumulative impacts after mitigation).
[33] While the DEIR says that the solar panel area is "to the west" of the Project, it does not disclose the exact distance.
[34] CarbonFrontier DEIR at 4.9-54.
[35] *Id.*
[36] *Id.* at 1-55
[37] CarbonFrontier DEIR at 1-57.

be a risk of deadly CO_2 concentrations. Then, the County must require immediate notification to these parties upon discovery of a CO_2 leak. It is unsupported and unconscionable to do otherwise.

Similarly, Mitigation Measure 4.3-6 should be amended. It currently prohibits any Class VI or Class II injection well from being located within 4000 feet of any sensitive receptor.[38] But as noted above, CO_2 pipelines can also cause serious harms or fatalities. This measure should prohibit any injection well *as well as CO_2 pipeline* from being within 4000 feet of any sensitive receptor, *as well as* residence or business. Also, given that the Satartia CO_2 leak spread for miles, the County should consider extending the buffer from 4000 feet to a larger distance.

Deferred creation of an emergency response plan

The County improperly deferred creating an emergency response plan to address CO_2 leaks. According to Mitigation Measure 4.9-18:

> Prior to commencement of any injection of CO2, and in addition to the emergency response plan required by the EPA UIC permit, the owner/operator shall prepare an emergency incident response plan that addresses, advance leak detection methods and communication with fire responders, emergency medical response, Kern County Fire and Kern County Sheriff notification and protocols for incident management.[39]

There is no reason for the County not to create that emergency response plan now, and for that plan to be included in DEIR materials for public review and input. There are expert organizations around the country, such as the Pipeline Safety Trust, that could provide valuable input to that plan if it were released with the DEIR and subject to public comment. Moreover, first responders—such as those in Satartia, MS who endured a CO_2 leak response—could also review and weigh in. Instead, the County imagines a behind-closed-doors process where the *project operator* prepares a plan. It is irrational to let a project developer create an emergency response plan. Doing so and deferring its creation is unsupported, dangerous, and violates CEQA.

The "[f]ormulation of mitigation measures should not be deferred until some future time."[40] As an exception, "measures may specify performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way."[41] Further, even where the deferred formulation of mitigation might be allowable, there is a point beyond which delayed implementation is not allowed: "[o]nce

[38] *Id.* at 1-31.
[39] *Id.* at 4.0-73.
[40] CEQA Guidelines, § 15126.4(a)(1)(B).
[41] *King & Gardiner Farms, LLC v. County of Kern* (2020) 45 Cal.App.5th 814, 856.

the project reaches the point where activity will have a significant adverse effect on the environment, the mitigation measures must be in place."[42] An emergency response plan is not a set of "performance standards" that may be deferred. Instead, the County must work on a proposed plan and open it up to input as part of the EIR process.

B. Climate Change & GHG Emissions

CEQA requires that EIRs consider a project's reasonably foreseeable indirect impacts on the environment,[43] which includes indirect greenhouse gas (GHG) emission impacts. An environmental review must evaluate these impacts to the extent doing so is feasible and the effects are not speculative.[44] CEQA Guidelines Appendix G requires lead agencies to evaluate whether "the project [would] generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment."[45]

Significant GHG Emissions

The Aera Project will emit a significant amount of GHGs. This is unacceptable at a time of climate crisis, and when every ton of GHGs puts the goal of keeping warming to the Paris Agreement's goal of 1.5 degrees Celsius farther out of reach. For this reason alone, the County must deny the Project's permit application.

The DEIR should give the public context for what the Project's GHGs mean. For example, EPA has a GHG Equivalencies Calculator that translates what every ton of CO_2/e emissions mean in concrete terms that the public can understand.[46] For the CarbonFrontier Project, the EPA Calculator shows the following:

CarbonFrontier Emissions Category/Source	Estimated GHG Emissions Per DEIR	EPA Equivalent/Translation
Construction	27,975 MT CO_2/e[47]	30.8 million pounds of coal burned
Mobile and indirect electricity	4 million MT CO_2/e[48]	4.4 billion pounds of coal burned 10.7 natural gas-fired power plants in one year

[42] *Id.* at 860, quoting *POET, LLC v. Cal. Air Resources Bd.* (2013) 218 Cal.App.4th 681, 738.
[43] Cal. Code Regs., tit. 14, § 15064(d).
[44] *See id.* § 15145.
[45] CEQA Guidelines, Appendix G.
[46] EPA, GHG Equivalencies Calculator, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.
[47] CarbonFrontier DEIR at 4.8-24.
[48] *Id.* at 4.8-25.

CarbonFrontier Emissions Category/Source	Estimated GHG Emissions Per DEIR	EPA Equivalent/Translation
Project operation, years 1-7 (years of "net positive" emissions)	3.8 million MT CO_2/e[49]	4.1 million pounds of coal burned 10.1 natural gas-fired power plants in one year

The total GHG emissions of the Project are astounding and certainly significant. The Project's construction emissions *alone* are equivalent to burning over 30 million pounds of coal. Nothing in the Project's capture and injection of CO_2 negates those *actual GHG emissions* that undermine California's GHG reduction goals and contribute to global climate change. Similarly, the Project's year 1-7 emissions are *net positive*, even with CCS, and are the same as burning 4.1 million pounds of coal or operating 10 separate natural gas-fired power plants for one year. This is unacceptable. Kern County cannot allow such an increase in GHG emissions. There is no mitigation that reduces these impacts nor is there any overriding concern to justify these emissions in service of keeping oil field operations alive.

Moreover, the Project's supposed reduction in GHG emissions over time are based on the vague notion that the oil fields will accept outside sources of CO_2. The DEIR is trying to have it both ways: it is saying that future sources of CO_2 are too vague to analyze in the DEIR (see section II, *supra*) while also relying on these future sources to ratchet down the GHG estimates. The DEIR must pick one story of future CO_2 sources—supported by substantial evidence-- and re-do the DEIR in line with this evidence.

Rate of Capture

While we appreciate Table 4.8-5 showing the Projected Injection rates of the Project, the DEIR leaves out key information describing the *rate of capture* estimated for the three on-site sources of CO_2. Showing only projected injection amounts does not provide insight into what is happening at each CO_2 source. This information should be easily obtainable from the project proponent.

The NOP claimed that the Project's amine absorption processes would "react with and bind with over 90 percent of the incoming CO_2."[50] The DEIR makes this claim with the Pre-C capture produced gas stream, but it says nothing of the binding rate for Post-C capture. The DEIR must explain what the binding rate is with the Post-C capture sources. The DEIR must then account for the CO_2 that is not captured in the amine processes.

[49] *Id.*
[50] Aera CarbonFrontier Notice of Preparation at 8 (June 2023).

In addition, the DEIR must acknowledge that CCS projects historically have over-promised and under-delivered on their carbon capture promises.[51] For example, Chevron's natural gas-and-CCS project promised 80% capture, but after five years, achieved less than half of that.[52] A Stanford study found that the energy penalty of CCS can be up to 25% (meaning, whatever the capture promise is must be reduced by the energy penalty to calculate the true capture benefit) and concluded that CCS can increase air pollution and is not efficient at reducing carbon in the atmosphere.[53] We recommend that the County add an enforceable mitigation measure holding Aera accountable for meeting a certain capture rate; if that rate is not met, the Project (and associated facilities) must be shut down.

CO_2 Leakage

The DEIR acknowledges, directly and indirectly, that leaks may occur. For example, the DEIR notes that "the level of seismic activity in the region potentially could result in CO_2 leakage from underground storage."[54] Operational mitigations "may include . . . surface and near surface leak monitoring."[55] And in the GHG section, the DEIR appropriately notes that "[s]hould any of the injected CO_2 leak . . ., then GHG emissions from the project would be potentially significant."[56] The DEIR then says that Mitigation Measures 4.8-1 through 4.8-6 "would greatly reduce the likelihood of CO2 escaping from the reservoir."[57]

But the mitigation measures named do little to provide evidence that injected CO_2 will stay in the reservoir. As explained in the expert report prepared for Earthjustice, et al. on the Carbon TerraVault I CCS project DEIR, "[t]here are no permanence criteria in the Class VI federal regulations," as the EPA standards are aimed at water protection.[58] To analyze the Project's potential impacts, therefore, the County must define its permanence

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[51] IEEFA, The carbon capture crux: Lessons learned (Sept. 2022), https://ieefa.org/resources/carbon-capture-crux-lessons-learned.

[52] Guardian UK, Gas giant Chevron falls further behind on carbon capture targets for Gorgon gasfield (July 15, 2022), https://www.theguardian.com/environment/2022/jul/16/gas-giant-chevron-falls-further-behind-on-carbon-capture-targets-for-gorgon-gasfield.

[53] Jacobson, Mark Z., The health and climate impacts of carbon capture and direct air capture, Energy & Envtl Sci. , Vol. 12 (2019), https://pubs.rsc.org/en/content/articlelanding/2019/ee/c9ee02709b/unauth#!divAbstract; *see also* Stanford News, Stanford study casts doubt on carbon capture (Oct. 25, 2019), https://news.stanford.edu/2019/10/25/study-casts-doubt-carbon-capture/.

[54] CarbonFrontier DEIR at 4.7-16.

[55] *Id*. at 3-66; *see also id*. 3-74 (describing post-injection CO_2 leak detection that "would be implemented").

[56] *Id*. at 4.8-28.

[57] *Id*.

[58] DiGiulio, Dom, Ph.D., "Evaluation of the Recirculated Draft Environmental Impact Report – Carbon TerraVault I Facility" (July 16, 2024) [hereinafter, "DiGiulio Report"]. We have attached this report as part of the materials submitted as part of this comment. The report is appended as part of the Earthjustice, et al. comment (2024) on the Carbon TerraVault I DEIR.

criteria--that is, what is the level of retention of CO_2 in the ground that will be considered as "permanent." Dr. DiGiulio recommends, based on current research, that a criterion for leakage to the atmosphere is specified as a 95% probability of occurrence that 99% of CO_2 will be retained within subsurface media over a period of 1,000 years.[59]

There are at least 71 abandoned oil and gas wells penetrating the CO_2 injection and storage area; 40 of these must be plugged and before the Project may commence.[60] As of March 2023, Aera has 2,449 idle wells and 24,830 plugged/abandoned wells across the Belridge oilfields.[61] Dr. DiGiulio's report explains that leakage of CO_2 from wellbores is widely considered to be one of the most significant leakage pathways for geologic storage of CO_2.[62] Here, as with the Carbon TerraVault I project, given the large number of well penetrations in the area, a robust evaluation of wellbore integrity of both plugged and unplugged wells prior to injection is required to assess the CO_2 retention.[63] However, the DEIR did not conduct this analysis and thus fails to support its conclusions regarding CO_2 retention with evidence.

Other GHG Impacts

The Project's NOP said that "flue gas would continue to be vented to the atmosphere as allowed under the facilities current permits."[64] The DEIR does not contain this statement, but it also does not explain whether or not uncaptured flue gas will be vented. The County should explain whether this will happen or not, and if it will happen, what the emissions impacts will be.

C. Energy

The DEIR fails to adequately disclose, analyze, and mitigate the Project's impacts to energy resources.

First, the DEIR seems to think that its threshold determination should be whether the Project is energy efficient compared to other projects. There is no support for that approach. CEQA Guidelines, Appendix F lays out the following directives for proper discussion of a proposed project's energy impacts in an EIR:

> The goal of conserving energy implies the wise and efficient use of energy. The means of achieving this goal include:
>
> (1) decreasing overall per capita energy consumption,
>
> (2) decreasing reliance on fossil fuels such as coal, natural gas and oil, and

[59] DiGiulio Report at 11.
[60] CarbonFrontier DEIR at 3-2; *id.* at 3-41.
[61] *Id.* at 3-23.
[62] DiGiulio Report at 3.
[63] *Id.* at 8.
[64] Aera CarbonFrontier Notice of Preparation at 9 (June 2023).

(3) increasing reliance on renewable energy sources.[65]

The DEIR's conclusion on construction-related energy impacts states:

> Overall, construction activities associated with the proposed project would result in the consumption of petroleum-based fuels. However, there are no unusual project characteristics that would necessitate the use of construction equipment or vehicles that would be less energy efficient than at comparable construction sites in other parts of the state. Therefore, it is expected that construction fuel consumption associated with the proposed project would not be any more inefficient, wasteful, or unnecessary than at other construction sites in the region.[66]

This conclusion erroneously begins by asking whether the Project would be *more* inefficient, wasteful, or unnecessary than at other construction sites in the region. But CEQA instead requires an evaluation of whether this project is energy-efficient, not average. CEQA further requires mitigation of impacts to energy consumption, where feasible. The claim that the Project has no significant impact on energy resources is thus not supported by substantial evidence. The EIR should require, for example, use of electricity-powered construction equipment and vehicles in all feasible applications. Because operations will be powered by the on-side natural gas cogeneration facility,[67] the County should also consider requiring operations to be powered by true renewables, like on-site wind or solar.

Second, the energy demand for Project operations will be significant, but the DEIR brushes this aside based on an unsupported policy statement. The Project's expected maximum electric load will be approximately 49 MW.[68] This amounts to *nearly 3%* of the County's total annual electricity demand.[69] As shown in the DEIR's GHG emissions table, the "energy penalty" of running the capture facilities plus indirect electricity emmissions total 4 million tons of CO_2/e.[70] But rather than call this "inefficient, wasteful, or unnecessary", and thus significant, the County broadly concludes that "the energy would be consumed efficiently and would be typical of industrial carbon capture projects," and anyways, CCS projects "are essential to achieve the state's climate goals."[71] Therefore, "any energy consumed by the project is not considered to be wasteful or unnecessary."[72]

[65] CEQA Guidelines, Appendix F, § 2.
[66] CarbonFrontier DEIR at 4.6-14.
[67] *Id*. at 1-17.
[68] *Id*. at 4.1-15.
[69] *Id*.
[70] *Id.* at 4.8-25.
[71] *Id*. at 4.1-16.
[72] *Id*.

There is no evidence to support the County's conclusion. There are no facts to support that the Project is using energy efficiently. There are no facts to support that the Project's energy use is typical of other CCS projects (and even still, see above, this type of comparison is not appropriate under the CEQA Guidelines.) There is also no evidence that the Project is "necessary," given that the Project objectives are to keep oil field operations alive, which will derail California's climate goals. Instead, the County must revise the DEIR and create enforceable mitigation measures so that the use of energy is shown to be efficient and the consumption is not inefficient, wasteful, or unnecessary.

Third, though the DEIR concludes that cumulative energy use will be significant,[73] Mitigation Measure 4.6-1 addresses this only by requiring an "annual report on the total amount of electricity consumed by the carbon capture facilities . . . ."[74] There is nothing in the mitigation to then require any reduction in energy use or striving for efficiency. This is a toothless mitigation that must be revised so as to meaningfully address and reduce impacts from the Project's energy use.

Fourth, the DEIR concludes that the Project will meet CEQA Appendix F requirements as the State phases out "oil and gas extraction and replaces gas power plants and fossil fuel industry sources with newer carbon capture facilities and renewable energy sources."[75] Similarly, the DEIR claims that implementing the Project will "decrease reliance on fossil fuels, including natural gas."[76] This makes no logical sense. The Project's CO_2 sources are part of running the oil fields' operations. Constructing the CCS equipment will require fossil fuels, and the CCS equipment will be powered by natural gas.[77] In other words, the Project is inextricably linked to gas power plants and the fossil fuel industry. The Project in no way *decreases* reliance on fossil fuels; the exact opposite is true. The only way to meet Appendix F requirements is to phase out oil field operations altogether, not add additional emissions sources (CCS construction and operation), as is proposed here.

D. Biological Resources

Protecting biological resources is a fundamental tenet of CEQA. Under Public Resources Code section 21001(c), it is the policy of the state to "[p]revent the elimination of fish or wildlife species due to man's activities, insure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities." The Biological Resources section's analyses and mitigations fall short on several grounds.

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[73] *Id*. at 1-13.
[74] *Id*. at 1-50.
[75] *Id*. at 1-17.
[76] *Id*.
[77] *See, e.g., id*. at 4.6-18 (""The majority of energy consumption during project operation would be natural gas consumption by operational equipment, operational electrical consumption, and maintenance trips and employee trips.").

Impacts of CO_2 Leaks on Wildlife, Plants, and Habitats

The DEIR fails to account for the evidence showing that operating CCS projects can be severely detrimental, or even deadly, to wildlife, plants, and habitats.

The Project poses risks to biological resources from leakage and uncontrolled blowouts of compressed CO_2 from pipelines and injection wells. Compressed CO_2 forms a low dense cloud that can spread long distances from the release site and sicken and asphyxiate living things, including plants and animals.[78] CO_2 injection in oil fields and CO_2 pipeline transport have resulted in leakage and blowouts in several states that have caused wildlife deaths and significant habitat degradation. For example, a CO_2 injection well blowout in the Tinsley field, Mississippi, took 37 days to bring under control and killed deer, birds, fish, and other animals.[79] The blowout ejected CO_2 along with mud and drilling fluids, requiring the removal of 27,000 tons of drilling mud and contaminated soil and 32,000 barrels of liquids, and causing extensive habitat damage.[80] Other examples of CO_2 harms to wildlife and plants, and research on this topic, include:

- In 1986, a sudden, catastrophic release of CO_2 from Lake Nyos in Cameroon killed 1,700 people and 3,000 cattle. The CO_2 spread 10 km from the lake. Bird, insect, and small mammal populations in the area were not seen for at least 48 hours after the event.[81]

- Experiments with controlled injections of CO_2 into soil showed adverse effects on plants in response to CO_2 exposure. Biomass changes were seen in all plants studied; for example, clover plants decreased by 79% while grass decreased by 42%. The researchers' overarching conclusion was that elevated concentrations of soil CO_2 damages both soil microbiology and growing vegetation.[82]

- Other research on CO_2 and plants showed reduced plant growth and extensive mortality where CO_2 concentrations were greatest in the soil. For the plants that survived, root and shoot growth was significantly lower than in controls.

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[78] See Pipeline Safety Trust and AccuFacts, *CO_2 Pipelines: Dangerous and Under-Regulated* (March 2022), https://pstrust.org/wp-content/uploads/2022/03/3-23-22-Final-Accufacts-CO2-Pipeline-Report2.pdf.

[79] Zegart, Dan, *The Gassing of Satartia*, Huffington Post (Aug. 26, 2021), https://www.huffpost.com/entry/gassing-satartia-mississippi-co2-pipeline_n_60ddea9fe4b0ddef8b0ddc8f.

[80] Amy, Jeff, *Oil spills in Mississippi, Alabama lead to $3.5 million in penalties for the company,* Clarion Ledger (Apr. 30, 2019), https://www.clarionledger.com/story/news/2019/04/30/oil-spills-penalties-mississippi/3625587002/.

[81] Kling, G.W. et al., *The 1986 Lake Nyos Gas Disaster in Cameroon, West Africa*, 236 Science 169 (1987).

[82] Smith, K.L. et al., *Environmental Impacts of CO2 Leakage: Recent Results from the ASGARD Facility, UK*, 37 Energy Procedia 791 (2013).

> Reproductive variables such as number of seeds per plant and seed dry weight per plant were also reduced compared to controls.[83]

It is an error for the DEIR not to acknowledge and analyze that a CO_2 leak could be harmful, or even deadly, to wildlife, and harmful to plants and soil ecosystems. Instead, the rundown of direct and indirect impacts fails to mention CO_2 leaks at all.[84]

Even though the DEIR does not find impacts from CO_2, it includes a mitigation measure acknowledging such harms could occur and requiring an immediate shutdown "of all injection operations, compliance with all requirements of the EPA Class VI UIC permit and on-site consultant with California Fish and Game and USFWS."[85] This is a useful mitigation but it is irrational and arbitrary for it not to be connected to a disclosure of potential impacts.

Similarly, the DEIR must disclose, analyze, and mitigate impacts of CO_2 leaks to burrowing species. Burrowing animals are particularly vulnerable to death from CO_2 suffocation in the event of CO_2 pipeline or injection well blowout, since released CO_2 could fill nearby burrows where animals are resting or retreating. The DEIR acknowledges that construction could adversely impact "ground-dwelling or fossorial animals (i.e., animals that live in nests, dens, burrows, or substrate below ground)."[86] The same acknowledgement, followed by mitigation, must be done for the potential of CO_2 leaks on species that use the subsurface.

Worker Awareness Program

Mitigation Measure 4.4-17 foreseeing a Worker Enviro Awareness Program is a good start, but the County must not defer its creation. The DEIR says that this program "shall be developed."[87] As noted earlier in this comment section, CEQA does not allow deferring development of a mitigation measure. CEQA only allows an agency to put off developing a mitigation if it requires further data or inputs from operations to prescribe measures, or if development is impractical or infeasible to devise the specifics of such a program.[88] None of these extenuating circumstances apply to this mitigation.

Further, the County should consider and incorporate into the mitigation what the U.S. Fish and Wildlife Service (USFWS) recommends regarding the San Joaquin Kit Fox:

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[83] Al-Traboulsi et al., *Potential Impact of CO2 Leakage from Carbon Capture and Storage (CCS) Systems on Growth and Yield in Spring Field Bean*, 80 Environ. Exper. Botany 43 (2012).
[84] *See* CarbonFrontier DEIR at 4.4-59 to 61.
[85] *Id.* at 4.4-85.
[86] *Id.* at 4.4-61.
[87] *Id.* at 4.4-84.
[88] See, e.g., *Defend the Bay v. City of Irvine* (2004) 119 Cal.App.4th 1261, 1275; *Preserve Wild Santee*, *supra,* 210 Cal.App.4th at 281; CEQA Guidelines, § 15126.4(a)(1)(B).

> The program should consist of a brief presentation by persons knowledgeable in kit fox biology and legislative protection to explain endangered species concerns to contractors, their employees, and military and/or agency personnel involved in the project. The program should include the following: A description of the San Joaquin kit fox and its habitat needs; a report of the occurrence of kit fox in the project area; an explanation of the status of the species and its protection under the Endangered Species Act; and a list of measures being taken to reduce impacts to the species during project construction and implementation. A fact sheet conveying this information should be prepared for distribution to the previously referenced people and anyone else who may enter the project site.[89]

This type of thorough education is appropriate for all protected species that are or could occur at the Project site. These materials must be developed and shared with the public and decisionmakers prior to finalizing and certifying the DEIR.

Finally, MM 4.4-18 provides that "wildlife found that might have been affected by exposure to CO_2 shall immediately cause a shutdown of all injection operations." This measure is important and should therefore be incorporated into the Worker Environmental Awareness Program, along with other information about exactly *how* to identify wildlife suffering symptoms of CO_2 exposure.

Consultation with Wildlife Agencies

The Project's mitigation measures suggest that consultation with the California Department of Fish and Wildlife (CDFW) and federal USFWS could occur *after* ground-disturbing activities commence, rather than before.[90] This approach is incorrect and must be amended.

The CDFW made clear in its July 6, 2023 comment letter on the Project's Notice of Preparation (included in the appendix for this DEIR) that consultation is needed based on a finding that protected species are present at the Project site:

> [I]f the surveys reveal the aforementioned unlisted species, the EIR should include a commitment by the Project proponent to consult with CDFW, *prior to commencing the Project*, to identify and implement appropriate measures to avoid or minimize impacts to those species.[91]

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[89] USFWS, *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* at 6, https://www.fws.gov/media/standardized-recommendations-protection-endangered-san-joaquin-kit-fox-prior-or-during-ground.

[90] *See, e.g.*, 1-4 ("If blunt-nosed leopard lizards are observed at the work site during construction, construction shall cease within a 250-foot radius and the USFWS, and the CDFW shall be consulted to determine what additional measures would be necessary to prevent take of this species.").

[91] CDFW letter to Kern County re: Aera CarbonFrontier Notice of Preparation (July 6, 2023) at 4.

Table 4.4-1 of the DEIR lists wildlife observed during reconnaissance surveys, including several State Threatened Species and the blunt-nosed leopard lizard (BNLL), a federally endangered and State endangered / CDFW fully protected species.[92] This is enough to trigger consultation with CDFW prior to construction. The DEIR must therefore be corrected, and the County must consult with this agency.

Similarly, the CDFW explains the following about federal Endangered Species Act obligations that apply *before* ground-disturbing activities:

> CDFW recommends consulting with the USFWS on potential impacts to federally listed species including, but not limited to the aforementioned San Joaquin kit fox, blunt-nosed leopard lizard, California jewelflower, giant kangaroo rat, Tipton kangaroo rat, Buena Vista Lake ornate shrew, San Joaquin woollythreads, and Kern mallow. Take under the Federal Endangered Species Act (FESA) is more broadly defined than CESA; take under FESA also includes significant habitat modification or degradation that could result in death or injury to a listed species by interfering with essential behavioral patterns such as breeding, foraging, or nesting. *Consultation with the USFWS in order to comply with FESA is advised well in advance of any ground disturbing activities*."[93]

The Project and County risk running afoul of the Endangered Species Act if federal consultation is not initiated as soon as possible, and certainly before any construction occurs. The DEIR acknowledges that it has not consulted, nor has it obtained a USFWS Incidental Take Permit (ITP).[94]

Blunt-nosed leopard lizard

The BNLL is federally Endangered under the Endangered Species Act and, as CDFW explains, "is State fully protected, therefore, no 'take', incidental or otherwise, can be authorized by CDFW; complete avoidance of this species is required to comply with State law."[95]

First, to avoid take, the County must not unlawfully defer creation of a Worker Environmental Awareness Program. At present, Mitigation Measure 4.4-15(c)(1) merely says that if BNLL are detected during surveys, such a program "shall be implemented." But 2023 reconnaissance surveys already detected five BNLLs across the Project.[96] There is no reason for the County to defer creation of this program; as explained earlier, deferring this mitigation is illegal under CEQA.

[92] CarbonFrontier DEIR at 4.4-1, 2.
[93] CDFW letter to Kern County re: Aera CarbonFrontier Notice of Preparation (July 6, 2023) at 7.
[94] CarbonFrontier DEIR at 1-2.
[95] CDFW letter to Kern County re: Aera CarbonFrontier Notice of Preparation (July 6, 2023) at 4.
[96] CarbonFrontier DEIR at 4.4-43.

Second, MM 4.4-15 proposes BNLL buffer areas that fail to match with evidence from CDFW regarding the appropriate buffer size to create a "reasonable chance of preventing take" of the BNLL.[97] The agency reviewed the best available scientific information on the area which individual BNLL use and the distances that individuals are known to move between points.[98] They summarized relevant findings and concluded that the buffer area would need to be 164 acres *at a minimum* to avoid take.[99]

The DEIR's buffers for the BNLL do not follow the CDFW's recommendations. The buffers are either and 50 feet (MM 4.4-15(a) or 250 feet (MM 4.4-15(b), (c)(3) and (c)(8)). A 50-foot buffer is only 2% of the CDFW's recommendation, whereas a 250-foot buffer only 10% of the CDFW recommendation. The DEIR offers no explanation for running counter to the best available scientific evidence of what buffers might be reasonable to avoid take.

Alternatives

The DEIR ignores the CDFW's urging "that the information and results obtained from the biological technical surveys, studies, and analysis . . . be used to develop and modify the Project's alternatives to avoid and minimize impacts to biological resources to the maximum extent possible."[100] Instead, the alternatives evaluation considers only cumulative Biological Resources impacts,[101] rather than consider how project infrastructure and activities could be sited to avoid all direct, indirect, and cumulative impacts. Even if the DEIR concluded that direct and indirect impacts to Biological Resources would be less than significant with mitigations, that does not reach what the CDFW advised the County to do. The County offers no explanation for ignoring this expert agency advice.

[97] *See* Carbon TerraVault I Draft EIR, Vol. 2, App'x A.2: Comment Letters at 151 (comment letter from the CDFW on the Elk Hills Project addressing species like the BNLL).
[98] *Id*.
[99] *Id*. at 152–53 (going on to explain that there is "a reasonable plan for avoidance is to assume that the lizard might utilize up to 98.8 acres in any direction from where it was observed," and assuming a circular home range, the diameter would be 2340.8 feet, or a 395-acre circle as a buffer).
[100] CDFW letter to Kern County re: Aera CarbonFrontier Notice of Preparation (July 6, 2023) at 6.
[101] CarbonFrontier DEIR at 6-2.

CONCLUSION

For the reasons set forth in this letter, we urge the County to re-do its DEIR for the Project, prepare and circulate a revised DEIR, and ultimately reject the Aera CarbonFrontier Project.

Please note that we have uploaded all of the sources cited herein for the County's convenience. Those are available at this link: https://diversity.box.com/s/yg3mq55cmewthmutparyg9n9fdv74ejy.

Respectfully submitted,

Center for Biological Diversity
Victoria Bogdan Tejeda, Staff Attorney
vbogdantejeda@biologicaldiversity.org

Central California Environmental Justice Network
Nayamin Martinez
nayamin.martinez@ccejn.org

Central Valley Air Quality Coalition
Jasmin Martinez
jasmin@calcleanair.org

From: SoCalGasTransmissionUtilityRequest
To: Keith Alvidrez
Subject: CarbonFrontier CCS
Date: Tuesday, September 10, 2024 9:05:42 AM
Attachments: 1679-24-.pdf
DCF 1370-23-85N 1203 7056 CarbonFrontier CCS Project by Aera Energy LLC (PP23402).msg

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Good morning,
The above request matches a previous request we responded to in 2023. Please see our email response attached above. Once plans are available for review please provide a copy for an engineer to be assigned and review your project.
Thank you,
Nerses Papazyan
Pipeline Planning Assistant-Transmission

From:	SoCalGasTransmissionUtilityRequest
To:	Cindi Hoover
Subject:	DCF: 1370-23-85N 1203 7056 / CarbonFrontier CCS Project by Aera Energy, LLC (PP23402)
Attachments:	1370-23-85N 1203 7056 MAP REQUEST.pdf 1370-23-85N 1203 7056 MAP.pdf 1370-23-.pdf 1370-23-85N 1203 7056 GEN REQ.pdf

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Good afternoon,

Attached is a letter from the Transmission Department of SoCalGas stating that we have high pressure gas transmission facilities within your proposed project vicinity. Included is a map of the conflict area and our general requirements when performing work or planning projects near SoCalGas high pressure lines. Please note, dimensioning is not provided, and we do not share as-built maps.

If additional assistance is required, please send a copy of the project plans for an engineer to review and advise.

Please reference the Document Control File number (DCF) on all future correspondence in regards to this project.

Thank you,
Nerses Papazyan
Pipeline Planning Assistant
Gas Transmission Technical Services

socalgas

PLEASE VISIT OUR INTERACTIVE WEBSITE TO VIEW OUR HIGH PRESSURE DISTRIBUTION AND TRANSMISSION LINES:
SOCALGAS - NATURAL GAS PIPELINE MAP.

TO HELP THE ENVIRONMENT AND TO EXPEDITE RESPONSES, PLEASE SEND FUTURE PROJECTS AND CORRESPONDING ATTACHMENTS VIA EMAIL: SoCalGasTransmissionUtilityRequest@semprautilities.com

Please allow up to 60 days to receive a response to all future utility requests

SCG Transmission General Requirements

Transmission Technical
Services Department

9400 Oakdale Ave
Chatsworth, CA 91311
SC9314

July 3, 2023

Cindi Hoover
Kern County Planning & Natural Resources Dept
hooverc@kerncounty.com

Subject: **CarbonFrontier CCS Project by Aera Energy, LLC (PP23402)**

DCF: **1370-23-85N 1203 7056**

The following are general requirements provided when performing work or planning projects near SoCalGas high pressure lines. Please review requirements along with project plans and notify SoCalGas Transmission Department about any questions or conflicts.

It is highly recommended that communication is maintained with SoCalGas to address all conflicts. Depending on the specific scope of your project there may be less or more requirements that need to be discussed regarding your project.

1. Consideration must be given to the safety of our pipeline(s) during all project stages.
2. SoCalGas must have continuous and uninterrupted access to the pipeline(s) and easement(s). In addition, SoCalGas conducts routine patrols and surveys of the pipeline(s); SoCalGas needs drivable access along the pipeline(s)/easement(s).
3. Buried pipelines must have a minimum cover of 3 feet and a maximum cover of 7 feet below finished grade. No change of grade whatsoever, even within these parameters, shall be made without prior approval of SoCalGas.
4. Prior to SoCalGas approving encroachment onto its easement(s), SoCalGas must be furnished with final grading plans showing the depth of the pipeline(s) below the existing surface and the depth of the pipeline(s) below the proposed finished grade. These elevations must meet SoCalGas' requirements for buried pipelines.
5. No permanent structures, such as buildings, block walls, foundations, gates, etc., shall be constructed within the easement or over the pipeline(s).

SCG Transmission General Requirements

6 - There shall be no planting of trees or other deep-rooted plants within the easement(s) or over the pipeline(s).

7 - Substructures shall cross perpendicular to the easement(s). Substructure crossings must provide a minimum of 18-inches vertical clearance from the pipeline(s). Additional separation is required for leach lines, fuel lines, etc.

8 - Parallel encroachments within the easement(s) are prohibited. In areas where a parallel substructure is being constructed outside of the easement(s), SoCalGas requires five feet of separation, with three feet of undisturbed fill, in order to protect the integrity of our facilities and allow the facilities to be safely accessed during inspection, maintenance, and repair. Additional separation may be needed for leach lines, fuel lines, high voltage electric, etc.

9 - All encroachments onto SoCalGas' easement(s) must have written approval of SoCalGas prior to construction or encroaching onto the easement(s).

10 - All work within the SoCalGas easement(s) and/or within 10 feet of the pipeline(s) must be witnessed by a SoCalGas representative, and no work will be allowed without the SoCalGas representative on site.

11 - No heavy equipment shall cross the pipeline(s) without SoCalGas' approval. Additional protective measures may be required where heavy equipment is expected to cross the pipeline(s).

12 - No mechanical equipment shall operate within three horizontal feet of the pipeline(s), and any closer work must be performed by hand.

13 - No mechanical equipment shall operate within two vertical feet of the pipeline(s), and any closer work must be performed by hand.

14 - Buried pipeline(s) shall not be left exposed, and exposed pipeline(s) shall not be buried, without prior inspection and approval by SoCalGas. If the pipeline(s) are exposed during construction (e.g. substructure crossings, etc.), the pipeline must be backfilled with sand or zero-sack slurry only.

15 - No vibratory compaction is permitted over the pipeline(s). In rare cases, vibratory compaction may be approved by SoCalGas' Engineering Department following review of detailed site conditions, pipeline data, and equipment specifications.

16 - All contractors and subcontractors must be notified of the presence of the pipeline(s).

17 - Contractors and subcontractors must call DigAlert (811) at least 2 working days prior to construction, grading, or excavation.

18 - Once approved, encroachments within SoCalGas' easement(s) shall be documented in an easement amendment or other document, as deemed appropriate by SoCalGas' Land Services Department.

SCG Transmission General Requirements

In addition to the previous requirements, SoCalGas recommends the following:

19 - Potholes should be made, as necessary, to establish the horizontal and vertical alignment of the pipeline(s) within the project area. This information should be indicated on the plans, as needed. CAUTION: SoCalGas personnel must be present during potholing operations. Arrangements for SoCalGas personnel to stand by during potholing activities can be made by calling DigAlert at 811.

20 - Consideration should be given to building setbacks from the easement lines. A minimum 15-foot setback is recommended whenever possible.

21 - All potential buyers or tenants of the property should be made aware of the presence of the pipeline(s) and easement restrictions.

Best Regards,

SoCalGas Transmission Technical Services

1 inch = 3,013 feet

Map Name: 1370-23-85N 1203 7056

Map Type: Gas Asset Map

Printed By: GTTS

Printed Date: 6/28/2023

Southern California Gas Company

A Sempra Energy utility

SIERRA CLUB

KERN-KAWEAH CHAPTER

September 11, 2024

VIA ELECTRONIC MAIL

County of Kern– Planning Commission

Attn: Keith Alvidrez, Planner II

Kern County Planning and Natural Resources Department
2700 “M” Street, Suite 100
Bakersfield, CA 93301

Submitted via email to AlvidrezK@kerncounty.com

Re: Comment on Draft EIR for CarbonFrontier CCS Project by Aera Energy, LLC, SCH 2023060293

Dear Mr. Alvidrez,

We at the Sierra Club Kern-Kaweah Chapter, would like to submit our comment on the Draft Environmental Impact Report (DEIR) for the CarbonFrontier Carbon Capture and Sequestration Project by Aera Energy, LLC (PP23402).

The proposed CarbonFrontier project would construct and operate a carbon capture and storage (CCS) facility for permanent underground storage of up to 40 million metric tons of carbon dioxide (CO2) on approximately 12,362 surface acres in the North and South Belridge oilfield in unincorporated Kern County. The CCS facility would be comprised of four (4) CO2 capture sites which consist of one (1) pre-combustion and three (3) post-combustion sources, up to nine (9) Class VI underground injection control (UIC) wells, up to eight (8) monitoring wells, and approximately 14.5 miles of CO2 facility pipelines. The proposed CCS project would capture CO2 from an initial source of existing produced gas streams (precombustion) and emissions from existing stationary sources (post-combustion) within the South Belridge Oil Field and transport the CO2 through a facility pipeline to the North Belridge oilfield for injection at up to the nine (9) dedicated Class VI UIC wells. The proposed CO2 underground storage space, which is approximately 2,290 acres in size (maximum modeled CO2 plume area), would be

located within the North Belridge oilfield within the CCS Surface Land Area rights held by Aera Energy and other private owners.

Considering the short term and long-term impacts on this development on the environmental health of Kern County and surroundings, the DEIR for this project is deficient in not having more fully addressed numerous issues including:

The project has not yet met the regulatory standards and review process of the Federal EPA class vi injection wells and should therefore not be allowed to continue with this phase of environmental review; instead, the county's environmental review should pause until the Federal EPA has made its determination on the safety and feasibility of the project.

The project's assumptions regarding its ability to store carbon dioxide is led by the hope that leakage will not occur and admits there is significant and unavoidable risk of air contamination from greenhouse gas emissions. This is because carbon dioxide is highly corrosive when it comes into contact with water, as is a possibility in oil and gas related production. This alone indicates the project may be unsafe.

GHG EMISSIONS AND CLIMATE CHANGE

Global warming is a serious issue, perhaps the most serious issue that we as a species will ever have to face. Dr. James Hansen, Director of the NASA Goddard Institute for Space Studies writes, "The stakes, for all life on the planet, surpass those of any previous crisis. The greatest danger is continued ignorance and denial, which could make tragic consequences unavoidable."

There is much important new information on climate change. For example:

- The IPCC AR6 synthesis report (https://www.ipcc.ch/report/ar6/syr/) includes warnings that the world is approaching "irreversible" levels of global heating, with catastrophic impacts rapidly becoming inevitable; and that it is "now or never" to take drastic action to avoid disaster.
- "A new study has revealed that the language used by the global climate change watchdog, the Intergovernmental Panel on Climate Change (IPCC), is overly conservative - and therefore the threats are much greater than the Panel's reports suggest." https://www.sciencedaily.com/releases/2019/03/190320102010.htm
- NOAA Global Monitoring Laboratory - THE NOAA ANNUAL GREENHOUSE GAS INDEX (https://gml.noaa.gov/aggi/aggi.html) is also substantial and critically important new information.

- Harmful tipping points in the natural world pose some of the gravest threats faced by humanity. Environmental stresses could become so severe that large parts of the natural world are unable to maintain their current state, leading to abrupt and/or irreversible changes. Global Tipping Points | Home (global-tipping-points.org)

California courts have ruled, "the greater the existing environmental problems are, the lower the threshold should be for treating a project's contribution to cumulative impacts as significant."

On page 4-20, the Air Quality Impact Analysis (AQIA) states, "The installed capture facilities will have a capture efficiency of 95% at the pre-combustion facility and 90% at the post-combustion facilities."

- The DEIR is deficient in that neither the AQIA nor the DEIR present any evidence for this high capture rate assumption.
- These capture rate assumptions must not be accepted without convincing evidence that they will be attained.
- According to Table 4.8-4 of the DEIR for the neighboring Carbon TerraVault I CCS project, this similar project will achieve only a 24.1% GHG capture ratio, much lower than the CarbonFrontier assumptions. Why would CarbonFrontier so vastly outperform Carbon TerraVault I?
- The numbers in Table 4-10 of the AQIA lead to a total 90.22% GHG capture ratio speculation. This unfounded assumption is incorporated into Table 4.8-5 of the DEIR which also incorporates additional CO_{2e} injections from ambiguous outside sources so as to supposedly achieve negative total net CO_{2e} emissions.
- Based on these questionable assumptions and tortured reasoning, the DEIR improperly concludes that "the project's impacts related to GHG emissions would be less than significant."
- Even though there is no substantial evidence presented, the project takes credit for the highest capture rates and for carbon capture from "unknown" outside sources. The result of all this tortured reasoning is that there are only minimal GHG mitigation measures for this huge project.

The DEIR is deficient in not having justified extreme GHG capture ratios. The DEIR must be revised to reflect more realistic and justifiable ratios. At the very least, the County must add an enforceable mitigation measure holding the project accountable for meeting the assumed capture efficiency rates; if that rate is not met, the project must be shut down.

GHG Mitigation Measure 4.8-6 requires the project to offset all GHG emissions not covered by other regulations. Based on the questionable capture ratios noted above, Table 4.8-4 concludes that the project will have negative GHG emissions. If this is true,

there will be nothing to offset, and MM 4.8-6 is pointless. The DEIR must specify the amount of GHG emissions to be offset via MM 4.8-6.

The other GHG mitigation measures either require the project to comply with regulations of other agencies (something it would have to do anyway) or to submit an inconsequential report to the County.

The DEIR is deficient in not determining realistic GHG emissions for this project and in not requiring substantial enforceable mitigation measures.

On page 4-21, the Air Quality Impact Analysis (AQIA) speculates, "Although no outside sources of CO_2 have been identified at this time, it is reasonable to assume that Aera Energy would begin importing CO_2 in year 5 of project operation." The DEIR is deficient in not presenting the reasoning behind this speculation. The DEIR presumably relies on Table 3.10, Cumulative Projects, as a list of offsite projects which may or may not export CO_2 to the CarbonFrontier project, but none of these projects have been permitted, and most have not even begun the permitting process. One which is actually in the process, the Eastridge CCS project in the Kern River oilfield, would require at least a 40-mile pipeline through populated areas to export CO_2 to the CarbonFrontier project, the major impacts of which must be addressed in this EIR if CarbonFrontier is to reap the benefits. In general, the DEIR must address the impacts of importing CO_2 within 5 years from outside sources if it is to take credit for it.

AIR POLLUTION

The southern San Joaquin Valley fights it out every year with Los Angeles for having the worst air pollution in the nation. See the American Lung Association report at http://www.lung.org/our-initiatives/healthy-air/sota/city-rankings/states/california/. Since our extreme air pollution affects the health of many residents, the EIR must thoroughly address the issue.

Mitigation measure MM 4.3-5 requires the project to enter into a Developer Mitigation Agreement (DMA) with the SJVAPCD to fully offset NOx, ROG, PM10, and PM2.5 "not otherwise required to be fully offset by District permit rules and regulations." While the principle is sound, the DEIR needs to clarify a number of issues so as to assure proper implementation.

- The DEIR is defective in that it does not contain a table of unmitigated emissions, emissions occurring after existing rules and regulations have been applied. Without this information, DMA implementation and effectiveness is obscured.
- On page 4.3-71, the DEIR states, "The total of all project emissions from all sources of construction and operation is 808.61 tons." This does not seem to be consistent with total project emissions listed in Table 4.3-15, which add up to

849.06 tons per year. How is this computed? How much will be offset by the DMA?

- The DEIR, on page 4.3-73, seems to indicate that the mitigation cost per ton of criteria pollutant will be at least $13,153. It then states that, “The current estimate for the mitigation fee amount is $1,625,973.86 plus the 4 percent administrative fee.” A simple division indicates that 123.62 tons of pollutants will be offset by the DMA under this scheme. Is this the total amount of pollutants that will be offset by the DMA? Is this a one-time or an annual amount?
- On page 4-15, the AQIA states, “The VERA fee would be calculated based on the calculated emission tonnage for the total wells of the Project.” Summing emissions from Table 4-8 would indicate that 104.89 tons of emissions would be offset by the DMA. Is this a one-time or an annual amount?
- As noted, project emissions values in the DEIR are inconsistent. The DEIR must reveal the amounts of criteria pollutants which will be offset by the DMA over the lifetime of the project.
- Project emissions are computed in tons per year, and each year of operation will see significant criteria pollutant emissions, a total of 201.28 tons per year of ROG, NOx, PM10, and PM2.5 operational emissions **annually** according to Table 4.3-15. The DEIR must condition the DMA requirement to account for unmitigated annual emissions.
- SB 905 requires this project to “ensure that the use of carbon dioxide removal technologies and carbon capture and storage technologies does not have an adverse impact on **local** air quality and public health, particularly in low-income and disadvantaged communities” (emphasis added). The County should require that the DMA include provisions that air pollution reduction projects be situated in the area of the impact, perhaps in the vicinity of nearby AB 617-designated Shafter.
- Unfortunately, there is no requirement that DMA air pollution mitigation projects take place here locally. The city of Stockton or somewhere else in the north valley could benefit from the cleaner air resulting from this agreement. Bakersfield’s already dreadfully dirty air gets dirtier; Stockton’s air gets cleaner. The local pollution burden gets even worse; the air in nearby AB 617-designated Shafter communities gets even worse. Why would the County give away the clean air benefits to some other region instead of requiring them to be here where the impact is? If we don’t want our local air to get dirtier from the pollution associated with this project, the County should insist that the DMA include provisions that air pollution reduction projects be situated in the area of the impact.

BIOLOGICAL RESOURCES

Multiple endangered and/or special status species were observed on the project site, including San Joaquin kit fox, blunt-nosed leopard lizards, horned lark, and San Joaquin antelope squirrels, and the property is suitable habitat for many other species. The DEIR notes, “direct impacts on the species could include mortality or injury caused by project construction activities. The project could also result in the loss of suitable habitat.”

Post-approval biological surveys do not satisfy CEQA’s informational requirements; the decision-makers need to know the results of the biological surveys in order to assess the Project’s potential biological impacts BEFORE deciding whether to approve the Project. Post-approval surveys cannot inform the County’s decision whether to approve the Project. To address biological resource issues, **focused/protocol biological surveys and consultation with the USFWS and CDFW should be required *before project approva*l**. Consultation with state and federal wildlife agencies must not be left to the developer’s or the biologist’s option.

To approve this project now before decisive current input from wildlife resource agencies is received, neither the decision-makers nor the public have any idea whether there are significant species and habitat issues, nor do we know what mitigation may be required. Mitigation requirements must not be deferred until after project approval.

Loss of habitat is a major reason for species decline. Mitigation for habitat loss and potential species take should include Incidental Take Permit acquisition and purchase of replacement habitat.

Mitigation measure MM 4.4-20 requires that, post-construction, temporarily impacted habitat be restored and a “qualified habitat restoration specialist shall prepare a Habitat Mitigation and Monitoring Plan.”

- The timing of the habitat restoration project must be enforceable and not be left to the project proponent. The Habitat Mitigation and Monitoring Plan must be approved by the fish and wildlife agencies and must include triggers that initiate the restoration.
- The choice and qualifications of the habitat restoration specialist must not be left to the project proponent. The DEIR should specify that this specialist be chosen and approved by the fish and wildlife agencies.
- The habitat restoration specialist must work independently of the project proponent and report to the fish and wildlife agencies.
- The designation of success in habitat restoration must not be left to the project proponent. Fish and wildlife agencies must concur.
- Fish and wildlife agencies must be in charge of long-term management of restored habitat.

Mitigation measure MM 4.4-21 requires “permanent” habitat losses to be replaced at a 2:1 ratio.

- The measure is restricted to “permanent” impacts to habitat lands, presumably after habitat restoration as specified in MM 4.4-20. The DEIR is deficient in not having defined the notion of permanence. Who will determine when an impact is permanent? When will this determination be made? Will the determination of permanence be appealable to CDFW? The public should be informed of the permanence determination.
- It could be many years before habitat restoration is deemed unsuccessful and permanence is declared, many years that that habitat will have been lost to special status species. The replacement ratio should be doubled for permanently impacted lands for each year following the inception of the habitat restoration project from MM 4.4-20 until the conservation easement is purchased.
- In order to be confident that the conservation easements will be appropriately enforced, they must be held by an appropriate government agency (perhaps CDFW) or an accredited local land trust with knowledge of the local area.
- Such easements must be monitored and enforced, and the conservation easements must include an endowment to pay for monitoring and enforcement expenses by the easement holder.

GEOLOGY

0n page 4.9-47, the DEIR admits, “A release of CO2 from underground geologic storage may occur due to migration to the surface via an abandoned well, fault, or fracture.”

The North and South Belridge oil fields and surrounding regions have been deeply shaped by oil and gas drilling activity for many decades. North and South Belridge are some of the oldest and largest oil fields in the U.S., discovered over 100 years ago, and these oilfields are characterized by the presence of a large number of well penetrations. Leakage of CO2 from wellbores is widely considered to be one of the most significant leakage pathways for geologic storage of CO2, and the large number of wellbores at North and South Belridge therefore increases the possibility of leakage which could be catastrophic.

These risks are exacerbated where wellbores have not been properly abandoned or permanently plugged back to surface, and the DEIR fails to disclose the number of wellbores that require plugging, potential failure rates, and the impacts of potential CO2 leakage from these unplugged wellbores.

The DEIR fails to acknowledge these issues or disclose the inherent and heightened risks of CO2 storage in a depleted oil field like this one, which renders it lacking in

substantial evidence to support its subsequent conclusions about impacts and mitigation.

On page 4.7-17, the DEIR states, “Impacts from seismic hazards are considered potentially significant without mitigation …”. The DEIR’s mitigation for seismic hazards depends solely upon MM 4.7-1, which requires the project to prepare a seismic activity monitoring plan which will “include all requirements of State law”. While obeying the law is laudable, the DEIR jumps to the conclusion that the preparation of a monitoring plan will somehow address all potential seismic hazard impacts and considers seismic hazards to be therefore less than significant. We note that whatever State law says about monitoring plans, these laws are not specifically tailored to the complexities of the Belridge oil fields (some as noted above). The DEIR is deficient in not having presented substantial evidence that preparation of a monitoring plan is all that is needed to reduce seismic hazards to insignificance.

Please place the Sierra Club on the distribution list for the CarbonFrontier Project to receive any notice of meetings, hearings, availability of documents, and to receive the environmental documents. We prefer email communications and electronic formatting of documents. Thank you for your consideration and for the opportunity to comment.

Sincerely,

Gordon L. Nipp, Ph.D.
Vice-Chair
gnipp@bak.rr.com
661-872-2432

Mercedes Macias
Senior Campaigner
The Sierra Club National
mercedes.macias@sierraclub.org
661-972-4762

SUPPORT COMMENTS

Community Action Partnership of Kern
Helping People. Changing Lives.

September 12, 2024

Kern County Planning Commission
1115 Truxtun Avenue
Bakersfield, CA 93301

RE: Letter of Support for CarbonFrontier CCS Project- Public Hearing Item G.2

Dear Kern County Planning Commissioners,

Community Action Partnership of Kern (CAPK) supports the CarbonFrontier CCS Project.

Since 1965, CAPK has been working to fight poverty in Kern County. We provide an integrated network of services and programs as the official anti-poverty agency. CAPK is one of the largest 501 (c) (3) nonprofit agencies in the county serving 114,000 clients annually. In our work, we know that moving people out of poverty takes a wholistic and muti-faceted approach. It is complex work that also includes the efforts of many partners. We believe strongly in partnerships, which is why we are part of the Kern Coalition/California Jobs First Initiative, tasked with building a robust and inclusive economy for all residents of Kern County.

One key aspect of moving people out of poverty is the availability of good paying, living wage jobs. Kern County has always suffered from a higher-than-average poverty rate, and the ongoing contraction of the petroleum industry is only adding to the suffering and woeful outlook for many families. Our local economy and job creation is as important an issue as any we face in Kern County. This is a burden we must stand up and face on our own as a community, we cannot foolishly wait for others to fix it for us.

The fight to improve our economy so it is healthy, strong, and supports all people of this county, will need the attraction and growth of many different economic sectors. To be successful it will need investments in new technologies, sometimes not fully proven and still in an incubation phase. It will need the support of large employers, small employers and everyone in between.

While we should certainly be cautious and calculated with our plans and proposals, we must also not be afraid to pursue new technologies and industries. The State of California has developed one of the most stringent and transparent environmental processes in the nation. Our regulations, protections, and transparency are at the highest of standards. It is my full expectation that these projects will follow the mitigation measures spelled out in the EIR, will be closely monitored, and will follow all available safety protocols.

Thank you for your hard work and dedication to those that live in Kern County.

Sincerely,

Jeremy T. Tobias
Chief Executive Officer

1300 18th Street, Suite 200, Bakersfield, CA 93301 (661) 336-5236 Toll Free (888) 445-0090 Fax (661) 322-2237
www.capk.org

I am writing to express my strong support for the CarbonFrontier project. As a resident of Kern County with a family, I see this initiative as a critical opportunity for our community and for our future.

Kern County has long been a cornerstone of California's energy sector. The CarbonFrontier project aligns perfectly with our region's strengths in infrastructure and expertise. By focusing on carbon capture and storage, this project positions us as a leader in the transition to cleaner energy technologies.

Supporting CarbonFrontier means more than just advancing environmental goals. It offers significant economic benefits, including job creation and economic growth, which are essential for our community's well-being. This project also enhances our reputation as a forward-thinking region committed to sustainable energy solutions.

For the sake of our families and future generations, I urge you to support CarbonFrontier. It represents a pivotal step toward securing a prosperous and environmentally responsible future for Kern County.

Thank you for considering this important initiative.

Name: Daisy Coronado Zip: 93203

Signature: Date: 8/3/24

I am writing to express my strong support for the CarbonFrontier project. As a resident of Kern County with a family, I see this initiative as a critical opportunity for our community and for our future.

Kern County has long been a cornerstone of California's energy sector. The CarbonFrontier project aligns perfectly with our region's strengths in infrastructure and expertise. By focusing on carbon capture and storage, this project positions us as a leader in the transition to cleaner energy technologies.

Supporting CarbonFrontier means more than just advancing environmental goals. It offers significant economic benefits, including job creation and economic growth, which are essential for our community's well-being. This project also enhances our reputation as a forward-thinking region committed to sustainable energy solutions.

For the sake of our families and future generations, I urge you to support CarbonFrontier. It represents a pivotal step toward securing a prosperous and environmentally responsible future for Kern County.

Thank you for considering this important initiative.

Name: Rafael Pelayo Zip: 93263

Signature: Date: 8-3-24

As a proud resident in the community, I am writing to express my strong support for the CarbonFrontier project.

Kern County is not just a place where my family and I live; it's our home. Over the years, we've seen significant progress in our community, much of which has been made possible by the support of our local oil and gas industry partners. The CarbonFrontier project is a continuation of this positive trend, offering both economic and philanthropic benefits that are vital for our community.

I am aware that the County will soon be voting on this project, and I want to emphasize how crucial initiatives like CarbonFrontier are for us. They bring not only job opportunities but also contribute to the overall well-being of our community. My neighbors and I are enthusiastic supporters of this project, and we hope you will be too.

Thank you for considering our perspective.

Name: Diego Garcia Zip: 93308

Signature:  Date: 8/3/24

As someone who has lived in Kern County for a long time, I'm excited about the CarbonFrontier project and what it could mean for our community.

This project seems like it will bring investment and create jobs in our area, which we really need. It also looks like it could help support important local services like schools and roads.

I've seen how past projects have helped our community, and I believe CarbonFrontier could do the same. I hope you'll support it.

Name: Francisco Sanchez Zip: 93312

Signature: Date: 8-3-24

I'm reaching out to share my support for the CarbonFrontier project. Living in Kern County, I see how important it is to bring in projects that can offer good jobs and boost our local economy. From what I understand, CarbonFrontier could provide many job opportunities and help fund crucial services like schools and roads. These are things that really matter to us here.

A lot of people in our community feel the same way and are hopeful about the benefits this project might bring. I ask that the County supports this project too.

Name: Gina Sanchez Zip: 93263

Signature: [signature] Date: 8/3/24

As a Kern County resident who cares about progress, I'm excited about the CarbonFrontier project. It promises to create good jobs in engineering, construction, and facility operations, which is exactly what our community needs.

The project will also bring in extra tax revenue to improve essential services like schools, roads, and public safety—things that are crucial for our community's well-being.

Supporting CarbonFrontier is a chance to make Kern County stronger and more sustainable. I urge you to back this project and help us secure a better future for everyone.

Thank you for your time and consideration.

Name: Cindy Garibay Zip: 93263

Signature: Cindy Garibay Date: 8/3/24

I believe CarbonFrontier and cabron capture and storage projects in general could be really good for Kern County. After all, we already have the best energy workers and other experts.

From what I've heard, this project can help keep jobs in fields like engineering and construction, which our community really needs.

On top of that, the extra money from this project could help improve our schools, roads, and safety services. These are things that make a big difference in our everyday lives.

I hope you'll support this project and help make Kern County an even better place to live and raise a family.

Name: Rudy Morales Zip: 93263

Signature: [signature] Date: 8-3-24

I'm writing to show my support for the CarbonFrontier project. Our county is at a point where we need to balance our environmental goals with keeping our economy strong. As oil and gas production in California drops and demand continues to rise, we need new solutions to protect our local economy and way of life.

CarbonFrontier could be part of that solution. It promises to create new jobs and bring in extra tax revenue that could improve our schools, roads, and other important services.

Kern County has a history of being strong and finding new ways to succeed. Supporting CarbonFrontier could help us keep that tradition going by moving towards more sustainable energy practices.

I hope you'll support this project and help us build a better future for our community.

Name: Nicolas Cuevas Zip: 93312

Signature: Date: 8/3/24

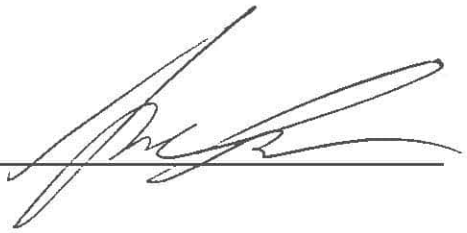
I'm writing to support the CarbonFrontier project. As a Kern County resident, I believe this initiative is vital for our future.Califomia's oil and gas production is falling, but demand is still high. We need CarbonFrontier to keep jobs and public services in our community. The project will create new jobs and generate revenue to boost our local economy. It also shows we're committed to responsible energy practices that benefit everyone. Kern County has always been a leader in innovation. Supporting CarbonFrontier will help us continue this tradition and secure a strong future for our community.

Name: GUSTAVO OLVERA Zip: 93263

Signature: [signature] Date: 8/2/2024

For Kern County, Carbon Capture and Storage is essential for both our economic stability and our environmental goals. California faces a decline in oil and gas production while energy demand continues to rise, CarbonFrontier offers a promising solution. Kern County has always been a leader in energy for a long time – let's continue that path. CarbonFrontier aligns perfectly with this approach by helping us maintain a strong economy while advancing our commitment to sustainable practices. Supporting CarbonFrontier will benefit our entire community and set a positive example for integrating economic and environmental progress. I urge you to back this project for the future of Kern County.

Name: Guillermo Gonzalez Zip: 93309

Signature:  Date: 08/03/2024

I'm writing to say I'm all in for the CarbonFrontier project. Kern County has always been about hard work and innovation, and this project fits right into that spirit while also looking out for the environment.

CarbonFrontier seems like a solid plan with strong environmental rules and checks to make sure everything stays on track. It's a good balance between keeping our climate goals in mind and creating new job opportunities for us.

Supporting this project is a way to keep our community moving forward, both in terms of jobs and taking care of our environment. I hope you'll back it and help us build a better future for Kern County.

Thanks for listening!

Name: Veronica Castro Zip: 93306

Signature: Veronica Castro Date: 8/3/24

I'm writing to let you know I fully support the CarbonFrontier project. As a family person here in Kern County, I see this project as a great chance for us to do right by our community and our environment. CarbonFrontier is designed with strong environmental rules and oversight to ensure it meets high standards. It's not just about protecting the environment, though—it also promises to bring new job opportunities to our area, which is important for families like mine.

By backing this project, you're helping us balance economic growth with taking care of our environment. It's a win-win for our community and our future. I hope you'll consider supporting CarbonFrontier to help us all have a better tomorrow.

Name: Hannah Garza Zip: 93263

Signature: Hannah Garza Date: 8/3/24

I proudly endorse the CarbonFrontier project in Kern County. As we strive for a sustainable future, this initiative sets a high bar for environmental responsibility. With decades of development in Carbon Capture and Storage, the project has successfully implemented the most stringent regulations worldwide.

The project's commitment to rigorous oversight by both governmental and non-governmental organizations guarantees its operation at the highest standards. This meticulous approach ensures that CarbonFrontier will not only protect but also enhance our environment.

Supporting CarbonFrontier means investing in our community's future. The economic benefits it promises are substantial, creating jobs and supporting local businesses. We have a unique opportunity to lead the way in sustainable innovation, showing the world that economic growth and environmental protection can coexist.

Name: Rosa D. Romero Zip: 93280

Signature: Date: 8/3/24

I'm writing to show my support for the CarbonFrontier project. As a resident of Kern County, I believe this project is a great opportunity for our community.

CarbonFrontier comes with solid environmental rules and oversight to ensure it meets high standards. It's a smart way to balance environmental protection with the creation of new jobs, which we really need in our area.

Supporting this project means investing in our local economy while also moving towards a more sustainable future. It's a chance for our community to benefit both now and in the long run. I hope you'll back CarbonFrontier and help us make the most of this opportunity.

Name: Maria Gutierrez Zip: 93312

Signature: Maria Date: 8/3/24

I'm excited to support the CarbonFrontier project. As someone who cares about Kern County, I believe this initiative is a big step towards a more sustainable future.

CarbonFrontier focuses on capturing and storing carbon, which can help reduce emissions. It also takes advantage of what Kern County does best.

Our community has always been a leader in energy innovation, and this project keeps us on that path. By supporting CarbonFrontier, we can bring new technology that creates jobs, boosts our economy, and benefits the environment.

I hope you'll consider how important this project is for our future. Let's work together to ensure Kern County continues to grow and stay sustainable.

Name: Manuel Cantu Zip: 93263

Signature: Date: 8/13/24

Kern County has always been a big part of California's energy sector, and the CarbonFrontier project is a great chance for our region. We have the infrastructure and know-how to lead in carbon capture and storage, which is key to moving towards cleaner energy.

It's not just about cutting emissions; it's about building a better future for our community.

I hope you'll join me in backing CarbonFrontier and help Kern County be at the forefront of a sustainable and successful future.

Name: Flora Quitoriano Zip: 93307

Signature: [signature] Date: 8/3/24

Comment:

I fully support the CarbonFrontier project in Kern County. What sets CarbonFrontier apart is its commitment to rigorous monitoring by both government and non-government organizations. This oversight guarantees that the project operates with the highest level of transparency and accountability.

Supporting CarbonFrontier means supporting a future where economic growth and environmental responsibility come together. This project not only aligns with our climate goals but also promises to bring significant economic benefits to our community.

I urge you to consider the positive impact CarbonFrontier will have on our environment and local economy and join me in supporting this important project.

Name: YESENIA SALGADO Zip: 93249

Signature:  Date: 7-31-24

Comment:

Over the years, our county has flourished thanks to the efforts of companies and projects that have invested in our area. CarbonFrontier, which is currently under review, is another such project that can have many positive impacts in our community.

CarbonFrontier is more than just a project - it's a lifeline for our community. Kern County is the perfect place for this carbon capture and storage project. Beyond the environmental benefits, CarbonFrontier will create jobs and provide essential resources that support our local economy.

This project represents a crucial step toward a sustainable future, and it's vital that we give it our full support. I urge you to consider the positive impact CarbonFrontier will have on all of us in the community.

Name: Maria Galindo Zip: 7/31/24

Signature: _____ Date: 93249

Comment:

CarbonFrontier has earned the support from the community. Over the years, we have thrived through collaboration with local industry leaders. The CarbonFrontier initiative is poised to be another remarkable step forward for Kern County.

This project represents environmentally responsible technology at its absolute best! It promises to meet the toughest environmental regulations, keeping our air and water clean.

This technology has been in development for decades and has proven successful in many regions worldwide. By supporting CarbonFrontier, we can join these global leaders in adopting cutting-edge technology that secures both our environmental and economic future.

We want this in our County!

I urge you to support CarbonFrontier, recognizing its potential to bring sustainable progress and prosperity to our community.

Name: Cindy Hnizdil Zip: 93249

Signature: Cindy Hnizdil Date: 7-31-24

Comment:

I support the CarbonFrontier project in Kern County. CarbonFrontier is an environmentally responsible technology. Its operations will be thoroughly monitored by the government and others who care greatly about our safety and environment.

The technology is being used around the glove, and it is time to bring it to our County. We take pride in being an energy leader. By embracing this technology, we can lead the way in sustainable practices.

Supporting CarbonFrontier means investing in a future where environmental responsibility and economic growth go hand in hand. I encourage you to consider the long-term benefits this project can bring to Kern County.

Name: Juan Soria Zip: 93280

Signature:  Date: 93280

Comment:

Kern County is my home, and I feel deeply connected to the growth/prosperity and well-being of our community. Our progress over the years has been remarkable, and much of this is thanks to initiatives like CarbonFrontier.

Kern County is an ideal location for the CarbonFrontier project. This project promises not only to advance environmental sustainability but also to provide new economic opportunities for our residents.

Supporting CarbonFrontier means supporting a brighter, more sustainable future for our community. It's a chance for us to show that we care about both our environment and our livelihoods. I encourage you to join me and my neighbors in backing this important project.

Name: Yisel Verastegui Zip: 93249

Signature:  Date: 7-31-2024

Comment:

I have joined my community in supporting the CarbonFrontier project. The project's commitment to environmental responsibility is important. Our government and local industry partners will help ensure this project is done the right way. There is no better place for this project than right here in Kern County because our industry leaders have been working hard here for many many years.

CarbonFrontier promises will really help our economy. We need to make sure we have projects our workers can work on. Not to mention, the services our community provides these workers who pass through here to fill up their trucks or grab lunch at our stores.

This project and others like it need our support. Do not stop the great progress we are marking. Join us in supporting CarbonFrontier. It is the right thing to do.

Name: Cruz Lopez Zip: 93280

Signature: Cruz Lopez Date: 7/31/24

Estoy escribiendo para mostrar mi apoyo al proyecto CarbonFrontier, que traerá nuevos empleos de alta calidad a nuestro condado en áreas como ingeniería, construcción y gestión de instalaciones. Estos grandes trabajos que ayudarán a proporcionar estabilidad a los trabajadores que han estado en la industria del petróleo y gas.

No solo mejorará el mercado laboral local, sino que los ingresos fiscales de este proyecto apoyarán cosas esenciales como nuestras escuelas, carreteras y servicios de seguridad pública.

Apoyar a CarbonFrontier significa que estamos ayudando a fortalecer y asegurar a nuestra comunidad. Tendremos mejores oportunidades laborales y mejores servicios públicos. Creo que este proyecto es una gran oportunidad para nuestro condado y espero que ustedes también lo apoyen.

Nombre: Cristian Ojeda Código Postal: 93280

Firma: [signature] Fecha: 7/31/24

Estoy escribiendo para expresar mi gran apoyo al proyecto CarbonFrontier. Este proyecto traerá muchos cambios positivos a nuestra comunidad.Uno de los mayores beneficios es que creará nuevos empleos bien remunerados en campos como ingeniería, construcción y operación de instalaciones. Esto significa estabilidad y seguridad para los trabajadores, especialmente aquellos en la industria del petróleo y gas que pueden necesitar nuevas oportunidades.

Este proyecto también es crucial para ayudar a impulsar nuestra economía local a través de mayores ingresos fiscales que apoyarán servicios públicos importantes como escuelas, carreteras y seguridad pública. Al generar más dinero para estos servicios, CarbonFrontier ayuda a garantizar que nuestras comunidad siga siendo más fuerte y apoyada.

CarbonFrontier es un proyecto que promete no solo nuevas oportunidades laborales, sino también un apoyo vital para los servicios públicos. Es una situación beneficiosa para todos los involucrados y creo firmemente que será de gran beneficio para nuestro condado.

Nombre: Mayra Ojeda Código Postal: 93280

Firma: Mayra Ojeda Fecha: 07/31/24

Comment:

As a resident of Kern County, I want to express my support for the CarbonFrontier project. This carbon capture technology is not new, and it is something that can really help us meet our goals responsibly. It is shocking we haven't done this sooner.

As I've learned, this technology captures carbon emissions before they can reach our atmosphere and it's a forward-thinking solution that aligns perfectly with our county's commitment to climate goals.

Supporting CarbonFrontier means support for our local workers and communities. It's crucial for the prosperity of our community and the future of our children.
I urge you to support CarbonFrontier, recognizing its potential to bring about positive change and a sustainable future for Kern County.

Name: Graciela Arvizu Zip: 93249

Signature: Date: 07/31/24

Por favor apoyen a CarbonFrontier. Este proyecto equilibra los objetivos climáticos con prácticas energéticas responsables.

La producción de petróleo y gas está disminuyendo en California. Sin embargo, si no encontramos formas de coexistir e innovar, nuestra comunidad podría enfrentar serios desafíos. Se podrían perder empleos, los servicios públicos podrían sufrir y nuestra calidad de vida en general podría disminuir.

CarbonFrontier tiene como objetivo prevenir estas interrupciones creando nuevas oportunidades laborales y generando ingresos fiscales, lo que ayudará a apoyar los servicios locales. Al apoyar a CarbonFrontier, nos estarán ayudando a crear un futuro sostenible para el condado de Kern. Necesitamos su ayuda para garantizar que nuestra comunidad prospere mientras trabajamos hacia nuestros objetivos climáticos.
Gracias por considerar esta importante iniciativa. Su apoyo puede marcar una gran diferencia.

Nombre: marcel Perez Código Postal: 93249

Firma: _____ Fecha: 07-31-2024

Soy residente del condado de Kern y escribo para expresar mi gran apoyo al proyecto CarbonFrontier en el condado de Kern. Nuestra comunidad siempre ha prosperado con el equilibrio entre el crecimiento industrial y la administración ambiental. Proyectos como CarbonFrontier demuestran este equilibrio al promover objetivos climáticos responsables mientras proporcionan beneficios económicos esenciales.

El condado de Kern tiene historia de innovación, y CarbonFrontier es un testimonio de nuestra capacidad para liderar en prácticas sostenibles. Al apoyar este proyecto, aseguramos que nuestra economía se mantenga robusta y que los servicios públicos sigan mejorando. El éxit de CarbonFrontier traerá nuevos empleos y oportunidades, mejorando la calidad de vida de todos los residentes.

Creo que el progreso responsable es la clave para un mejor futuro. CarbonFrontier no es solo un proyecto industrial; es un compromiso con el bienestar de nuestra comunidad. Les insto a que apoyen este iniciativa y ayuden a lograr un equilibrio armoniosos entre el crecimiento económico y la responsabilidad ambiental.

Nombre: María Mendoza. Código Postal: 93249.

Firma: María Mendoza. Fecha: 07-31-2024.

Comment:

There's a fantastic opportunity to bring opportunity to our region. It's called CarbonFrontier, and it has my full support. I hope it can count on you too.

Our county is a unique place for energy projects because of our rock formations and skilled workers we have. This is an ideal location for this project. This initiative aims to reduce carbon emissions, which is crucial for helping clean up our air while protecting jobs and our economy.

CarbonFrontier can bring innovation and job opportunities right to our doorstep. It's about embracing a future where we balance environmental responsibility with economic growth. I urge you to join me in supporting this important project for a cleaner, more sustainable future for Kern County.

Name: Eduardo Carlos Zip: 93249

Signature: Eduardo Carlos Date: 7.31.24

Comment:

I am writing to voice my support for the CarbonFrontier project under review. Our county's exceptional geology, robust infrastructure, and talented workforce all add up to position us perfectly to make a real difference.

This project represents more than just a technological advancement; it's a commitment to addressing climate change responsibly while supporting local jobs and economic stability. By supporting CarbonFrontier, we're endorsing a future where we can coexist with our environment, ensuring both progress and preservation.

I invite you to join me in championing this initiative. Together, we can embrace a brighter, more sustainable future for Kern County and beyond.

Name: Maria Cruz Malanche Zip: 93249

Signature: Maria Cruz Malanche Date: 1-31-2024

Comment:

I am writing to share my enthusiastic support for the CarbonFrontier initiative, with its focus on carbon capture and storage, it is a promising opportunity for our area. Kern County's geology, infrastructure, and skilled workforce make it an ideal location for this project.

Supporting CarbonFrontier means embracing new technologies that can reduce our carbon footprint while providing valuable economic and philanthropic benefits to our community. I urge you to consider the long-term advantages of this project for our families and neighbors.

Name: Maria Mangay Zip: 7-31-24

Signature: Maria Mangay Date: 7-31-24

Comment:

CarbonFrotnier can help bring a wave of positive change to our community. This initiative represents a critical opportunity for our local community, providing essential stability and financial security through new job opportunities.

What excites me even more is how CarbonFrontier will benefit our community beyond job creation. With the additional tax revenue generated by this project, we'll see improvements in our local schools, roads, and public safety. This means better education for our children, safer streets, and well-maintained infrastructure that we all rely on everyday.

I urge you to support CarbonFrontier and recognize the substantial positive impact it will have on our community.

Name: Janet Perez Zip: 93249

Signature: Janet Perez Date: 7.31.24

Soy residente de Lost Hills y escribo en apoyo del proyecto CarbonFrontier.

Lost Hills es mi hogar y el de mi familia, y estoy agradecido por el progreso que nuestra comunidad ha logrado a lo largo de los años. Gran parte de lo que hemos podido proveer a nuestros miembros de la comunidad ha sido posible gracias a nuestros socios locales de la industria del petróleo y gas, como los que lideran el proyecto CarbonFrontier.

Entiendo que el Condado votará para aprobar CarbonFrontier, pero creo que es importante saber que proyectos como este son los que ayudan a traer buenas oportunidades económicas y filantrópicas a nuestra gente. Por eso mis vecinos y yo apoyamos CarbonFrontier y los invito a que hagan lo mismo.

Nombre: Maria Hernandez Código Postal: 93249

Firma: Maria Hernandez Fecha: 7-31-24

Comment:

Please support CarbonFrontier. This project balances climate goals with responsible energy practices.

Oil and gas production is reducing in California However, if we don't find ways to coexist and innovate, our community could face serious challenges. Jobs could be lost, public services could suffer, and our overall quality of life could decline.

CarbonFrontier aims to prevent these disruptions by creating new job opportunities and generating tax revenue, which will help support local services. By supporting CarbonFrontier, you will be helping us to create a sustainable future for Kern County. We need your help to ensure that our community thrives while we work towards our climate goals.

Thank you for considering this important initiative. Your support can make a significant difference.

Name: Ana M Ramirez Zip: 93249

Signature: Ana M Ramirez Date: 07-31-24

Comment:

I am a resident of Kern County and I am writing to express my strong support for the CarbonFrontier project in Kern County. Our community has always thrived on the balance between industrial growth and environmental stewardship. Projects like CarbonFrontier embody this balance by promoting responsible climate goals while providing essential economic benefits.

Kern County has a rich history of innovation, and CarbonFrontier is a testament to our ability to lead in sustainable practices. By supporting this project, we ensure that our economy remains robust and that public services continue to improve. The success of CarbonFrontier will bring new jobs and opportunities, enhancing the quality of life for all residents.

I believe that responsible progress is the key to a better future. CarbonFrontier is not just an industrial project; it is a commitment to our community's well-being. I urge you to support this initiative and help achieve a harmonious balance between economic growth and environmental responsibility.

Name: Oziel Martinez Zip: 93219

Signature: [signature] Date: 7/31/24

CarbonFrontier es un proyecto que será de gran ayuda para nuestra comunidad al proporcionar inversión económica y oportunidades de trabajo, y creo que merece la aprobación del condado.

Este proyecto ayudará a nuestras comunidades de muchas maneras. No solo CarbonFrontier ayudará a nuestra economía local, sino que también apoyará a nuestras escuelas, carreteras y a la seguridad pública al generar más ingresos que se destinarán a estos servicios importantes de los que dependemos cada día. Creo que CarbonFrontier hará que nuestra comunidad sea más fuerte y mejor que nunca. Traera nuevas oportunidades económicas y mejores servicios para todos.

Mi comunidad apoya a CarbonFrontier y ustedes también deberían. Por favor, aprueben el proyecto CarbonFrontier.

Nombre: Adrian Martinez Código Postal: 93249

Firma: Adrian Martinez Fecha: 7-31-2024

Como un/a orgulloso/a residente de Lost Hills, he sido testigo de primera mano de la gran inversión y otros apoyos proporcionados por nuestra industria local del petróleo y gas a nuestra comunidad. Me ha alegrado ver que hay nuevas oportunidades llegando a nuestra región que continúan con este gran trabajo.

La iniciativa CarbonFrontier es un claro ejemplo de cómo los proyectos locales pueden tener beneficios significativos para nuestros miembros comunitarios y negocios.El progreso que hemos logrado a lo largo de los años ha sido respaldado por el compromiso de empresas y organizaciones como las que respaldan a CarbonFrontier.

También he tenido la oportunidad de aprender más sobre el proyecto de la industria que ha hecho un verdadero esfuerzo para involucrar a nuestra comunidad local y escuchar nuestras preocupaciones y preguntas. Han sido proactivos y eso es muy importante para nosotros.

Quiero enfatizar lo crucial que son las iniciativas como CarbonFrontier para el futuro de Lost Hills. El apoyo a proyectos como CarbonFrontier juega un papel clave para continuar construyendo una comunidad próspera y solidaria. Mis vecinos y yo apoyamos plenamente este proyecto y les animamos a que también lo hagan.

Nombre: Kati Martinez Código Postal: 93249

Firma: Kati Martinez Fecha: 7-31-24

Comment:

Our community has greatly benefited from local industries, and the CarbonFrontier project can help continue this positive trend by aligning with our climate goals in a responsible manner.

The importance of coexistence and innovation cannot be overstated. Without them, California risks serious economic challenges on top of what we're already experiencing in this state.

We need to continue investing in our future and we're so happy our local industry continues to do that. CarbonFrontier is a great example. I believe that this project will help keep Kern County an energy powerhouse and help our community along the way.

We have such a great opportunity in front of us. I support this project along with many of my fellow community members. Join us by approving this project.

Name: Maria Fernanda Avila Cambos Zip: 93249

Signature: Maria Fernanda Avila Cam. Date: 07/31/2024

Comment:

I am writing to express my strong support for the CarbonFrontier project in Kern County. I have seen firsthand how our community thrives when we balance economic growth with environmental stewardship. The CarbonFrontier project is a prime example of this balance.

CarbonFrontier's innovative approach to addressing climate goals responsibly is crucial for our community's future. By integrating advanced technologies and sustainable practices, this project not only reduces carbon emissions but also creates jobs and economic opportunities for local residents. Our local industries have always been the backbone of our community, and CarbonFrontier represents a new chapter in our commitment to progress and sustainability.

Without initiatives like CarbonFrontier, California risks facing significant disruptions to our economy and public services. It's essential that we embrace coexistence and innovation to ensure a high quality of life for all citizens.

I urge you to support CarbonFrontier, as it embodies the forward-thinking mindset we need to tackle the challenges of today and tomorrow.

Name: Adriana Juarez Zip: 93280

Signature: Date: 7/31/24

Comment:

I am writing to voice my support for the CarbonFrontier project in Kern County. Our community has always valued hard work and innovation, and CarbonFrontier is a perfect example of these principles in action.

CarbonFrontier is not just another project; it's a vital step towards achieving our climate goals responsibly. This initiative promises to significantly reduce carbon emissions while fostering economic growth and creating new jobs. The collaboration between local industry leaders and CarbonFrontier showcases our region's ability to adapt and thrive in a changing world.

It's crucial to recognize that without projects like CarbonFrontier, California could face severe disruptions in its economy and public services. We must pursue climate goals with a mindset that values coexistence and innovation, ensuring that our efforts do not compromise the well-being of our citizens. Supporting CarbonFrontier is a commitment to a sustainable and prosperous future for our community.

I strongly encourage you to support the CarbonFrontier project and help us continue building a resilient and thriving Kern County.

Name: Gloria Cantu Zip: 93263

Signature: Date: 7/31/24

Invito a la Junta de Supervisores a aprobar CarbonFrontier. La captura y el almacenamiento de carbono son una parte importante del futuro energético de California. Nuestros objetivos climáticos deben ser perseguidos de manera responsable.

Nombre: Juan Medel Código Postal: 93249

Firma: Juan Medel Fecha: 7.31.24

Comment:

I am writing to express my strong support for the CarbonFrontier project. This project will bring a lot of positive changes to our community. One of the biggest benefits is that it will create new, well-paying jobs in fields like engineering, construction, and facility operation. This means stability and security for workers, especially those in the oil and gas industry who may need new job opportunities.

This project is also crucial in helping to boost our local economy through increased tax revenues which will support important public services like schools, roads, and public safety. By generating more money for these services, CarbonFrontier helps ensure that our community remains strong and well-supported.

CarbonFrontier is a project that promises not only new job opportunities but also vital support for public services. It's a win-win situation for everyone involved, and I strongly believe it will be a great benefit to our County.

Name: Elsa M Jorz Zip: 93249

Signature: Elsa M Jorz Date: 08-31-24

Comment:

I hope this letter finds you well. CarbonFrontier is a project that will be a big help to our community by providing economic investment and job opportunities, and I think it deserves the county's approval.

This project is going to help our communities in a lot of ways. Not only will CarbonFrontier help our local economy, but it will also help support our schools, roads, and public safety by generating more revenues that will go towards these important services we rely on every day. I believe that CarbonFrontier will make our community stronger and better than ever before. It's a chance for new economic opportunities and better services for everyone.

My community supports CarbonFrontier and you should too. Please approve the CarbonFrontier project.

Name: Alejandra Linares Zip: 93249

Signature: Alejandra Linares Date: 7-31-2024

Nuestra comunidad se ha beneficiado enormemente de las industrias locales, y el proyecto CarbonFrontier puede ayudar a continuar esta tendencia positiva al alinearse con nuestros objetivos climáticos de manera responsable.

La importancia de la coexistencia y la innovación no puede ser subestimada. Sin ellos California enfrenta serios desafíos económicos además de lo que ya estamos experimentando en este estado.

Necesitamos seguir invirtiendo en nuestro futuro y estamos muy contentos de que nuestra industria local continúe haciéndolo. CarbonFrontier es un gran ejemplo. Creo que este proyecto ayudará a mantener al condado de Kern como una potencia energética y ayudará a nuestra comunidad en el camino.

Tenemos una gran oportunidad frente a nosotros. Apoyo este proyecto junto con muchos de mis compañeros de comunidad. Únase a nosotros aprobando este proyecto.

Nombre: Euer Barboza Código Postal: 93249

Firma: Euer Barboza Fecha: Julio 31 2024

Comment:

As a proud resident of Lost Hills, I have witnessed firsthand the great investment and other support provided by our local oil and gas industry to our community. I have been happy to see that there are new opportunities coming to our region that continue this great work.

The CarbonFrontier initiative is a clear example of how local projects can have significant benefits for our community members and businesses. The progress we've achieved over the years has been supported by the commitment of businesses and organizations like those behind CarbonFrontier.

I've also had the opportunity to learn more about the project from the industry who has made a real effort to engage our local community and hear our concerns and questions. They have been proactive and that is very important to us.

I want to emphasize how crucial such initiatives as CarbonFrontier are for the future of Lost Hills. The support of projects like CarbonFrontier plays a key role in continuing to build a thriving and supportive community. My neighbors and I fully back this project and encourage you to lend your support as well.

Name: Karina Trinadad Zip: 93249

Signature:  Date: 7.31.24

Comment:

I am a resident of Lost Hills and I am writing in support of the CarbonFrontier project.

Lost Hills is home to me and my family and I am grateful for the progress our community has made over the years. A lot of what we have been able to provide for our community members was made possible by our local oil and gas industry partners like the ones leading the CarbonFrontier project.

I understand that the County will vote to approve CarbonFrontier, but I think it is important to know that projects like this are what help bring good economic and philanthropic opportunities to our people. That is why me and my neighbors support CarbonFrontier and I encourage you to please do the same.

Name: Aide Jusso Zip: 93249

Signature: Aide Jusso Date: 7-31-25

Comment:

I'm writing to show my support for the CarbonFrontier project which will bring new, high-quality jobs to our County in areas like engineering, construction, and facility management. These are great jobs that will help provide stability for workers who have been in the oil and gas industry.

Not only will the local job market improve but the tax revenues from this project will support essential things like our schools, roads, and public safety services.

Supporting CarbonFrontier means we are helping to make our community stronger and more secure. We will have better job opportunities and improved public services. I believe this project is a fantastic chance for our County, and I hope you will support it too.

Name: Luis Vargas Zip: 93249

Signature:  Date: 7/31/24

CarbonFrontier se ha ganado el apoyo de la comunidad. A lo largo de los años, hemos prosperado gracias a la colaboración con los líderes de la industria local. La iniciativa CarbonFrontier está lista para ser otro paso notable hacia adelante para el condado de Kern.

Este proyecto representa la tecnología ambientalmente responsable en su máxima expresión. Promete cumplir con las regulaciones ambientales más estrictas, manteniendo nuestro aire y agua limpios.

Esta tecnología ha estado en desarrollo durante décadas y ha demostrado ser exitosa en muchas regiones del mundo. Al apoyar carbonFrontier, podemos unirnos a estos líderes globales en la adopción de tecnología de vanguardia que asegura tanto nuestro futuro ambiental como económico.
¡Queremos esto en nuestro condado!

Los invito a que apoyen CarbonFrontier, reconociendo su potencial para traer progreso sostenible y prosperidad a nuestra comunidad.

Nombre: Martha Brito Código Postal: 93309

Firma: Martha Brito Fecha: 7/31/24

Apoyo el proyecto CarbonFrontier en el condado de Kern. CarbonFrontier es una tecnología ambientalmente responsable. Sus operaciones serán minuciosamente monítoreadas por el gobierno y otros que se preocupan mucho por nuestra seguridad y medio ambiente.

La tecnología se está utilizando en todo el mundo, y es hora de traerla a nuestro condado. Nos enorgullecemos de ser líderes en energía. Al adoptar esta tecnología, podemos liderar el camino en prácticas sostenibles.

Apoyar a CarbonFrontier significa invertir en un futuro donde la responsabilidad ambiental y el crecimiento económico van de la mano. Les animo a que consideren los beneficios a largo plazo que este proyecto puede traer al condado de Kern.

Nombre: Marbella Bustamante Código Postal: 93249

Firma: [signature] Fecha: 07/31/24

I am writing to support the CarbonFrontier project - a carbon capture and storage project by our local industry. As a long time resident of Kern County, I am glad to see a positive change in the environmental sector. The introduction of CarbonFrontier to Kern County promises a significant economic uplift.

The project is expected to create numerous job opportunities, ranging from technical roles to support services, thereby invigorating the local job market.

Additionally, increased investment in infrastructure and technology will stimulate economic growth, positioning Keren County as a hub for green technology and sustainable development. Please consider joining me and the community in support of this coalition.

Name: Iris Vribe Zip: 93305

Signature: Iris Vribe Date: 9/4/24

The CarbonFrontier project will be a transformative force for Kern County's economy. By introducing advanced carbon capture technology, the project is set to create a range of high-quality jobs, from technical roles to operational positions, thereby boosting local employment.

Additionally, the increase of investment and development associated with the project will stimulate economic growth, enhance infrastructure, and attract further business opportunities. Overall, CarbonFrontier will invigorate Kern County's economy, positioning it as a hub for sustainable technology and innovation, and providing long-term economic benefits for the community. Please consider joining the coalition in order to support Kern's economy.

Name: Claudia Saldaña Zip: 93312

Signature: _____ Date: 9/4/24

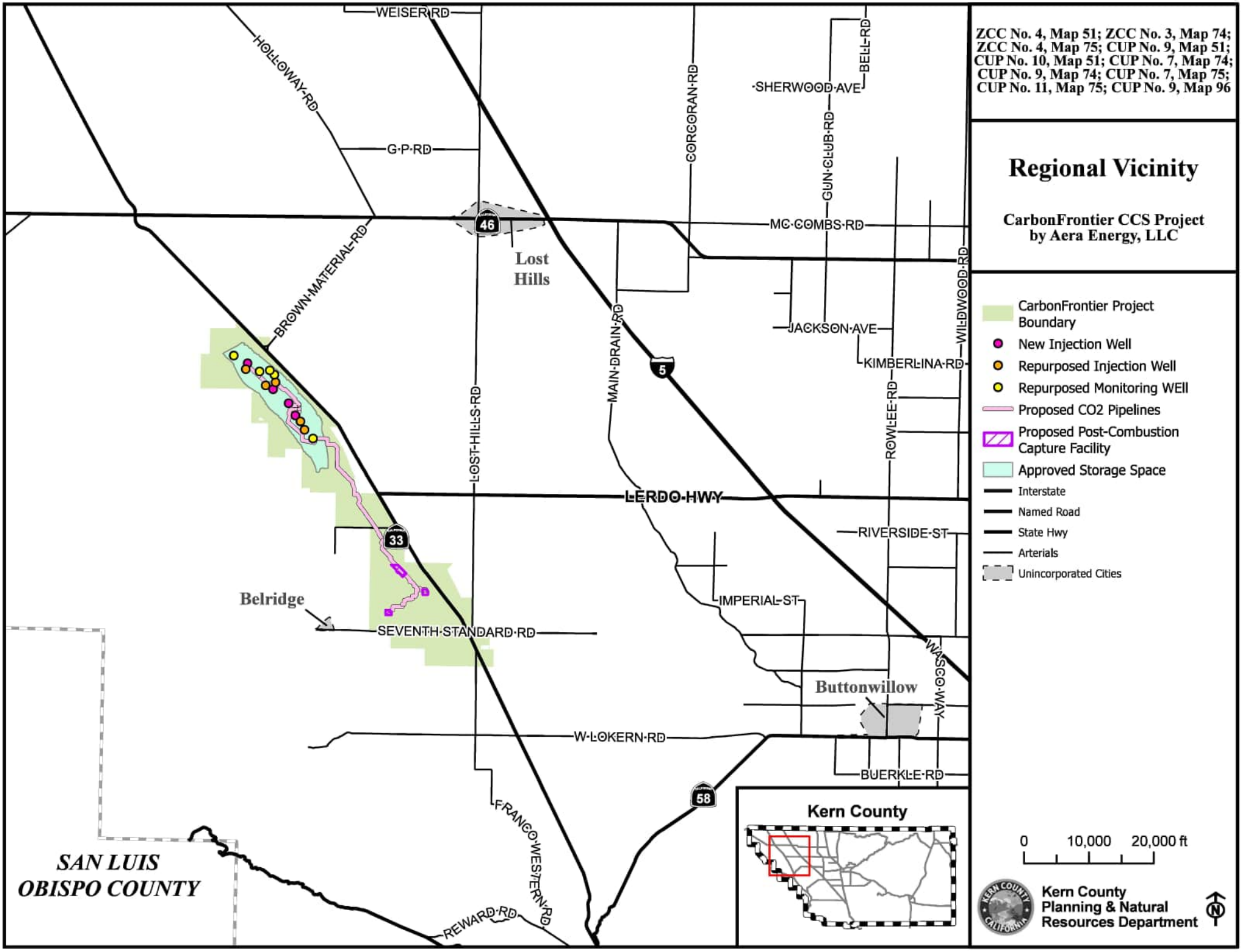
The CarbonFrontier project is set to give Kern County's economy a big boost. It will create new jobs and bring in investment, which means more money and opportunities for local businesses. This project will help the community grow and thrive, making Kern County an exciting place for economic development and innovation.

The CarbonFrontier project will help Kern County by reducing pollution and keeping the air cleaner. It's a good step towards protecting the environment and making the area greener and healthier for everyone. I hope you join me in supporting this by joining the coalition.

Name: C. Pfeiffer Zip: 93312

Signature: [signature] Date: 9/4/24

Maps



ZCC No. 4, Map 51; ZCC No. 3, Map 74; ZCC No. 4, Map 75; CUP No. 9, Map 51; CUP No. 10, Map 51; CUP No. 7, Map 74; CUP No. 9, Map 74; CUP No. 7, Map 75; CUP No. 11, Map 75; CUP No. 9, Map 96

Regional Vicinity

CarbonFrontier CCS Project by Aera Energy, LLC

- CarbonFrontier Project Boundary
- New Injection Well
- Repurposed Injection Well
- Repurposed Monitoring WEll
- Proposed CO2 Pipelines
- Proposed Post-Combustion Capture Facility
- Approved Storage Space
- Interstate
- Named Road
- State Hwy
- Arterials
- Unincorporated Cities

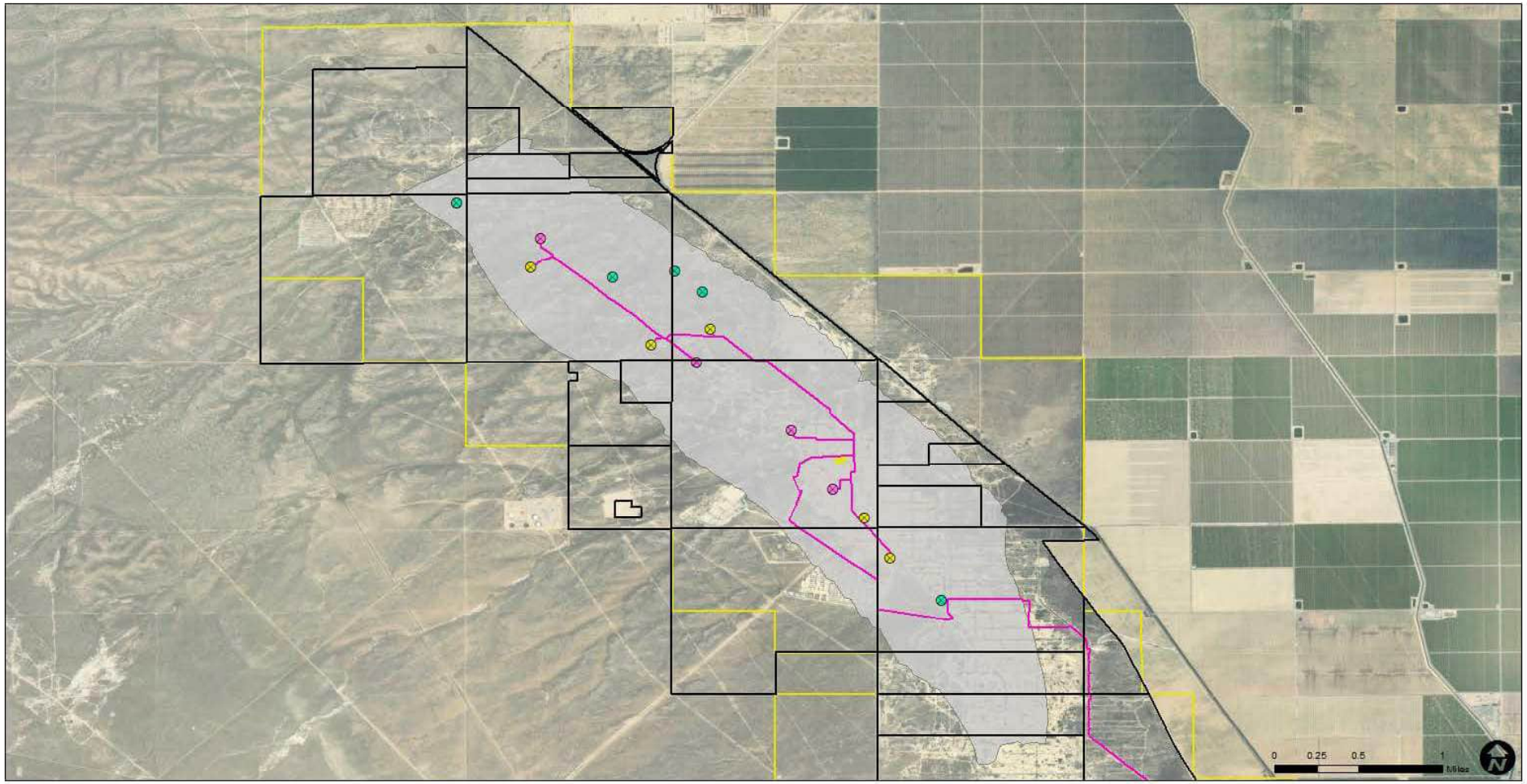
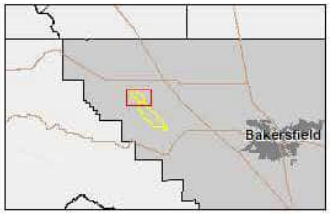


FIGURE 3.10
Site Plan - North Belridge Oilfield



CUP Boundary
Belridge Oilfields
Proposed Compressor Booster Station
Proposed CO2 Pipeline
New Injection Well
Repurposed Injection Well
Repurposed Monitoring Well
Approved Storage Space

Draft Environmental Impact Report
Aera CarbonFrontier Project

Data Source: WSP 2024, Kern County 2024, AERA 2024

ZCC No. 4, Map 51; ZCC No. 3, Map 74; ZCC No. 4, Map 75; CUP No. 9, Map 51; CUP No. 10, Map 51; CUP No. 7, Map 74; CUP No. 9, Map 74; CUP No. 7, Map 75; CUP No. 11, Map 75; CUP No. 9, Map

Site Plan

CarbonFrontier CCS Project
by Aera Energy, LLC

Kern County
Planning & Natural Resources Department

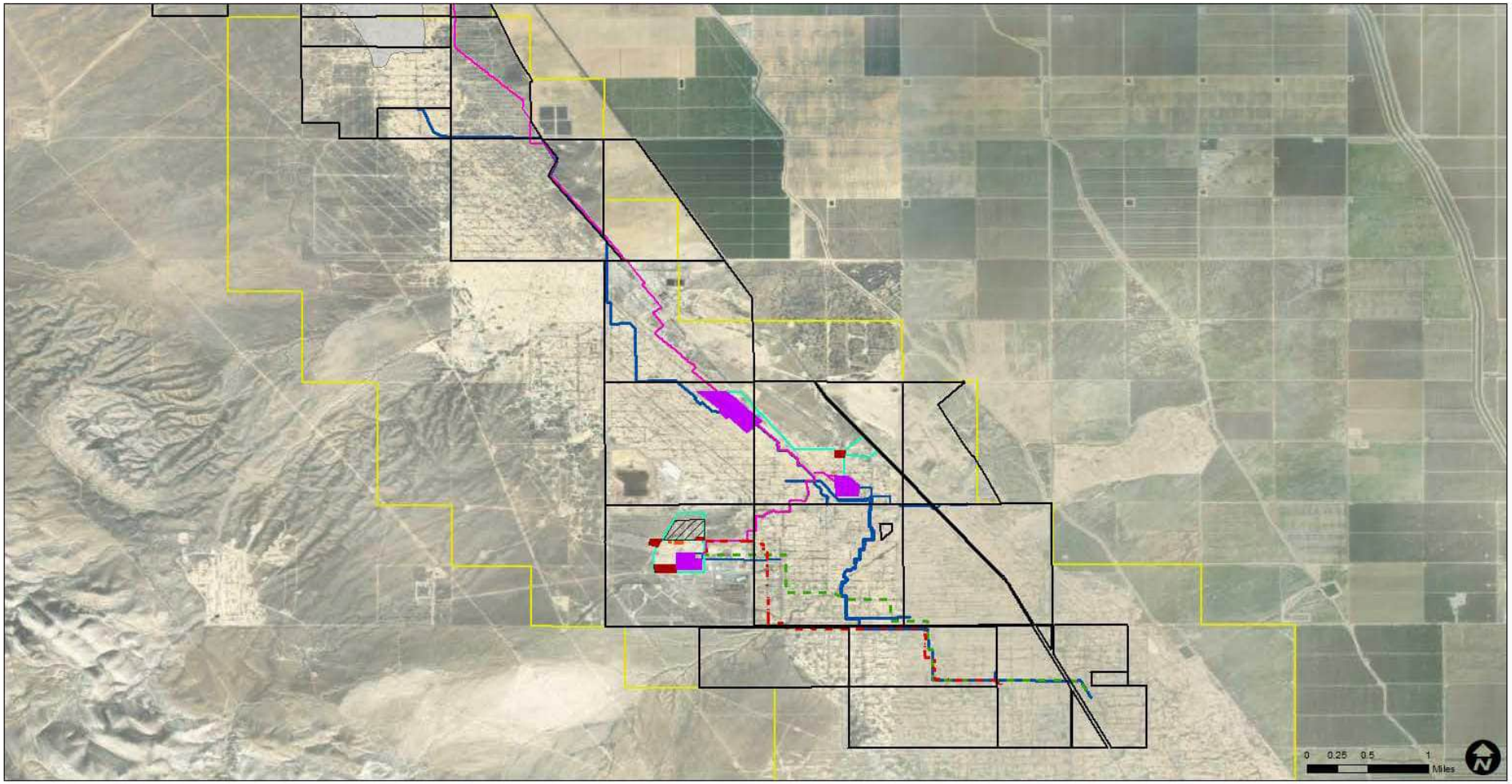
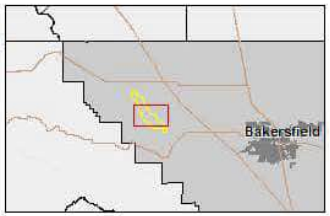


FIGURE 3.11
Site Plan - South Belridge Oilfield



CUP Boundary
Belridge Oilfields
Proposed CO2 Capture Facility
Proposed Pre-Combustion Facilities
Proposed Substation Locations
Proposed Staging Area Adjacent to Gas Plant 32
Existing Del Sur Gas Line to Gas Plant 32
Proposed CO2 Pipeline
Proposed Gas Pipeline (Gas PLant 32 to SGS 2972)
Potential Power Line Routes
Potential Produced Water Line Routes
Tulare CVR to GP32 (Optional)
Proposed Steam Line Routes
Approved Storage Space

Data Source: WSP 2024, Kern County 2024, AERA 2024

Draft Environmental Impact Report
Aera CarbonFrontier Project

ZCC No. 4, Map 51; ZCC No. 3, Map 74; ZCC No. 4, Map 75; CUP No. 9, Map 51; CUP No. 10, Map 51; CUP No. 7, Map 74; CUP No. 9, Map 74; CUP No. 7, Map 75; CUP No. 11, Map 75; CUP No. 9, Map

Site Plan

CarbonFrontier CCS Project
by Aera Energy, LLC

Kern County
Planning & Natural Resources Department