Antelope Valley Commerce Center

Mobile Source Health Risk Assessment

City of Palmdale

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LIST OF ABBREVIATED TERMS

(1)	Reference
µg	Microgram
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AQMD	Air Quality Management District
ASF	Age Sensitivity Factor
AVAQMD	Antelope Valley Air Quality Management District
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CPF	Cancer Potency Factor
DPM	Diesel Particulate Matter
EMFAC	Emission Factor Model
EPA	Environmental Protection Agency
FAH	Fraction of Time at Home
HHD	Heavy Heavy-Duty
HI	Hazard Index
HRA	Health Risk Assessment
LHD	Light Heavy-Duty
MATES	Multiple Air Toxics Exposure Study
MEIR	Maximally Exposed Individual Receptor
MEIW	Maximally Exposed Individual Worker
MHD	Medium Heavy-Duty
MM	Mitigation Measure
OEHHA	Office of Environmental Health Hazard Assessment
PM_{10}	Particulate Matter 10 microns in diameter or less
Project	Antelope Valley Commerce Center
REL	Reference Exposure Level
ROW	Right of Way
SCAQMD	South Coast Air Quality Management District
TAC	Toxic Air Contaminant
TA	Traffic Analysis
URF	Unit Risk Factor
UTM	Universal Transverse Mercator

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EXECUTIVE SUMMARY

This report evaluates the potential health risk impacts to sensitive receptors (which are residents) and adjacent workers associated with the development of the proposed Project, more specifically, health risk impacts as a result of exposure to Toxic Air Contaminants (TACs) including diesel particulate matter (DPM) as a result of heavy-duty diesel trucks accessing the site. This section summarizes the significance criteria and Project health risks.

The results of the health risk assessment from Project-generated DPM emissions are provided in Table ES-1, ES-2, and ES-3 below for the Project.

CONSTRUCTION IMPACTS

The land use with the greatest potential exposure to Project construction DPM source emissions is Location R2 which is located approximately 607 feet north of the Project site at an existing residence located at 42057 5th Street E. R2 is placed in the private outdoor living area (backyard) facing the Project site. Without mitigation measures (MMs) AQ-1 through AQ-5, the maximum incremental cancer risk attributable to Project construction DPM source emissions at the maximally exposed individual receptor (MEIR) is estimated at 0.29 in one million, which is less than the Antelope Valley Air Quality Management District (AVAQMD) significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0.

With implementation of MMs AQ-1 through AQ-5, the land use with the greatest potential exposure to Project construction DPM source emissions is Location R2. At the MEIR, with mitigation the maximum incremental cancer risk is estimated at 0.21 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project construction activity. Because all other modeled residential receptors are located at a greater distance from the Project site and are exposed to lesser concentrations of DPM than the MEIR analyzed herein, and TACs generally dissipate with distance from the source, all other residential receptors in the vicinity of the Project site would be exposed to less emissions and therefore less risk than MEIR identified herein. The nearest modeled receptors are illustrated on Exhibit 2-D.

OPERATIONAL IMPACTS

Residential Exposure Scenario:

The residential land use with the greatest potential exposure to Project DPM source emissions is Location R2 which is located approximately 607 feet north of the Project site at an existing residence located at 42057 5th Street E. R2 is placed in the private outdoor living areas (backyard) facing the Project site. At the MEIR, without MMs AQ-1 through AQ-5, the maximum incremental cancer risk attributable to Project DPM source emissions is estimated at 4.85 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable significance threshold of 1.0.

With implementation of MMs AQ-1 through AQ-5, the residential land use with the greatest potential exposure to Project DPM source emissions is Location R2. At the MEIR, with mitigation the maximum incremental cancer risk is estimated at 3.73 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project operational activity. Because all other modeled residential receptors are located at a greater distance from the Project site and primary truck routes and are exposed to lesser concentrations of DPM than the MEIR analyzed herein, and TACs generally dissipate with distance from the source, all other residential receptors in the vicinity of the Project site would be exposed to less emissions and therefore less risk than the MEIR identified herein. As such, the Project will not cause a significant human health or cancer risk to nearby residences. The nearest modeled receptors are illustrated on Exhibit 2-D.

Worker Exposure Scenario[1]*:*

The worker receptor land use with the greatest potential exposure to Project DPM source emissions is Location R6, which represents the adjacent potential worker receptor approximately 127 feet north of the Project site. At the maximally exposed individual worker (MEIW), without MMs AQ-1 through AQ-5, the maximum incremental cancer risk impact is 1.10 in one million which is less than the AVAQMD threshold of 10 in one million. Maximum non-cancer risks at this same location were estimated to be ≤0.01, which would not exceed the applicable significance threshold of 1.0.

With implementation of MMs AQ-1 through AQ-5, the worker receptor land use with the greatest potential exposure to Project DPM source emissions is Location R6. At the MEIW, with mitigation the maximum incremental cancer risk is estimated at 0.97 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project operational activity. Because all other modeled worker receptors are located at a greater distance than the MEIW analyzed herein, and DPM dissipates with distance from the source, all other worker receptors in the vicinity of the Project would be exposed to less emissions and therefore less risk than the MEIW identified herein. As such, the Project will not cause a significant human health or cancer risk to adjacent workers. The nearest modeled receptors are illustrated on Exhibit 2-D.

1 AVAQMD guidance does not require assessment of the potential health risk to on-site workers. Excerpts from the document OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines—The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2003), also indicate that it is not necessary to examine the health effects to on-site workers unless required by RCRA (Resource Conservation and Recovery Act) / CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) or the worker resides on-site.

School Child Exposure Scenario:

Proximity to sources of toxics is critical to determining the impact. In traffic-related studies, the additional non-cancer health risk attributable to proximity was seen within 1,000 feet and was strongest within 300 feet. California freeway studies show about a 70-percent drop-off in particulate pollution levels at 500 feet. Based on California Air Resources Board (CARB) and South Coast Air Quality Management District (SCAQMD) emissions and modeling analyses, an 80-percent drop-off in pollutant concentrations is expected at approximately 1,000 feet from a distribution center (1).

The 1,000-foot evaluation distance is supported by research-based findings concerning Toxic Air Contaminant (TAC) emission dispersion rates from roadways and large sources showing that emissions diminish substantially between 500 and 1,000 feet from emission sources (1).

In addition, the Waters Bill (AB 3205) (H&SC Section, 42301.6 through 42301.9) addresses sources of hazardous air pollutants near schools and although not directly applicable to this project, this bill further evidences the propriety of considering hazardous emissions sources within a defined 1,000-foot radius. That is, pursuant to the Waters Bill, prior to approving an application for a permit to construct or modify a source which emits hazardous air emissions (i.e. DPM), which source is located within 1,000 feet from the outer boundary of a school site, the air pollution control officer shall prepare a public notice in which the proposed project or modification for which the application for a permit is made is fully described.

More recent studies suggest that in light of emission reductions due to tightening emission standards over the past twenty years, this 1,000-foot siting distance is overly conservative. Modeling performed for the 2021 report *Evaluating Siting Distances for New Sensitive Receptors Near Warehouses*, prepared by the Ramboll Group, demonstrates a significant reduction in DPM emissions and risk between year 2000 emissions (which were utilized by CARB in establishing its recommended siting guidance of 1,000 feet) and 2023 (2). This reduction is attributed to a significant reduction in DPM emission rates from trucks and TRUs resulting from the adoption of increasingly stringent emission standards. This reduction in DPM emission rates has resulted in a corresponding significant reduction in risk as well, despite increasingly conservative regulatory guidance in the preparation of HRAs, particularly OEHHA's adoption of age sensitivity factors (ASF) in their revised HRA guidance released in 2015.

A one-quarter mile radius, or 1,320 feet, is commonly utilized for identifying sensitive receptors, such as schools, that may be impacted by a proposed project. This radius is more robust than, and therefore provides a more health protective scenario for evaluation than the 1,000-foot impact radius identified above.

There are no schools within ¼ mile of the Project site. The nearest school is Adventureland Preschool, which is located approximately 6,750 feet southwest of the Project site. Because there is no reasonable potential that TAC emissions would cause significant health impacts at distances of more than ¼ mile from the air pollution source, there would be no significant impacts that would occur to any schools in the vicinity of the Project.

CONSTRUCTION AND OPERATIONAL IMPACTS

The land use with the greatest potential exposure to Project construction and operational DPM source emissions is Location R2. At the MEIR, without MMs AQ-1 through AQ-5, the maximum incremental cancer risk attributable to Project construction and operational DPM source emissions is estimated at 1.90 in one million, which is less than the AVAQMD threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0.

With implementation of MMs AQ-1 through AQ-5, the land use with the greatest potential exposure to Project construction and operational DPM source emissions is Location R2. At the MEIR, with mitigation the maximum incremental cancer risk is estimated at 1.45 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project construction and operational activity. It should be noted that the combined construction and operational risk is lower than the operational risk alone as this scenario evaluates the risk for a child that is born at the start of Project construction, exposed to construction-related emissions for the 7.61 year duration of construction activities, and is then exposed to Project operational emissions for an additional 22.31 years for a total exposure duration of 30 years. Because risk estimates for Project construction are relatively low, and exposure that occurs during the earlier years of life is more heavily weighted, the combined construction and operational risk is lower than the calculated 30-year operational only risk. All other receptors during construction and operational activity would experience less risk than what is identified for this location. The nearest modeled receptors are illustrated on Exhibit 2-D.

TABLE ES-1: SUMMARY OF CONSTRUCTION CANCER AND NON-CANCER RISKS

Scenario	Time Period	Location	Maximum Lifetime Cancer Risk (Risk per Million)	Significance Threshold (Risk per Million)	Exceeds Significance Threshold
Without Mitigation	7.61 Year Exposure	Maximum Exposed Sensitive Receptor (Location R2)	0.29	10	NO
With Mitigation	7.61 Year Exposure	Maximum Exposed Sensitive Receptor (Location R2)	0.21	10	NO
Scenario	**Time Period**	**Location**	**Maximum Hazard Index**	**Significance Threshold**	**Exceeds Significance Threshold**
Without Mitigation	Annual Average	Maximum Exposed Sensitive Receptor (Location R2)	≤0.01	1.0	NO
With Mitigation	Annual Average	Maximum Exposed Sensitive Receptor (Location R2)	≤0.01	1.0	NO

TABLE ES-2: SUMMARY OF OPERATIONAL CANCER AND NON-CANCER RISKS

Scenario	Time Period	Location	Maximum Lifetime Cancer Risk (Risk per Million)	Significance Threshold (Risk per Million)	Exceeds Significance Threshold
Without Mitigation	30 Year Exposure	Maximum Exposed Sensitive Receptor (Location R2)	4.85	10	NO
	25 Year Exposure	Maximum Exposed Worker Receptor (Location R6)	1.10	10	NO
With Mitigation	30 Year Exposure	Maximum Exposed Sensitive Receptor (Location R2)	3.73	10	NO
	25 Year Exposure	Maximum Exposed Worker Receptor (Location R6)	0.97	10	NO
Scenario	**Time Period**	**Location**	**Maximum Hazard Index**	**Significance Threshold**	**Exceeds Significance Threshold**
Without Mitigation	Annual Average	Maximum Exposed Sensitive Receptor (Location R2)	≤0.01	1.0	NO
	Annual Average	Maximum Exposed Worker Receptor (Location R6)	≤0.01	1.0	NO
With Mitigation	Annual Average	Maximum Exposed Sensitive Receptor (Location R2)	≤0.01	1.0	NO
	Annual Average	Maximum Exposed Worker Receptor (Location R6)	≤0.01	1.0	NO

TABLE ES-3: SUMMARY OF CONSTRUCTION AND OPERATIONAL CANCER AND NON-CANCER RISKS

Scenario	Time Period	Location	Maximum Lifetime Cancer Risk (Risk per Million)	Significance Threshold (Risk per Million)	Exceeds Significance Threshold
Without Mitigation	30 Year Exposure	Maximum Exposed Sensitive Receptor (Location R2)	1.90	10	NO
With Mitigation	30 Year Exposure	Maximum Exposed Sensitive Receptor (Location R2)	1.45	10	NO
Scenario	**Time Period**	**Location**	**Maximum Hazard Index**	**Significance Threshold**	**Exceeds Significance Threshold**
Without Mitigation	Annual Average	Maximum Exposed Sensitive Receptor (Location R2)	≤0.01	1.0	NO
With Mitigation	Annual Average	Maximum Exposed Sensitive Receptor (Location R2)	≤0.01	1.0	NO

APPLICABLE HRA MITIGATION MEASURES

MM AQ-1 through MM AQ-5 are included in the Project's Air Quality Impact Analysis. For purposes of the HRA, only the following mitigation measures are applicable and quantified:

The *Antelope Valley Commerce Center Air Quality Impact Analysis* (*AQIA*) report (3) identifies five mitigation measures. Although these measures are designed to reduce Project air quality emissions, three of these measures would also assist in the reduction of DPM and consequently a reduction in health risks. More specifically, MM AQ-1, MM AQ-3, and MM AQ-5 from the AQIA have the potential to reduce DPM emissions and are restated below.

MM AQ-1

The Construction Contractor shall ensure that off-road diesel construction equipment used during grading activities, complies with EPA/CARB Tier 4 emissions standards or equivalent and shall ensure that all construction equipment is tuned and maintained in accordance with the manufacturer's specifications.

MM AQ-3

The Project shall implement the following measures in order to reduce operational mobile source air pollutant emissions to the extent feasible:

- Only haul trucks meeting model year 2010 engine emission standards shall be used for the on-road transport of materials to and from the Project site.
- Legible, durable, weather-proof signs shall be placed at truck access gates, loading docks, and truck parking areas that identify applicable California Air Resources Board (CARB) anti-idling regulations. At a minimum, each sign shall include: (1) instructions for truck drivers to shut off

engines when not in use; (2) instructions for drivers of diesel trucks to restrict idling to no more than 5 minutes once the vehicle is stopped, the transmission is set to “neutral” or “park,” and the parking brake is engaged; and (3) telephone numbers of the building facilities manager and CARB to report violations. Prior to the issuance of an occupancy permit, the City of Palmdale shall conduct a site inspection to ensure that the signs are in place.

- Prior to tenant occupancy, the Project Applicant or successor in interest shall provide documentation to the City demonstrating that occupants/tenants of the Project site have been provided documentation on funding opportunities, such as the Carl Moyer Program, that provide incentives for using cleaner-than-required engines and equipment.
- The minimum number of automobile electric vehicle (EV) charging stations required by the California Code of Regulations Title 24 shall be provided. In addition, the buildings shall include electrical infrastructure sufficiently sized to accommodate the potential installation of additional auto and truck EV charging stations in the future.
- Conduit shall be installed to tractor trailer parking areas in logical locations determined by the Project Applicant during construction document plan check, for the purpose of accommodating the future installation of EV truck charging stations at such time this technology becomes commercially available.

MM AQ-5

The Project shall include the following language within tenant lease agreements in order to reduce operational air pollutant emissions to the extent feasible:

- Require tenants to use the cleanest technologies available and to provide the necessary infrastructure to support zero-emission vehicles, equipment, and appliances that would be operating on site. This requirement shall apply to equipment such as forklifts, handheld landscaping equipment, yard trucks, office appliances, etc.
- Require future tenants to exclusively use zero-emission light and medium-duty delivery trucks and vans, when economically feasible.
- Tenants shall be in, and monitor compliance with, all current air quality regulations for on-road trucks including the CARB’s Heavy-Duty (Tractor-Trailer) Greenhouse Gas Regulation, Periodic Smoke Inspection Program, and the Statewide Truck and Bus Regulation.

Only the following, specific measures from MM AQ-1, MM AQ-3, and MM AQ-5 have the potential to reduce DPM emissions, more specifically, only two of these measures are in fact quantifiable as summarized below:

Only the following, specific measures from MM AQ-1, MM AQ-3, and MM AQ-5 are quantifiable.

- MM AQ-1: MM AQ-1 requires construction grading equipment to meet a minimum CARB Tier 4 engine standard. Reductions associated with this measure have been incorporated in the analysis.
- MM AQ-3: Although MM AQ-3 has the potential to reduce DPM emissions, the efficacy of reductions that may be achieved is unknown and therefore no quantified DPM reduction has been taken from implementation of this measure.
- MM AQ-5: MM AQ-5 requires the project to utilize electric yard trucks/on-site cargo handling equipment. Reductions associated with this measure have been incorporated in the analysis.

1 INTRODUCTION

The purpose of this Health Risk Assessment (HRA) is to evaluate Project-related impacts to the nearest sensitive receptors (residents) and workers as a result of heavy-duty diesel trucks accessing the site.

The AVAQMD identifies that if a proposed Project is expected to generate/attract heavy-duty diesel trucks, which emit DPM, preparation of a mobile source HRA is recommended. This document serves to meet the AVAQMD's recommendation for preparation of an HRA. The mobile source HRA has been prepared in accordance with the relevant documentation available including Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis (4) and is comprised of all relevant and appropriate procedures presented by the United States Environmental Protection Agency (U.S. EPA), California EPA and AVAQMD. Cancer risk is expressed in terms of expected incremental incidence per million population. The AVAQMD has established an incidence rate of ten (10) persons per million as the maximum acceptable incremental cancer risk due to DPM exposure from a project such as the proposed Project. This threshold serves to determine whether or not a given project has a potentially significant development-specific and cumulatively considerable impact.

The AVAQMD has also established non-carcinogenic risk parameters for use in HRAs. Non-carcinogenic risks are quantified by calculating a "hazard index," expressed as the ratio between the ambient pollutant concentration and its toxicity or Reference Exposure Level (REL). An REL is a concentration at or below which health effects are not likely to occur. A hazard index less of than one (1.0) means that adverse health effects are not expected. In this HRA, non-carcinogenic exposures of less than 1.0 are considered less-than-significant. Both the cancer risk and non-carcinogenic risk thresholds are applied to the nearest sensitive receptors below.

1.1 SITE LOCATION

The Project site is located on the southeast corner of Avenue M/Columbia Way and Sierra Highway in the City of Palmdale as shown on Exhibit 1-A. The Project site is vacant with nearby sensitive land uses located to the north across Avenue M. The Project site is located approximately 0.5 miles northwest of Runway 7 at Palmdale Airport/USAF Plant 42.

1.2 PROJECT DESCRIPTION

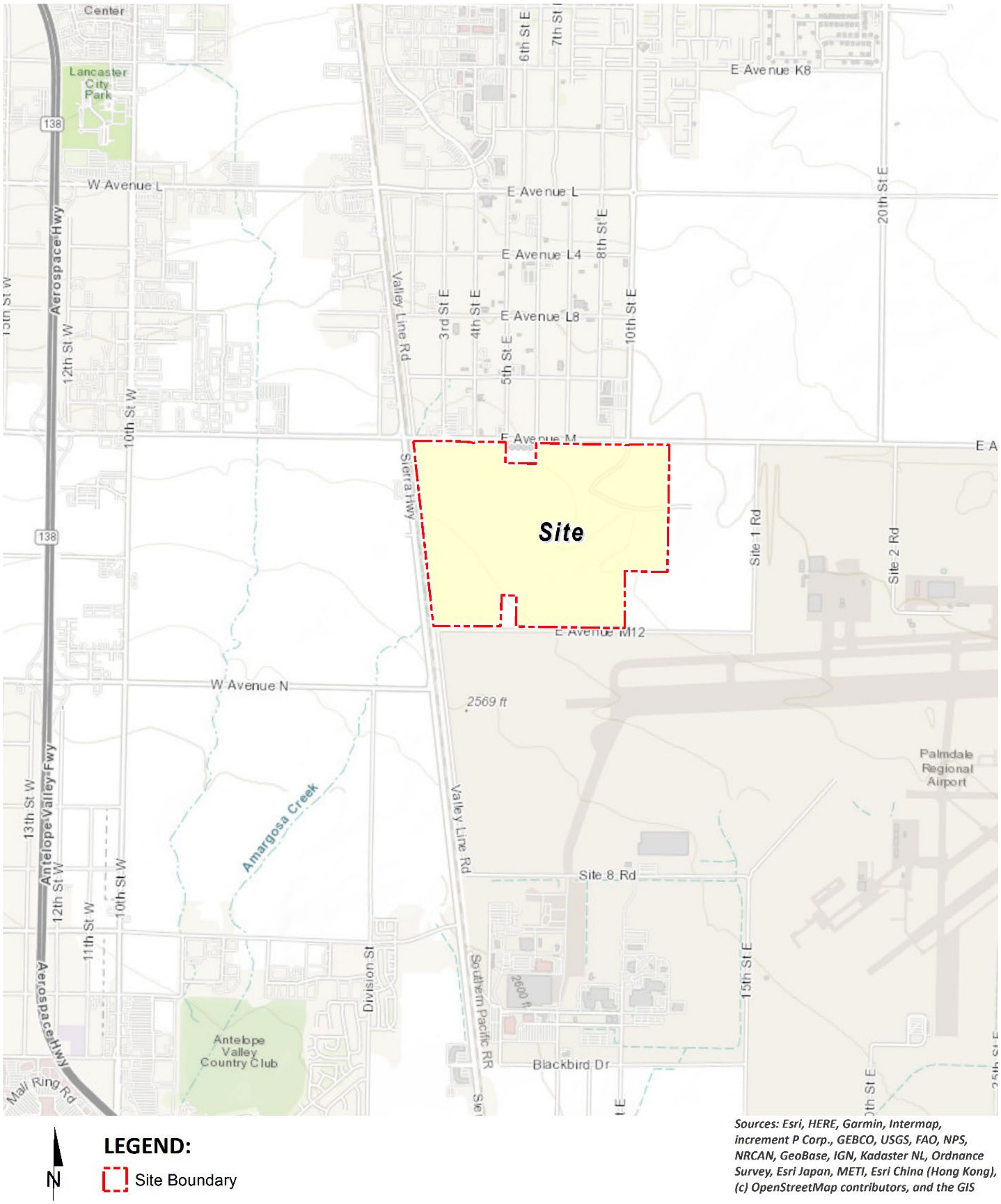
Six buildings are proposed in the first phase of the Project's development. Site-specific detail for subsequent phases of development would be determined in the future based on the proposed Specific Plan, but reasonable assumptions are made herein about the future phases of development to enable a complete and comprehensive analysis of the whole of the Project (see Exhibit 1-B):

- Phase 1:
    - Building 1 is 136,670 square feet
    - Building 2 is 144,306 square feet
    - Building 3 is 132,695 square feet
        - Buildings 1 through 3 will assume 25% general light industrial and 75% general warehousing use
    - Building 4 is 680,469 square feet of high-cube fulfillment center (sort) warehouse use
    - Building 5 is 1,004,228 square feet with 25% high-cube cold storage warehouse use and high-cube fulfillment center (non-sort) warehouse use
    - Building 6 is 274,858 square feet with 25% manufacturing and 75% general warehousing use
- Phase 2:
    - 1,630,362 square feet of high-cube parcel hub warehousing use
    - 549,790 square feet with 25% manufacturing and 75% general warehousing use
- Phase 3:
    - 1,156,576 square feet with 25% high-cube cold storage warehouse use and 75% high-cube fulfillment (non-sort) warehousing use
    - 2,500 square feet of fast-food restaurant without drive-through window use, 2,500 square feet of fast-food restaurant with drive-through window use, 2,000 square feet of coffee shop with drive-through window use, and 53,984 square feet of commercial retail use (for a total of 60,984 square feet)
- Phase 4:
    - 2,555,556 square feet with 25% high-cube cold storage warehouse use and 75% high-cube fulfillment (non-sort) warehousing use

The proposed Project is anticipated to have an opening year of 2025 for Phase 1 and 2032 for Project Buildout. At the time this analysis was prepared, the future tenants of the proposed Project were unknown, and therefore, this study includes a conservative analysis of the proposed Project uses.

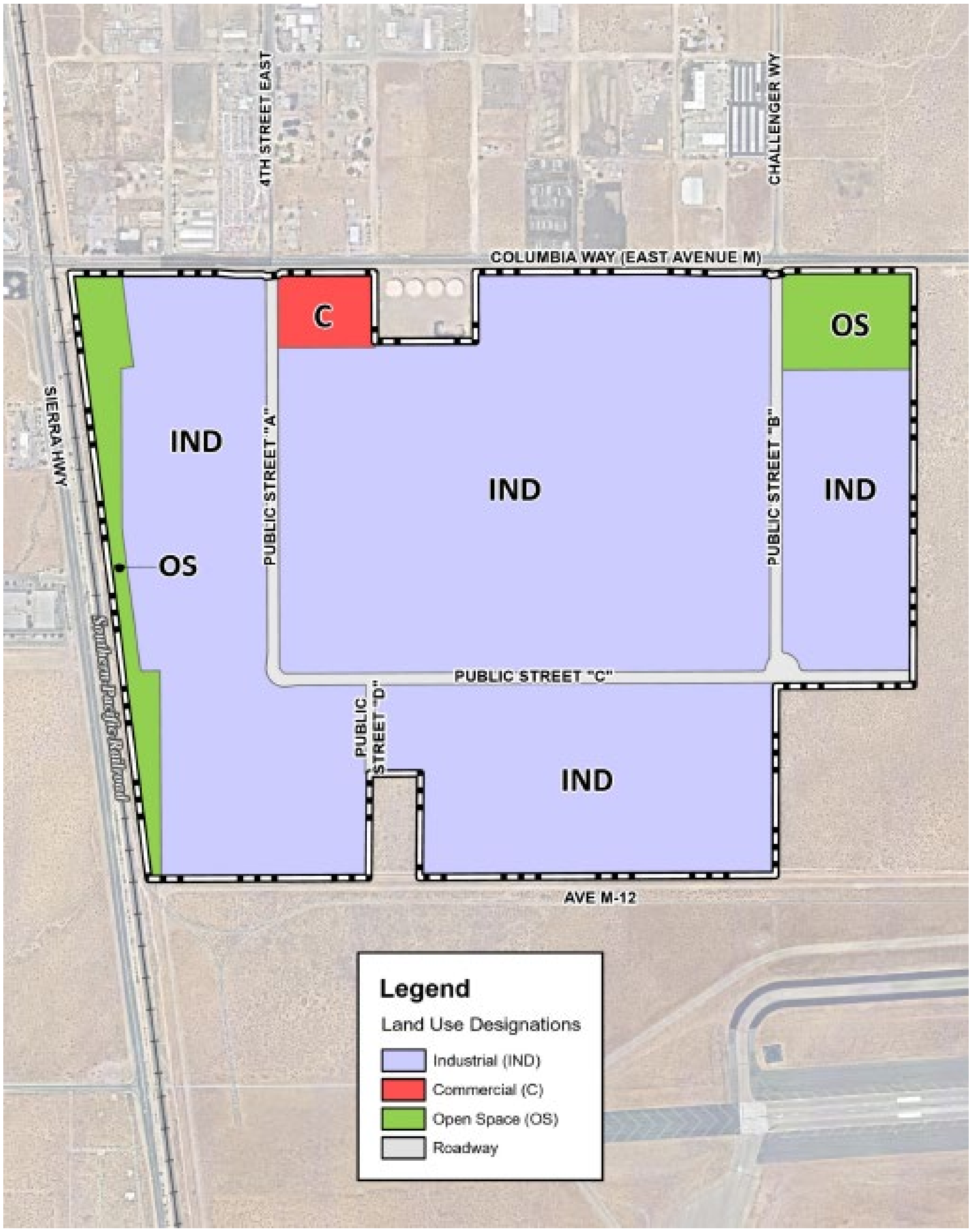
Because this analysis considers long-term exposure to TACs over a period of 30 years, the analysis evaluates Project emissions that would occur at buildout. This approach is conservative as the Project has the potential to generate the greatest quantity of TAC emissions at buildout versus the earlier phases of Project development.

EXHIBIT 1-A: LOCATION MAP



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS

EXHIBIT 1-B: SITE PLAN



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2 BACKGROUND

2.1 BACKGROUND ON RECOMMENDED METHODOLOGY

This HRA is based on applicable guidelines to produce conservative estimates of human health risk posed by exposure to DPM. The conservative nature of this analysis is due primarily to the following factors:

- The ARB-adopted diesel exhaust Unit Risk Factor (URF) of 300 in one million per µg/m3 is based upon the upper 95 percentile of estimated risk for each of the epidemiological studies utilized to develop the URF. Using the 95^{th} percentile URF represents a very conservative (health-protective) risk posed by DPM because it represents breathing rates that are high for the human body.
- The emissions derived assume that every truck accessing the Project site will idle for 15 minutes under the unmitigated scenario, and this is an overestimation of actual idling times and thus conservative.[2] The California Air Resources Board (CARB's) anti-idling requirements impose a 5-minute maximum idling time and therefore the analysis conservatively overestimates DPM emissions from idling by a factor of 3.

The AVAQMD has established an incidence rate of ten (10) persons per million as the maximum acceptable incremental cancer risk due to DPM exposure from a project such as the proposed Project. Carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, will have some associated risk. As a result, the State of California has established a threshold of one in one hundred thousand (1.0E-05) as a level posing no significant risk for exposures to carcinogens regulated under the Safe Drinking Water and Toxic Enforcement Act (Proposition 65). These thresholds are also consistent with the maximum incremental cancer risk established by the South Coast Air Quality Management District (SCAQMD) for projects prepared under CEQA.

Non-carcinogenic risk is expressed as a hazard index, which is quantified by comparing the exposure to the reference level via a ratio (i.e., the exposure divided by the appropriate chronic or acute value). Exposures below the reference level (a hazard index of 1.0) are not likely to be associated with any adverse health effects and are considered to be less than significant.

2.2 CONSTRUCTION HEALTH RISK ASSESSMENT

2.2.1 EMISSIONS CALCULATIONS

The emissions calculations for the construction HRA component are based on an assumed mix of construction equipment and hauling activity as presented in the *Antelope Valley Commerce Center Air Quality Impact Analysis* ("technical study") prepared by Urban Crossroads, Inc. (5)

[2] Although the Project is required to comply with ARB's idling limit of 5 minutes, staff at SCAQMD recommends that the on-site idling emissions should be estimated for 15 minutes of truck idling (personal communication, in person, with Jillian Wong, December 22, 2016), which would take into account on-site idling which occurs while the trucks are waiting to pull up to the truck bays, idling at the bays, idling at check-in and check-out, etc.

Construction related DPM emissions are expected to occur primarily as a function of heavy-duty construction equipment that would be operating on-site.

To support the Project development, there will be grading, trenching, and paving for off-site improvements associated with roadway construction and utility installation for the Project. It is expected that these off-site improvements will be constructed within the existing public right-of-way (ROW) on Columbia Way/Avenue M. It is expected that the off-site construction activities would not take place at any one location for more than four days due to the nature of the linear construction activity. Construction emissions from this off-site work would, therefore, be relatively short term, not concentrated in any one area, and would be reduced at any given location as construction work moves linearly along the existing public right-of-way and farther from sensitive uses. The physical constraints would limit the amount of construction equipment that could be used, and any off-site and utility infrastructure construction would not use equipment totals that would exceed the equipment totals on Table 2-2. Because off-site construction activity would be located near existing homes on an intermittent and short-term basis, no health risk impacts beyond what has already been identified in this report are expected to occur.

As discussed in the technical study, the Project would result in approximately 1,986 total working-days of construction activity. The construction duration by phase is shown on Table 2-1. A detailed summary of construction equipment assumptions by phase is provided at Table 2-2. The CalEEMod emissions outputs are presented in Appendix 2.1. The modeled emission sources for construction activity are illustrated on Exhibit 2-A.

TABLE 2-1: CONSTRUCTION DURATION

Construction Activity	Start Date	End Date	Days
Phase 1			
Site Preparation	6/3/2024	7/12/2024	30
Grading	7/15/2024	11/1/2024	80
Building Construction	11/4/2024	10/31/2025	260
Paving	7/1/2025	7/28/2025	20
Architectural Coating	7/1/2025	8/25/2025	40
Phase 2			
Site Preparation	6/1/2026	7/10/2026	30
Grading	7/13/2026	9/11/2026	45
Building Construction	9/14/2026	9/10/2027	260
Paving	7/1/2027	7/28/2027	20
Architectural Coating	7/1/2027	8/25/2027	40
Phase 3			
Site Preparation	6/1/2028	7/12/2028	30

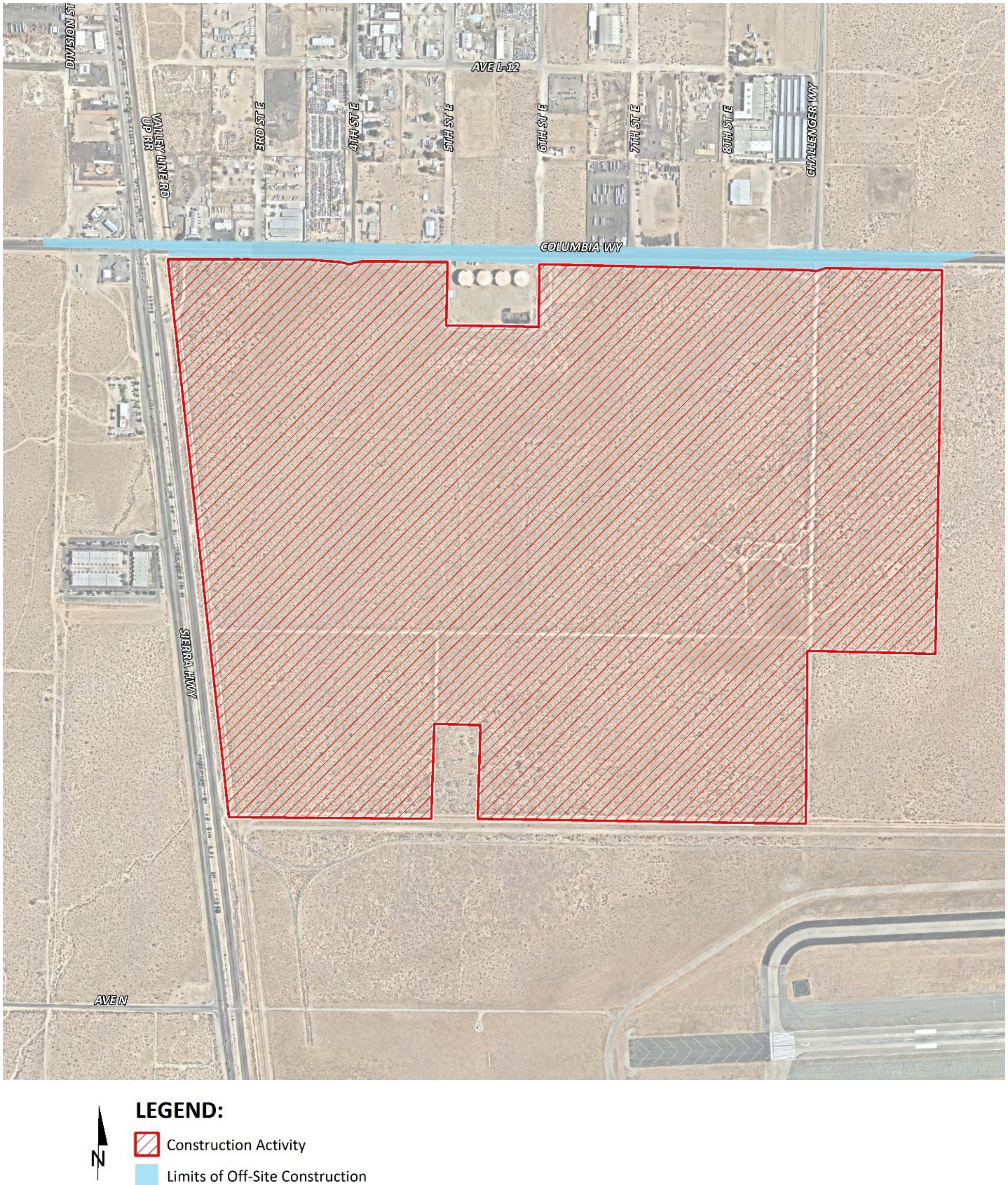
Construction Activity	Start Date	End Date	Days
Grading	7/13/2028	9/13/2028	45
Building Construction	9/14/2028	9/12/2029	260
Paving	7/2/2029	7/27/2029	20
Architectural Coating	7/2/2029	8/24/2029	40
Phase 4			
Site Preparation	10/1/2030	11/11/2030	30
Grading	11/12/2030	1/13/2031	45
Building Construction	1/14/2031	1/12/2032	260
Paving	11/3/2031	11/28/2031	20
Architectural Coating	11/3/2031	12/26/2031	40

TABLE 2-2: CONSTRUCTION EQUIPMENT ASSUMPTIONS

Phase Name	Equipment	Number	Hours Per Day
Phase 1			
Site Preparation	Rubber Tired Dozers	5	8
	Crawler Tractors	7	8
Grading	Excavators	1	8
	Graders	3	8
	Rubber Tired Dozers	2	8
	Scrapers	6	8
	Crawler Tractors	2	8
Building Construction	Cranes	1	8
	Forklifts	3	8
	Generator Sets	3	8
	Welders	2	8
	Crawler Tractors	3	8
Paving	Pavers	2	8
	Paving Equipment	4	8
	Rollers	4	8
Architectural Coating	Air Compressors	2	8
Phases 2 - 4			
	Rubber Tired Dozers	5	8

Phase Name	Equipment	Number	Hours Per Day
Site Preparation	Crawler Tractors	7	8
Grading	Excavators	1	8
	Graders	3	8
	Rubber Tired Dozers	2	8
	Scrapers	6	8
	Crawler Tractors	2	8
Building Construction	Cranes	1	8
	Forklifts	3	8
	Generator Sets	3	8
	Welders	2	8
	Crawler Tractors	3	8
Paving	Pavers	2	8
	Paving Equipment	4	8
	Rollers	4	8
Architectural Coating	Air Compressors	2	8

EXHIBIT 2-A: MODELED CONSTRUCTION EMISSION SOURCES



2.3 OPERATIONAL HEALTH RISK ASSESSMENT

2.3.1 ON-SITE AND OFF-SITE TRUCK ACTIVITY

Vehicle DPM emissions were calculated using emission factors for particulate matter less than 10µm in diameter (PM_{10}) generated with the 2021 version of the EMission FACtor model (EMFAC) developed by the CARB. EMFAC 2021 is a mathematical model that CARB developed to calculate emission rates from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by the ARB to project changes in future emissions from on-road mobile sources (6). The most recent version of this model, EMFAC 2021, incorporates regional motor vehicle data, information and estimates regarding the distribution of vehicle miles traveled (VMT) by speed, and number of starts per day.

Several distinct emission processes are included in EMFAC 2021. Emission factors calculated using EMFAC 2021 are expressed in units of grams per vehicle miles traveled (g/VMT) or grams per idle-hour (g/idle-hr), depending on the emission process. The emission processes and corresponding emission factor units associated with diesel particulate exhaust for this Project are presented below.

For this Project, annual average PM_{10} emission factors were generated by running EMFAC 2021 in EMFAC Mode for vehicles in the Los Angeles County jurisdiction. The EMFAC Mode generates emission factors in terms of grams of pollutant emitted per vehicle activity and can calculate a matrix of emission factors at specific values of temperature, relative humidity, and vehicle speed. The model was run for speeds traveled in the vicinity of the Project. The vehicle travel speeds for each segment modeled are summarized below.

- Idling – on-site loading/unloading and truck trailer parking
- 5 miles per hour – on-site vehicle movement including driving and maneuvering
- 25 miles per hour – off-site vehicle movement including driving and maneuvering.

Calculated emission factors are shown at Table 2-3. As a conservative measure, a 2032 EMFAC 2021 run was conducted and a static 2032 emissions factor data set was used for the entire duration of analysis herein (e.g., 30 years). Use of 2032 emission factors would overstate potential impacts since this approach assumes that emission factors remain “static” and do not change over time due to fleet turnover or cleaner technology with lower emissions that would be incorporated into vehicles after 2032. Additionally, based on EMFAC 2021, Light-Heavy-Duty Trucks are comprised of 61.9% diesel, Medium-Heavy-Duty Trucks are comprised of 93.4% diesel, and Heavy-Heavy-Duty Trucks are comprised of 99.6% diesel. Trucks fueled by diesel are accounted for by these percentages accordingly in the emissions factor generation. Appendix 2.2 includes additional details on the emissions estimates from EMFAC.

The vehicle DPM exhaust emissions were calculated for running exhaust emissions. The running exhaust emissions were calculated by applying the running exhaust PM_{10} emission factor (g/VMT) from EMFAC over the total distance traveled. The following equation was used to estimate off-site emissions for each of the different vehicle classes comprising the mobile sources (7):

$$Emissions_{Speed\ A} = EF_{Run\ Exhaust} \times Distance \times \frac{Number\ of\ Trips\ per\ Day}{Seconds\ per\ Day}$$

Where:

$Emissions_{Speed\ A}$	=	Vehicle emissions at a given speed A (g/s)
$EF_{Run\ Exhaust}$	=	EMFAC running exhaust PM_{10} emission factor at speed A (g/vmt)
$Distance$	=	Total distance traveled per trip (miles)

Similar to off-site traffic, on-site vehicle running emissions were calculated by applying the running exhaust PM_{10} emission factor (g/VMT) from EMFAC and the total vehicle trip number over the length of the driving path using the same formula presented above for on-site emissions. In addition, on-site vehicle idling exhaust emissions were calculated by applying the idle exhaust PM_{10} emission factor (g/idle-hr) from EMFAC and the total truck trip over the total assumed idle time (15 minutes). The following equation was used to estimate the on-site vehicle idling emissions for each of the different vehicle classes (7):

$$Emissions_{Idle} = EF_{Idle} \times Number\ of\ Trips \times Idling\ Time \times \frac{60\ minutes\ per\ hour}{seconds\ per\ day}$$

Where:

$Emissions_{Idle}$	=	Vehicle emissions during Idling (g/s)
EF_{Idle}	=	EMFAC idle exhaust PM_{10} emission factor (g/s)
$Number\ of\ Trips$	=	Number of trips per day
$Idling\ Time$	=	Idling time (minutes per trip)

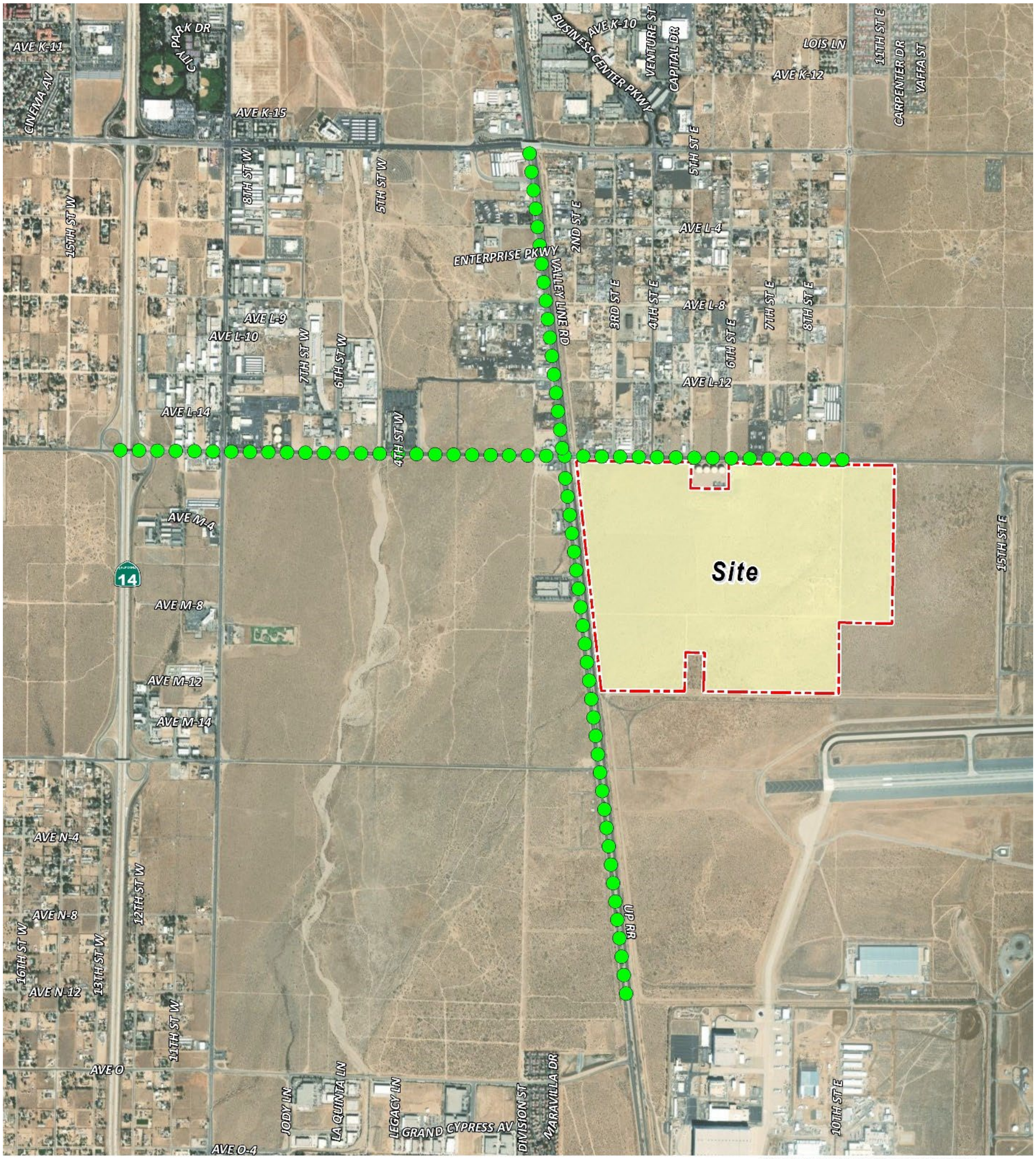
TABLE 2-3: 2032 WEIGHTED AVERAGE DPM EMISSIONS FACTORS

Speed	Weighted Average
0 (idling)	0.10138 (g/idle-hr)
5	0.01816 (g/s)
25	0.00823 (g/s)

Each roadway was modeled as a line source (made up of multiple adjacent volume sources). Due to the large number of volume sources modeled for this analysis, the corresponding coordinates of each volume source have not been included in this report but are included in Appendices 2.3 through 2-6. The DPM emission rate for each volume source was calculated by multiplying the emission factor (based on the average travel speed along the roadway) by the number of trips and the distance traveled along each roadway segment and dividing the result by the number of volume sources along that roadway, as illustrated on Table 2-4. Six buildings are proposed in the first phase of the Project's development. Although site-specific detail for subsequent phases of development would be determined in the future based on the proposed Specific Plan, the applicant provided a conceptual layout for Phases 2-3 for analytical purposes reasonable assumptions were made about future building placement in Phase 4 to enable a complete and comprehensive analysis. The modeled emission sources are illustrated on Exhibit 2-B for on-site sources and Exhibit 2-C for off-site sources. The modeling domain is limited to the Project's primary truck route and includes off-site sources in the study area for more than ¾ mile. This modeling domain is more inclusive and conservative than using only a ¼ mile modeling domain which is the distance supported by several reputable studies which conclude that the greatest potential risks occur within a ¼ mile of the primary source of emissions (1) (in the case of the Project, the primary source of emissions is the on-site idling and on-site travel).

EXHIBIT 2-B: MODELED ON-SITE EMISSION SOURCES

EXHIBIT 2-C: MODELED OFF-SITE EMISSION SOURCES



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

LEGEND:

Site Boundary Truck Movements

TABLE 2-4: DPM EMISSIONS FROM PROJECT TRUCKS (2032 ANALYSIS YEAR)

Truck Emission Rates						
Source	Trucks Per Day	VMT [a] (miles/day)	Truck Emission Rate [b] (grams/mile)	Truck Emission Rate [b] (grams/idle-hour)	Daily Truck Emissions [c] (grams/day)	Modeled Emission Rates (g/second)
On-Site Idling - Building 1 Loading Docks	33			0.1014	0.93	1.073E-05
On-Site Idling - Building 2 Loading Docks	33			0.1014	0.93	1.071E-05
On-Site Idling - Building 3 Loading Docks	31			0.1014	0.86	9.938E-06
On-Site Idling - Building 4 Loading Docks N.	74			0.1014	2.05	2.374E-05
On-Site Idling - Building 4 Loading Docks S.	74			0.1014	2.05	2.374E-05
On-Site Idling - Building 5 Loading Docks N.	105			0.1014	2.90	3.360E-05
On-Site Idling - Building 5 Loading Docks S.	105			0.1014	2.90	3.360E-05
On-Site Idling - Building 6 Loading Docks	57			0.1014	1.58	1.831E-05
On-Site Idling - Building 7 Loading Docks	57			0.1014	1.58	1.831E-05
On-Site Idling - Building 8 Loading Docks	56			0.1014	1.57	1.812E-05
On-Site Idling - Building 9 Loading Docks N.	176			0.1014	4.90	5.668E-05
On-Site Idling - Building 9 Loading Docks S.	176			0.1014	4.90	5.668E-05
On-Site Idling - Building 10 Loading Docks E.	66			0.1014	1.83	2.124E-05
On-Site Idling - Building 10 Loading Docks W.	66			0.1014	1.83	2.124E-05
On-Site Idling - Building 10 Loading Docks S.	66			0.1014	1.83	2.124E-05
On-Site Idling - Building 11 Loading Docks	59			0.1014	1.64	1.894E-05
On-Site Idling - Building 12 Loading Docks N.	167			0.1014	4.64	5.367E-05
On-Site Idling - Building 12 Loading Docks S.	167			0.1014	4.64	5.367E-05
On-Site Idling - Building 13 Loading Docks N.	84			0.1014	2.32	2.683E-05
On-Site Idling - Building 13 Loading Docks S.	84			0.1014	2.32	2.683E-05
On-Site Idling - Building 4 Trailer Parking N.	74			0.1014	0.80	9.290E-06
On-Site Idling - Building 4 Trailer Parking S.	74			0.1014	0.80	9.290E-06
On-Site Idling - Building 5 Trailer Parking N.	105			0.1014	1.14	1.315E-05
On-Site Idling - Building 5 Trailer Parking S.	105			0.1014	1.14	1.315E-05
On-Site Idling - Building 6 Trailer Parking	57			0.1014	0.62	7.165E-06
On-Site Idling - Building 7 Trailer Parking	57			0.1014	0.62	7.165E-06
On-Site Idling - Building 8 Trailer Parking	56			0.1014	0.61	7.094E-06
On-Site Idling - Building 9 Trailer Parking N.	176			0.1014	1.92	2.218E-05
On-Site Idling - Building 9 Trailer Parking S.	176			0.1014	1.92	2.218E-05
On-Site Idling - Building 10 Trailer Parking E.	99			0.1014	1.08	1.247E-05
On-Site Idling - Building 10 Trailer Parking W.	99			0.1014	1.08	1.247E-05
On-Site Idling - Building 12 Trailer Parking N.	167			0.1014	1.81	2.100E-05
On-Site Idling - Building 12 Trailer Parking S.	167			0.1014	1.81	2.100E-05
On-Site Idling - Building 13 Trailer Parking N.	84			0.1014	0.91	1.050E-05
On-Site Idling - Building 13 Trailer Parking S.	84			0.1014	0.91	1.050E-05
On-Site Travel - Buildings 1, 2, 3	195	72.36	0.0182		1.38	1.602E-05
On-Site Travel - Buildings 4, 5 N.	357	218.87	0.0182		4.19	4.845E-05
On-Site Travel - Buildings 4, 5 S.	357	218.01	0.0182		4.17	4.826E-05
On-Site Travel - Building 6	114	17.94	0.0182		0.34	3.972E-06
On-Site Travel - Building 7	114	18.43	0.0182		0.35	4.080E-06
On-Site Travel - Building 8	113	17.24	0.0182		0.33	3.818E-06
On-Site Travel - Building 9 N.	353	215.43	0.0182		4.12	4.769E-05
On-Site Travel - Building 9 S.	353	292.15	0.0182		5.59	6.468E-05
On-Site Travel - Building 9 SE DW	353	17.62	0.0182		0.34	3.901E-06
On-Site Travel - Building 9 SW DW	353	8.81	0.0182		0.17	1.951E-06
On-Site Travel - Building 10 E.	198	73.41	0.0182		1.40	1.625E-05
On-Site Travel - Building 10 W.	198	127.69	0.0182		2.44	2.827E-05
On-Site Travel - Building 11	118	17.11	0.0182		0.33	3.788E-06
On-Site Travel - Building 12 N.	334	162.69	0.0182		3.11	3.601E-05
On-Site Travel - Building 12 S.	334	162.69	0.0182		3.11	3.601E-05
On-Site Travel - Building 13 N.	167	32.02	0.0182		0.61	7.088E-06
On-Site Travel - Building 13 S.	167	32.02	0.0182		0.61	7.088E-06
Off-Site Travel - Public Street A 35%	1215	995.59	0.0082		8.39	9.707E-05
Off-Site Travel - Public Street B 65%	2257	1589.24	0.0082		13.39	1.549E-04
Off-Site Travel - Avenue M 65%	2257	1419.28	0.0082		11.96	1.384E-04
Off-Site Travel - Avenue M 100%	3472	979.68	0.0082		8.25	9.552E-05
Off-Site Travel - Avenue M 70%	2430	3664.15	0.0082		30.87	3.573E-04
Off-Site Travel - Sierra Highway N. 15%	521	527.00	0.0082		4.44	5.138E-05
Off-Site Travel - Sierra Highway S. 15%	521	925.56	0.0082		7.80	9.024E-05

[a] Vehicle miles traveled are for modeled truck route only.

[b] Emission rates determined using EMFAC 2021. Idle emission rates are expressed in grams per idle hour rather than grams per mile.

[c] This column includes the total truck travel and truck idle emissions. For idle emissions this column includes emissions based on the assumption that each truck idles for 15 minutes at loading docks and 5 minutes in parking areas. The analysis assumes that each TRU operates for 30 minutes.

On-site truck idling was estimated to occur as trucks enter and travel through the Project site. Although the Project's diesel-fueled truck and equipment operators will be required by State law to comply with CARB's idling limit of 5 minutes, staff at SCAQMD recommends that the on-site idling emissions be calculated assuming 15 minutes of truck idling (8), which would take into account on-site idling which occurs while the trucks are waiting to pull up to the truck bays, idling at the bays, idling at check-in and check-out, etc. As such, this analysis calculates truck idling at 15 minutes, consistent with SCAQMD's recommendation. Truck idling at trailer parking areas was assumed to occur over a period of 5 minutes. Even though the Project is not within the jurisdiction of the SCAQMD, these recommendations are relevant for CEQA purposes since AVAQMD does not provide similar guidance.

As summarized in the *Antelope Valley Commerce Center Traffic Analysis* prepared by Urban Crossroads, Inc., at buildout the Project is expected to generate a total of approximately 26,214 vehicular trips-ends per day (actual vehicles) which includes 3,472 two-way truck trips per day (9).

2.3.2 TRU EMISSIONS

In order to account for the possibility of refrigerated uses, trucks associated with the cold-storage land use are assumed to also have TRUs. For modeling purposes, a total of 888 two-way truck trips have been estimated to include TRUs. TRUs are accounted for during on-site and off-site travel. The TRU calculations are based on OFFROAD Model version 2021 (OFFROAD 2021), developed by CARB. OFFROAD 2021 does not provide emission rates per hour or mile as with the on-road emission model and only provides emission inventories. Emission results are produced in tons per day while all activity, fuel consumption and horsepower hours were reported at annual levels. The emission inventory is based on specific assumptions including the average horsepower rating of specific types of equipment and the hours of operation annually. These assumptions are not always consistent with assumptions used in the modeling of project level emissions. Therefore, the emissions inventory was converted into emission rates to accurately calculate emissions from TRU operation associated with project level details. This was accomplished by converting the annual horsepower hours to daily operational characteristics and converting the daily emission levels into hourly emission rates based on the total emission of each criteria pollutant by equipment type and the average daily hours of operations.

2.3.3 ON-SITE EQUIPMENT EMISSIONS

It is common for warehouse buildings to require the operation of exterior cargo handling equipment in the building's truck court areas. For this particular Project, it was assumed that a total of 36 pieces of diesel-powered cargo-handling equipment rated at 75 horsepower would operate 4 hours a day[3] for 365 days of the year. On-site equipment was modeled as volume sources placed in the truck court area of each industrial building, with a modeled release height of 5 meters and an initial lateral dimension of 1.4 meters.

[3] Based on Table II-3, Port and Rail Cargo Handling Equipment Demographics by Type, from CARB's Technology Assessment: Mobile Cargo Handling Equipment document, a single piece of equipment could operate up to 2 hours per day (Total Average Annual Activity divided by Total Number Pieces of Equipment). As such, the analysis conservatively assumes that the tractor/loader/backhoe would operate up to 4 hours per day.

2.3.4 EMERGENCY FIRE PUMPS

The proposed Project was conservatively assumed to include installation of a 300 horsepower diesel-powered emergency fire pump at each industrial building, for a total of 13 emergency fire pumps. Each emergency fire pump was estimated to operate for up to 1 hour per day, 1 day per week for up to 50 hours per year for maintenance and testing purposes. Emissions associated with the stationary emergency diesel-powered emergency fire pumps were calculated using CalEEMod. Each emergency engine was modeled in AERMOD as point source, and because specific engine data is not known at this time, release parameters from the California Air Pollution Control Officers Association Facility Prioritization Guidelines were utilized (10).

2.4 EXPOSURE QUANTIFICATION

The analysis herein has been conducted in accordance with the guidelines in the Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis (4). The U.S. EPA's AERMOD model has been utilized. For purposes of this analysis, the Lakes AERMOD View (Version 11.2.0) was used to calculate annual average particulate concentrations associated with site operations. Lakes AERMOD View was utilized to incorporate the U.S. EPA's latest AERMOD Version 22112 (11).

The model offers additional flexibility by allowing the user to assign an initial release height and vertical dispersion parameters for mobile sources representative of a roadway. For this HRA, the roadways were modeled as adjacent volume sources. Roadways were modeled using the U.S. EPA's haul route methodology for modeling of on-site and off-site truck movement. More specifically, the Haul Road Volume Source Calculator in Lakes AERMOD View has been utilized to determine the release height parameters. Based on the US EPA methodology, the Project's modeled sources would result in a release height of 3.49 meters, and an initial lateral dimension of 4.0 meters, and an initial vertical dimension of 3.25 meters.

Model parameters are presented in Table 2-5. The model requires additional input parameters including emission data and local meteorology. Meteorological data from the Palmdale Airport monitoring station was used to represent local weather conditions and prevailing winds (12).

TABLE 2-5: AERMOD MODEL PARAMETERS

Dispersion Coefficient (Urban/Rural)	Rural
Terrain (Flat/Elevated)	Elevated (Regulatory Default)
Averaging Time	1 year (5-year Meteorological Data Set)
Receptor Height	0 meters (Regulatory Default)

Universal Transverse Mercator (UTM) coordinates for World Geodetic System (WGS) 84 were used to locate the Project site boundaries, each volume source location, and receptor locations in the Project site's vicinity. The AERMOD dispersion model summary output files for the proposed Project are presented in Appendices 2.3 through 2.6. Modeled sensitive receptors were placed at residential and non-residential locations.

Receptors may be placed at applicable structure locations for residential and worker property and not necessarily the boundaries of the properties containing these uses because the human receptors (residents and workers) spend a majority of their time at the residence or in the workplace's building, and not on the property line. It should be noted that the primary purpose of receptor placement is focused on long-term exposure. For example, the HRA evaluates the potential health risks to residents and workers over a period of 30 or 25 years of exposure, respectively. Notwithstanding, as a conservative measure, receptors were placed at either the outdoor living area or the building façade, whichever is closer to the Project site.

For purposes of this HRA, receptors include both residential and non-residential (worker) land uses in the vicinity of the Project. These receptors are included in the HRA since residents and workers may be exposed at these locations over a long-term duration of 30 and 25 years, respectively. This methodology is consistent with AVAQMD and OEHHA recommended guidance.

Any impacts to residents or workers located further away from the Project site than the modeled residential and workers would have a lesser impact than what has already been disclosed in the HRA at the MEIR and MEIW because concentrations dissipate with distance.

All receptors were set to existing elevation height so that only ground-level concentrations are analyzed. United States Geological Survey (USGS) Digital Elevation Model (DEM) terrain data based on a 7.5-minute topographic quadrangle map series using AERMAP was utilized in the HRA modeling to set elevations (13).

Discrete variants for daily breathing rates, exposure frequency, and exposure duration were obtained from relevant distribution profiles presented in the 2015 OEHHA Guidelines. Tables 2-6 through 2-8 summarize the Exposure Parameters for Residents and Workers based on 2015 OEHHA Guidelines. Appendix 2.7 includes the detailed risk calculation.

2.5 CARCINOGENIC CHEMICAL RISK

Excess cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens over a specified exposure duration. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF). A risk level of 10 in one million implies a likelihood that up to 10 people, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the levels of toxic air contaminants over a specified duration of time.

TABLE 2-6: EXPOSURE ASSUMPTIONS FOR INDIVIDUAL CANCER RISK (CONSTRUCTION ACTIVITY)

Age	Daily Breathing Rate (L/kg-day)	Age Specific Factor	Exposure Duration (years)	Fraction of Time at Home	Exposure Frequency (days/year)	Exposure Time (hours/day)
0 to 2	1,090	10	2.00	1.00	250	8
2 to 16	572	3	5.61	1.00	250	8

TABLE 2-7: EXPOSURE ASSUMPTIONS FOR INDIVIDUAL CANCER RISK (30 YEAR RESIDENTIAL)

Age	Daily Breathing Rate (L/kg-day)	Age Specific Factor	Exposure Duration (years)	Fraction of Time at Home	Exposure Frequency (days/year)	Exposure Time (hours/day)
-0.25 to 0	361	10	0.25	0.85	350	24
0 to 2	1,090	10	2	0.85	350	24
2 to 16	572	3	14	0.72	350	24
16 to 30	261	1	14	0.73	350	24

TABLE 2-8: EXPOSURE ASSUMPTIONS FOR INDIVIDUAL CANCER RISK (25 YEAR WORKER)

Age	Daily Breathing Rate (L/kg-day)	Age Specific Factor	Exposure Duration (years)	Exposure Frequency (days/year)	Exposure Time (hours/day)
16 to 41	230	1	25	250	12

Guidance from CARB and the California EPA, Office of Environmental Health Hazard Assessment (OEHHA) recommends a refinement to the standard point estimate approach when alternate human body weights and breathing rates are utilized to assess risk for susceptible subpopulations such as children. For the inhalation pathway, the procedure requires the incorporation of several discrete variates to effectively quantify dose. Once determined, contaminant dose is multiplied by the CPF in units of inverse dose expressed in milligrams per kilogram per day (mg/kg/day)-1 to derive the cancer risk estimate. Therefore, to assess exposures, the following dose algorithm was utilized.

$$DOSE_{AIR} = \left(C_{AIR} \times \frac{BR}{BW} \times A \times EF\right) \times (1 \times 10^{-6})$$

Where:

$DOSE_{AIR}$ = chronic daily intake (mg/kg/day)

C_{AIR} = concentration of contaminant in air (µg/m^3)

$\frac{BR}{BW}$ = daily breathing rate normalized to body weight

		(L/kg BW-day)
A	=	inhalation absorption factor
EF	=	exposure frequency (days/365 days)
BW	=	body weight (kg)
1×10^{-6}	=	conversion factors (µg to mg, L to m^3)

$$RISK_{AIR} = DOSE_{AIR} \times CPF \times ASF \times FAH \times \frac{ED}{AT}$$

Where:

$DOSE_{AIR}$	=	chronic daily intake (mg/kg/day)
CPF	=	cancer potency factor
ASF	=	age sensitivity factor
FAH	=	fraction of time at home
ED	=	number of years within particular age group
AT	=	averaging time

2.6 NON-CARCINOGENIC EXPOSURES

An evaluation of the potential noncarcinogenic effects of chronic exposures was also conducted. Adverse health effects are evaluated by comparing a compound's annual concentration with its toxicity factor or REL. The REL for diesel particulates was obtained from OEHHA for this analysis. The chronic REL for DPM was established by OEHHA as 5 µg/m^3 (14).

The non-cancer hazard index was calculated as follows:

The relationship for the non-cancer health effects of DPM is given by the following equation:

$$HI_{DPM} = \frac{C_{DPM}}{REL_{DPM}}$$

Where:

HI_{DPM}	=	Hazard index (unitless)
C_{DPM}	=	Annual average DPM concentration (µg/m^3)
REL_{DPM}	=	REL for DPM (the DPM concentration at which no adverse health effects are anticipated).

2.7 POTENTIAL PROJECT-RELATED DPM SOURCE CANCER AND NON-CANCER RISKS

CONSTRUCTION IMPACTS

The land use with the greatest potential exposure to Project construction DPM source emissions is Location R2 which is located approximately 607 feet north of the Project site at an existing residence located at 42057 5th Street E. R2 is placed in the private outdoor living area (backyard) facing the Project site. Without MMs AQ-1 through AQ-5, the maximum incremental cancer risk attributable to Project construction DPM source emissions at the MEIR is estimated at 0.29 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0.

With implementation of MMs AQ-1 through AQ-5, the land use with the greatest potential exposure to Project construction DPM source emissions is Location R2. At the MEIR, with mitigation the maximum incremental cancer risk is estimated at 0.21 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project construction activity. Because all other modeled residential receptors are located at a greater distance from the Project site and are exposed to lesser concentrations of DPM than the MEIR analyzed herein, and TACs generally dissipate with distance from the source, all other residential receptors in the vicinity of the Project site would be exposed to less emissions and therefore less risk than MEIR identified herein. The nearest modeled receptors are illustrated on Exhibit 2-D.

OPERATIONAL IMPACTS

Residential Exposure Scenario:

The residential land use with the greatest potential exposure to Project DPM source emissions is Location R2 which is located approximately 607 feet north of the Project site at an existing residence located at 42057 5th Street E. R2 is placed in the private outdoor living areas (backyard) facing the Project site. At the MEIR, without MMs AQ-1 through AQ-5, the maximum incremental cancer risk attributable to Project DPM source emissions is estimated at 4.85 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable significance threshold of 1.0.

With implementation of MMs AQ-1 through AQ-5, the residential land use with the greatest potential exposure to Project DPM source emissions is Location R2. At the MEIR, with mitigation the maximum incremental cancer risk is estimated at 3.73 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project operational activity. Because all other modeled residential receptors are located at a greater distance from the Project site and primary truck routes and are exposed to lesser concentrations of DPM than the MEIR analyzed herein, and TACs generally dissipate with distance from the source, all other residential receptors in the vicinity of the Project site would be exposed to less emissions and therefore less risk than the MEIR identified herein. As such, the Project will not cause a significant human health or cancer risk to nearby residences. The nearest modeled receptors are illustrated on Exhibit 2-D.

Worker Exposure Scenario[4]*:*

The worker receptor land use with the greatest potential exposure to Project DPM source emissions is Location R6, which represents the adjacent potential worker receptor approximately 127 feet north of the Project site. At the MEIW, without MMs AQ-1 through AQ-5, the maximum incremental cancer risk impact is 1.10 in one million which is less than the AVAQMD threshold of 10 in one million. Maximum non-cancer risks at this same location were estimated to be ≤0.01, which would not exceed the applicable significance threshold of 1.0.

With implementation of MMs AQ-1 through AQ-5, the worker receptor land use with the greatest potential exposure to Project DPM source emissions is Location R6. At the MEIW, with mitigation the maximum incremental cancer risk is estimated at 0.97 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project operational activity. Because all other modeled worker receptors are located at a greater distance than the MEIW analyzed herein, and DPM dissipates with distance from the source, all other worker receptors in the vicinity of the Project would be exposed to less emissions and therefore less risk than the MEIW identified herein. As such, the Project will not cause a significant human health or cancer risk to adjacent workers. The nearest modeled receptors are illustrated on Exhibit 2-D.

School Child Exposure Scenario:

Proximity to sources of toxics is critical to determining the impact. In traffic-related studies, the additional non-cancer health risk attributable to proximity was seen within 1,000 feet and was strongest within 300 feet. California freeway studies show about a 70-percent drop-off in particulate pollution levels at 500 feet. Based on CARB and SCAQMD emissions and modeling analyses, an 80-percent drop-off in pollutant concentrations is expected at approximately 1,000 feet from a distribution center (1).

The 1,000-foot evaluation distance is supported by research-based findings concerning Toxic Air Contaminant (TAC) emission dispersion rates from roadways and large sources showing that emissions diminish substantially between 500 and 1,000 feet from emission sources.

4 AVAQMD guidance does not require assessment of the potential health risk to on-site workers. Excerpts from the document OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines—The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2003), also indicate that it is not necessary to examine the health effects to on-site workers unless required by RCRA (Resource Conservation and Recovery Act) / CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) or the worker resides on-site.

In addition, the Waters Bill (AB 3205) (H&SC Section, 42301.6 through 42301.9) addresses sources of hazardous air pollutants near schools and although not directly applicable to this project, this bill further evidences the propriety of considering hazardous emissions sources within a defined 1,000-foot radius. That is, pursuant to the Waters Bill, prior to approving an application for a permit to construct or modify a source which emits hazardous air emissions (i.e. DPM), which source is located within 1,000 feet from the outer boundary of a school site, the air pollution control officer shall prepare a public notice in which the proposed project or modification for which the application for a permit is made is fully described.

More recent studies suggest that in light of emission reductions due to tightening emission standards over the past twenty years, this 1,000-foot siting distance is overly conservative. Modeling performed for the 2021 report *Evaluating Siting Distances for New Sensitive Receptors Near Warehouses*, prepared by the Ramboll Group, demonstrates a significant reduction in DPM emissions and risk between year 2000 emissions (which were utilized by CARB in establishing its recommended siting guidance of 1,000 feet) and 2023 (2). This reduction is attributed to a significant reduction in DPM emission rates from trucks and TRUs resulting from the adoption of increasingly stringent emission standards. This reduction in DPM emission rates has resulted in a corresponding significant reduction in risk as well, despite increasingly conservative regulatory guidance in the preparation of HRAs, particularly OEHHA's adoption of ASF in their revised HRA guidance released in 2015.

A one-quarter mile radius, or 1,320 feet, is commonly utilized for identifying sensitive receptors, such as schools, that may be impacted by a proposed project. This radius is more robust than, and therefore provides a more health protective scenario for evaluation than the 1,000-foot impact radius identified above.

There are no schools within ¼ mile of the Project site. The nearest school is Adventureland Preschool, which is located approximately 6,750 feet southwest of the Project site. Because there is no reasonable potential that TAC emissions would cause significant health impacts at distances of more than ¼ mile from the air pollution source, there would be no significant impacts that would occur to any schools in the vicinity of the Project.

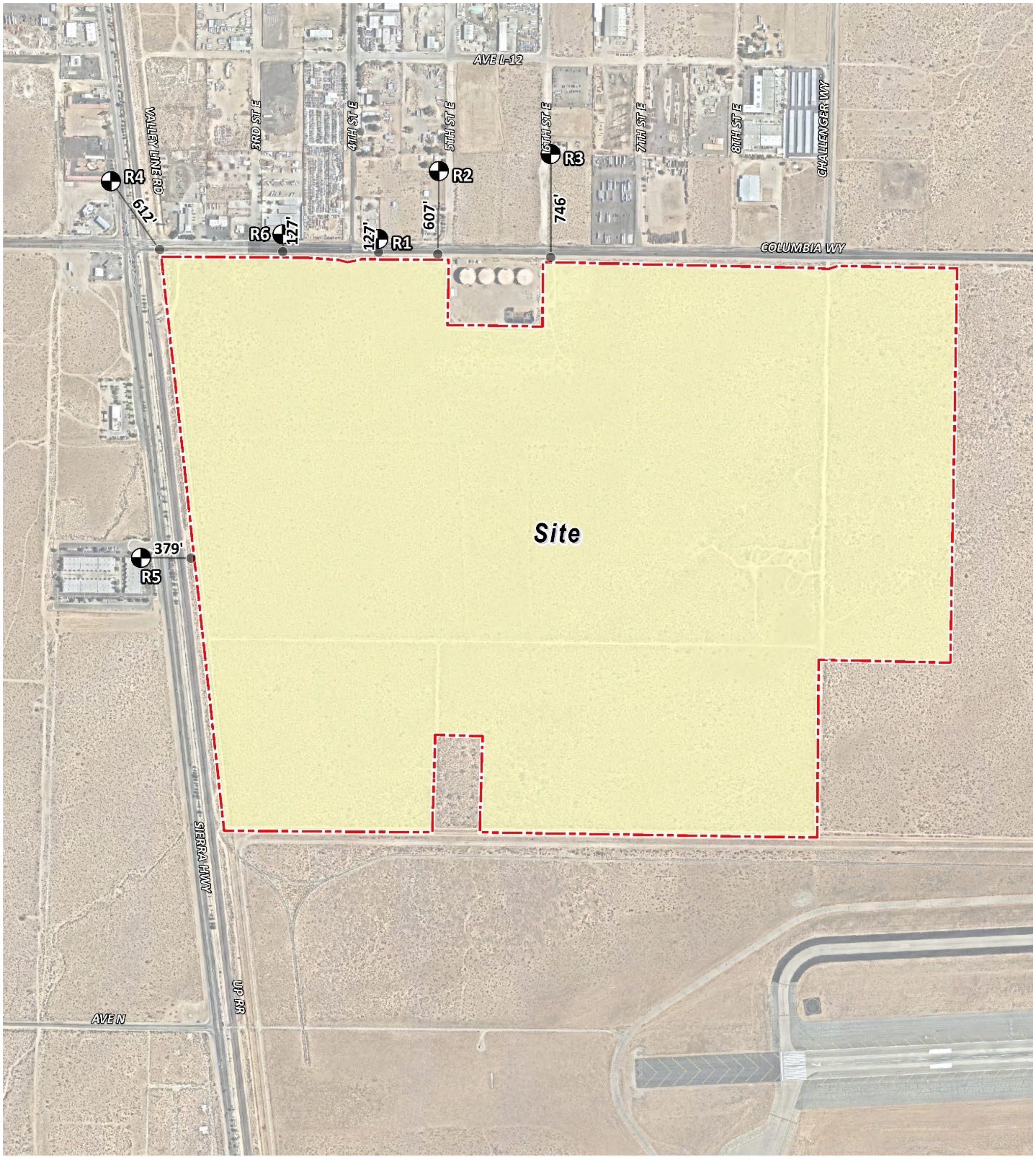
CONSTRUCTION AND OPERATIONAL IMPACTS

The land use with the greatest potential exposure to Project construction and operational DPM source emissions is Location R2. At the MEIR, without MMs AQ-1 through AQ-5, the maximum incremental cancer risk attributable to Project construction and operational DPM source emissions is estimated at 1.90 in one million, which is less than the AVAQMD threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0.

With implementation of MMs AQ-1 through AQ-5, the land use with the greatest potential exposure to Project construction and operational DPM source emissions is Location R2. At the MEIR, with mitigation the maximum incremental cancer risk is estimated at 1.45 in one million, which is less than the AVAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be ≤0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project construction and operational activity. It should be noted that the combined construction and operational risk is lower than the operational risk alone as this scenario evaluates the risk for a child that is born at the start of Project construction, exposed to construction-related emissions for the 7.61 year duration of construction activities, and is then exposed to Project operational emissions for an additional 22.31 years for a total exposure duration of 30 years. Because risk estimates for Project construction are relatively low, and exposure that occurs during the earlier years of life is more heavily weighted, the combined construction and operational risk is lower than the calculated operational only exposure risk. All other receptors during construction and operational activity would experience less risk than what is identified for this location. The nearest modeled receptors are illustrated on Exhibit 2-D.

It should be noted that for clarity purposes, the receptors presented in Exhibit 2-D do not represent all modeled receptors and instead presents the nearest receptors that would experience the highest pollutant concentrations. A total of 38 receptors extending up to 2.25 miles from the Project site were modeled in the analysis. Appendix 2.8 presents a figure detailing the locations of all receptors as modeled in AERMOD.

EXHIBIT 2-D: RECEPTOR LOCATIONS



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LEGEND:

Site Boundary · Receptor Locations · Distance from receptor to Project site boundary (in feet)

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3 REFERENCES

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3. **Urban Crossroads, Inc.** *Antelope Valley Commerce Center Air Quality Impact Analysis.* 2023.
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4 CERTIFICATIONS

The contents of this health risk assessment represent an accurate depiction of the impacts to sensitive receptors associated with the proposed Antelope Valley Commerce Center Project. The information contained in this health risk assessment report is based on the best available data at the time of preparation. If you have any questions, please contact me at (949) 660-1994.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Professionals
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Environmental Site Assessment – American Society for Testing and Materials • June 2013
Planned Communities and Urban Infill – Urban Land Institute • June 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August 2007
AB2588 Regulatory Standards – Trinity Consultants • November 2006
Air Dispersion Modeling – Lakes Environmental • June 2006

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APPENDIX 2.1:

CALEEMOD OUTPUTS

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APPENDIX 2.2:

EMFAC EMISSIONS SUMMARY

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APPENDIX 2.3:

AERMOD MODEL INPUT/OUTPUT – CONSTRUCTION WITHOUT MITIGATION

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APPENDIX 2.4:

AERMOD MODEL INPUT/OUTPUT – CONSTRUCTION WITH MITIGATION

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APPENDIX 2.5:

AERMOD MODEL INPUT/OUTPUT – OPERATIONS WITHOUT MITIGATION

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APPENDIX 2.6:

AERMOD MODEL INPUT/OUTPUT – OPERATIONS WITH MITIGATION

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APPENDIX 2.7:

RISK CALCULATIONS

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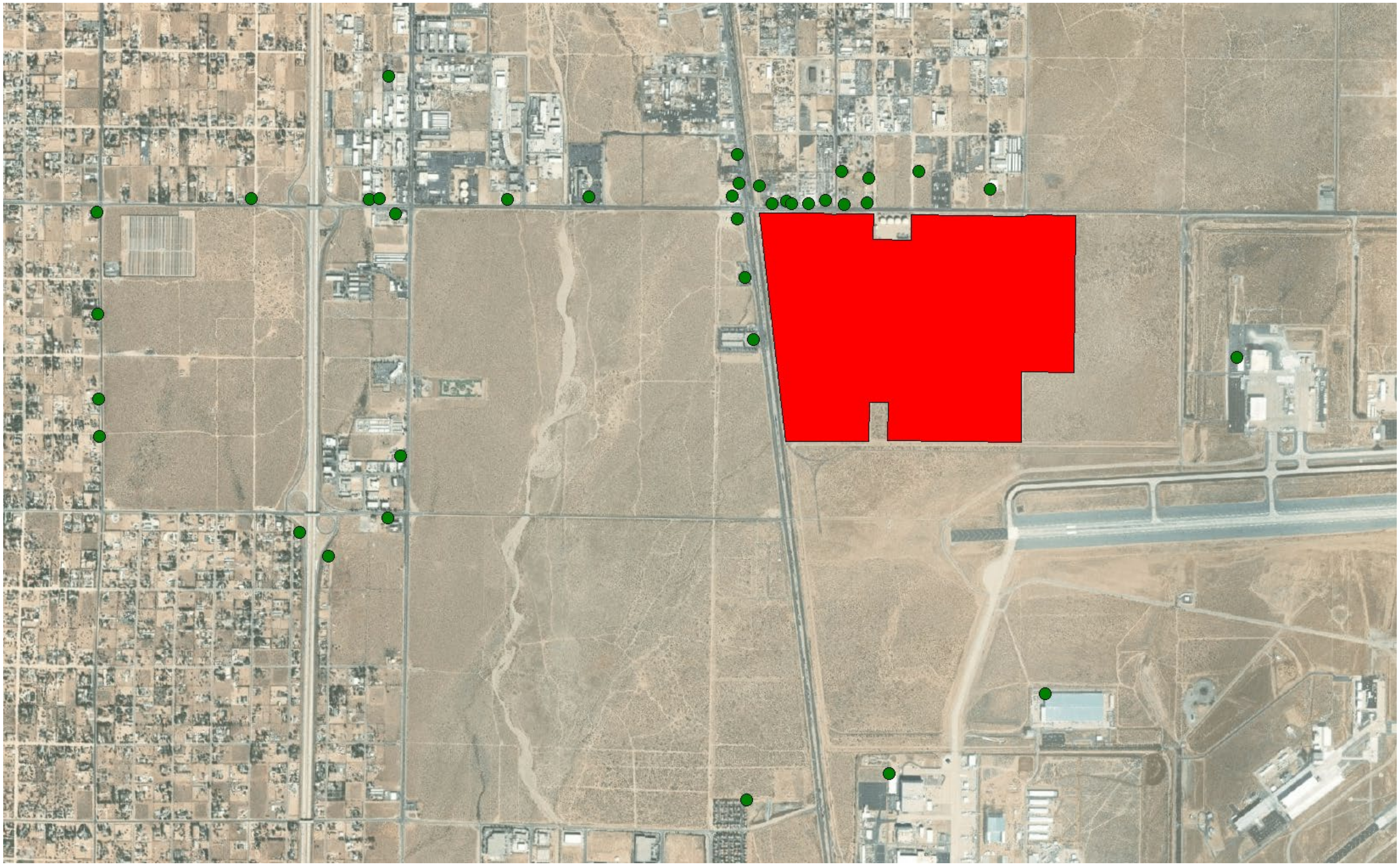
APPENDIX 2.8:

MODELED RECEPTORS



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